3. AFFECTED ENVIRONMENT

3.1 CHAPTER OVERVIEW

This chapter describes the environmental setting as it relates to the Proposed Action and alternatives. The chapter has been prepared to address the required elements of an EIS in accordance with NEPA (40 CFR 1502.15) and the Minnesota Power Plant Siting Act, and it includes information on relevant environmental resource areas identified through the scoping process in the following sections:

3.2 Aesthetics

3.3 Air Quality and Climate

3.4 Geology and Soils

3.5 Water Resources

3.6 Floodplains

3.7 Wetlands

3.8 Biological Resources

3.9 Cultural Resources

3.10 Land Use

3.11 Socioeconomics

3.12 Environmental Justice

3.13 Community Services

3.14 Utility Systems

3.15 Traffic and Transportation

3.16 Materials and Waste Management

3.17 Safety and Health

3.18 Noise

The extent of information provided in each section of this chapter is commensurate with the baseline data necessary to support the impacts analysis presented in Chapter 4.

INTENTIONALLY LEFT BLANK

3.2 AESTHETICS

This section describes the existing aesthetic attributes that may be affected by implementation of the Proposed Action. Aesthetic resources include scenic areas, such as public lands (e.g., national parks or forests), nature preserves, viewsheds, and other visual resources preserved and managed by the Federal, state, and local governments.

3.2.1 Background and Definitions

3.2.1.1 Aesthetic Definitions and Principles

Aesthetic resources addressed in this section consist of two aspects: viewsheds and scenic resources. Other aesthetic aspects, such as noise and visual haze (air quality), are addressed in other sections of this chapter. For this EIS, scenic resources are considered to be lands that are managed by Federal, state, and local governments for preservation purposes. These areas generally have inherent natural or manmade aesthetic properties that give a landscape its character and value as an environmental factor. Viewsheds are generally non-managed areas with aesthetic value. While the government does not typically protect viewshed locations, the community may still value these aesthetic qualities.

The framework for characterizing the existing conditions is derived from the Bureau of Land Management's (BLM) resource inventory system, which was designed to categorize and describe viewscapes for management and NEPA purposes (BLM, 1980). The resource inventory system is comprised of three elements, scenic quality, visual sensitivity, and visual distance:

- "Scenic quality" measures the visual appeal of the land area, and includes factors such as landform shape, vegetation, water, color, adjacent scenery, and additional cultural modifications. In essence, it describes the purity, or "pristineness," of a given viewscape;
- "Visual sensitivity" gauges the public's concern for the scenic quality. Wilderness areas with virgin forests are considered to have higher visual sensitivity than an industrial park. Publicly held lands, parks, and scenic routes would also be expected to have high visual sensitivity; and
- "Visual distance" describes the depth perspective of the view. Objects found in the foreground tend to be more predominant than ones in the distance. However, a deeper perspective provides depth and can add to the scenic quality. Therefore, elevation, tree height, and visual distance all contribute to a viewscape's visual distance.

The above criteria are used to qualitatively describe current aesthetics resources of the region. Public lands, industrial mining areas, lookout points, and lakes will be described here to provide context for the impacts analysis in Section 4.2.

3.2.1.2 Regional Setting

The Minnesotan north woods is a scenic area with rolling hills, many lakes of varying size, and large swaths of forests. The area is rural, with small towns, and a mixture of recreation cabins among permanent residences. Four-season outdoor activities are a main source of recreation and area income. Major activities in the area include fishing, water recreation, biking, operating all-terrain vehicles (ATVs) and snowmobiles, hiking, and skiing. There are numerous trails and unpaved roads within the area, which connect local villages to the deep woods. Forest views are extremely restricted during the growing seasons but extend further with the absence of leaves during the fall, winter, and early spring. Vegetation is thick and high, with an average tree height between 60 and 80 feet.

There are numerous industrial traces in the Mesabi Iron Range area, resulting from historic and active iron ore mining. An abandoned mine area consists of the mine pit and an adjacent tailings pile. Groundwater infiltrates the mining pits and generates manmade lakes and ponds. Separate mines may also be connected by water, generating long, linear lakes. Where the mine pit edge is above the water, the

slopes are very steep from the extensive local cuts. Adjacent to the mine pits are large waste rock piles from the mining activities. The tops of these tailings piles can extend up to 200 feet above the surrounding topography. They have steep slopes and sparse vegetation, and are very prominent in the landscape. Trees have begun to re-vegetate the top and slopes of some tailings piles; however, the shape and red rock are still visible from a distance. Figure 3.2-1 shows the Canisteo mine pit and a tailings pile near the West Range Site in late October 2005. The branch in the foreground is the top of a dead tree drowned by the increasing pit water height.

Figure 3.2-1. View of the Canisteo Mine Pit and Tailings Pile Looking North

3.2.2 Viewsheds

A viewshed is the land, water, and other environmental elements that are visible from a fixed vantage point. Since much of northern Minnesota is forested, most of the views are foreground to medium depth. Tall trees often adjoin roadways and population centers, restricting long-distance views. Breaks in the trees, from wetlands, lakes, or cleared areas generate the medium-range views in the area. The local topography is relatively flat, with a typical elevation variation of 200 feet. The best long-range views are from the summits of man-made tailings piles and on the ridges along the Messabe Mountain range. These areas have few trees and generally provide the height needed to see for many miles (Figure 3.2-2).

Figure 3.2-2. View from the Lind Mine Pit Tailings Pile Looking East

3.2.2.1 West Range Site and Corridors

West Range Site

The West Range Site is currently forested with shorter vegetation occurring in wetlands and along existing HVTL corridors that cross the property (Figure 3.2-3). Sections 3.10, Land Use; and 3.8, Biological Resources; describe the land use and local vegetation in more detail. The topography varies from 1,300 to 1,520 feet above sea level. There are several natural lakes that provide viewsheds within the vicinity of the West Range Site as shown in Figure 2.3-3 in Section 2.3.1.3, including Dunning Lake Holman Lake, Big Diamond Lake, and Little Diamond Lake. Many of the lakes in the area have water access through private cabins along the lakefront. The largest natural lakes in the West Range area are Trout Lake, Swan Lake, and Twin Lakes. Further discussion of the lakes is provided in Section 3.5, Water Resources.

Figure 3.2-3. View of West Range Site Looking North along HVTL (45L)

There are also numerous water-filled mine pits in the vicinity of the West Range Site. The CMP consists of a sequence of flooded mines extending from east to west. To the east, the Arcturus Mine, Hill Trumbull Mine and Hill-Annex Mine form the Gross-Marble Mine Pit (GMMP). When the pits were mined, large swaths of glacial overburden were removed, and the iron ore extracted. These cuts are still visible along the mine wall, with sheer drops of tens of feet occurring in places. Current access to the water occurs along old mining access roads and allows recreational boating to occur.

CR 7 extends north from US 169 around the west side of the West Range Site (Figure 3.2-4). This highway is screened on either side by trees and by wetlands to the west near US 169. From US 169, CR 7 extends north for approximately 25 miles and ends at Big Fork. Near Big Fork, CR 7 crosses portions of the George Washington State Forest. CR 7 is not a state or National Scenic Byway, and the designation "Scenic Highway" is considered to be a local reference.

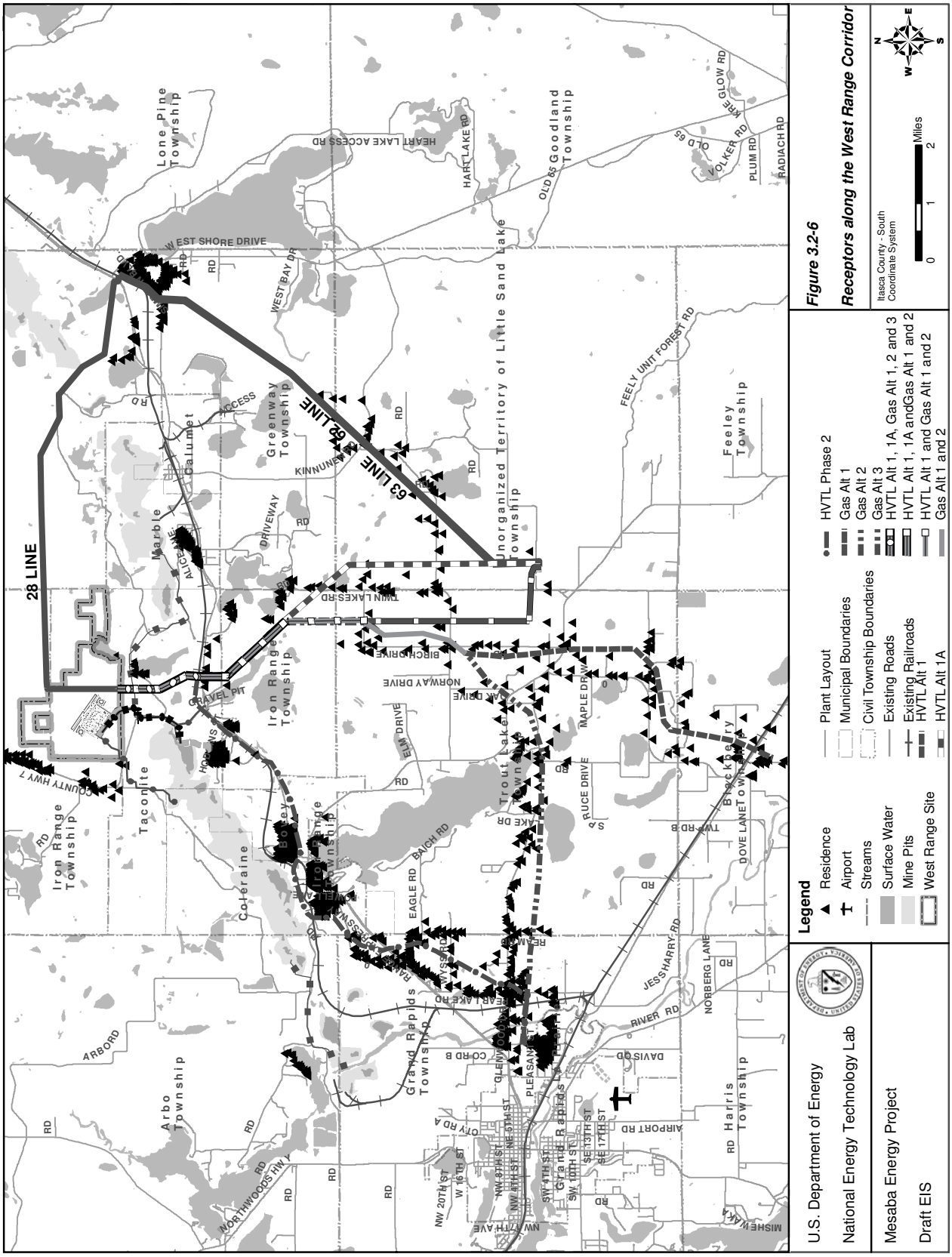
West Range Corridors

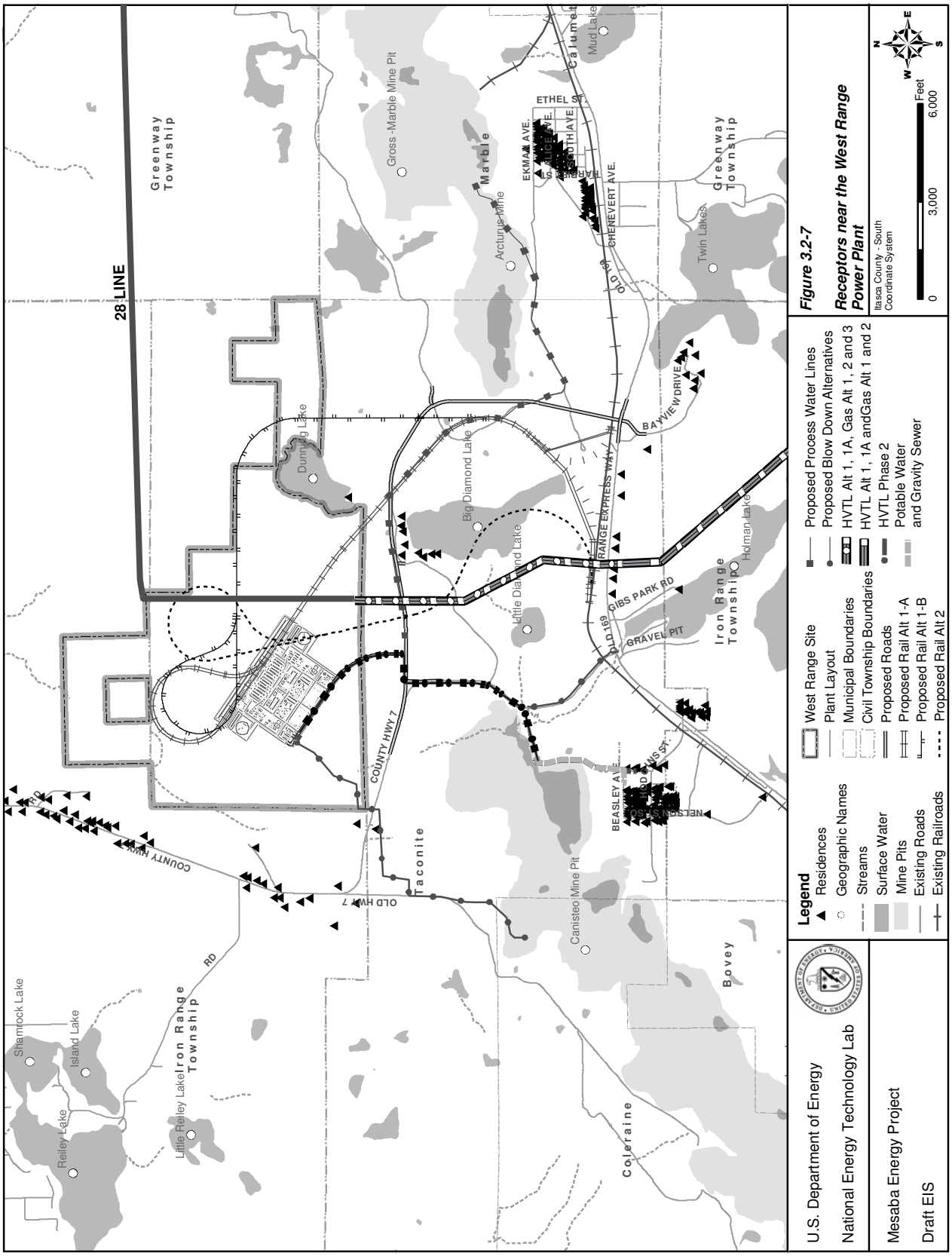
HVTL corridors for the West Range Site are described in Section 2.3.1.5 and shown in Figure 2.3-4. Where possible, HVTLs would follow existing utility corridors. In general, the existing corridors are characterized by areas of cleared/maintained low-lying vegetation bordered by forested areas (Figure 3.2-3). Surrounding forests typically screen the existing utility corridors with the exception of where they intersect roads or terminate at mine pits (Figure 3.2-4).

Figure 3.2-4. View of CR 7 Near West Range Site Looking North

The proposed rail alignments would cross Diamond Lake Road (Figure 3.2-5) and a minor unpaved road at different locations as illustrated in Figure 2.3-2. These corridors are generally comprised of undeveloped, vegetated lands except at road crossings or along areas disturbed by prior mining activities. Residential receptors near the West Range Site and associated utility and rail corridors are shown in Figure 3.2-6 and Figure 3.2-7.

Figure 3.2-5. View of Diamond Lake Road Near Potential Rail Crossing


28 LINE
63 LINE
63 LINE
Lone Pine Township
Greenway Township
Calumet
Marble
Iron Range Township
Taconite
Coleraine
Bovey
Iron Range Township
Trout Lake Township
Unorganized Territory of Little Sand Lake
Goodland Township
Feeley Township
Blackberry
Grand Rapids Township
Arbo Township
Harris Township
WEST SHORE DRIVE
HEART LAKE ACCESS RD
HART LAKE RD
OLD 65
VOLKER RD
PLUM RD
RADIACH RD
WEST BAY DR
KINNUNEN
DRIVEWAY
ACCESS
ALICE AVE
TWIN LAKES RD
BIRCH DRIVE
NORWAY DRIVE
ELM DRIVE
MAPLE DRIVE
GRAVEL PIT
HORVATH
COUNTY HWY 7
BAICH RD
EAGLE RD
RUCE DRIVE
TWP RD 8
DOVE LANE
JESSHARRY RD
NORBERG LANE
RIVER RD
DAVIS RD
AIRPORT RD
ARBORD
CO RD B
NORTHWOODS HWY
NW 20TH ST
W 16TH ST
NW 8TH ST
NE 6TH ST
NW 4TH ST
SW 4TH ST
SW 10TH ST
SE 13TH ST
SE 17TH ST
NW 7TH AVE
MISSHE WAKA
FEELY UNIT FOREST RD
Legend
Residence
Airport
Streams
Surface Water
Mine Pits
West Range Site
Plant Layout
Municipal Boundaries
Civil Township Boundaries
Existing Roads
Existing Railroads
HVTL Alt 1
HVTL Alt 1A
HVTL Phase 2
Gas Alt 1
Gas Alt 2
Gas Alt 3
HVTL Alt 1, 1A, Gas Alt 1, 2 and 3
HVTL Alt 1, 1A andGas Alt 1 and 2
HVTL Alt 1 and Gas Alt 1 and 2
Gas Alt 1 and 2
Figure 3.2-6
Receptors along the West Range Corridor
Itasca County - South
Coordinate System
0
1
2
Miles
N
E
S
W
U.S. Department of Energy
National Energy Technology Lab
Mesaba Energy Project
Draft EIS


28 LINE
Greenway Township
Marble
Gross-Marble Mine Pit
Arcturus Mine
Calumet
Mud Lake
Twin Lakes
Holman Lake
Dumbbell Lake
Big Diamond Lake
Little Diamond Lake
Iron Range Township
Taconite
Canisteo Mine Pit
Bovey
Coleraine
Shamrock Lake
Island Lake
Reiley Lake
Little Reiley Lake
ETHEL ST.
EKMAN AVE.
ALICE AVE.
SOUTH AVE.
HARRIS ST.
CHENEVERT AVE.
OLD HWY 7
BAYVIEW DRIVE
RANGE EXPRESS WAY
GIBS PARK RD
OLD 169
GRAVEL PIT
COUNTY HWY 7
BEASLEY AVE.
HOLMAN ST.
NELSON ST.
Legend
Residences
Geographic Names
Streams
Surface Water
Mine Pits
Existing Roads
Existing Railroads
West Range Site
Plant Layout
Municipal Boundaries
Civil Township Boundaries
Proposed Roads
Proposed Rail Alt 1-A
Proposed Rail Alt 1-B
Proposed Rail Alt 2
Proposed Process Water Lines
Proposed Blow Down Alternatives
HVTL Alt 1, 1A, Gas Alt 1, 2 and 3
HVTL Alt 1, 1A andGas Alt 1 and 2
HVTL Phase 2
Potable Water and Gravity Sewer
U.S. Department of Energy
National Energy Technology Lab
Mesaba Energy Project
Draft EIS
Figure 3.2-7
Receptors near the West Range Power Plant
Itasca County - South Coordinate System
0
3,000
6,000
Feet
N
E
S
W

3.2.2.2 East Range Site and Corridors

East Range Site

The East Range Site is located in an area characterized by active mining operations and undeveloped forest (Figure 3.2-8). The immediate area around the East Range Site slopes to the southeast towards wetlands and the northern border of Colby Lake. Sections 3.10, Land Use; and 3.8, Biological Resources; describe the land use and local vegetation in more detail. Area elevations range from 1,450 to 1,500 feet above sea level. Mine tailings piles exist in two locations near the proposed site. The closest is approximately 300 feet west of the East Range Site. The other is approximately one mile northeast of CR 666. Minnesota Power's Syl Laskin Energy Center, a coal-fired power plant, is located approximately 2 miles south of the East Range Site. The Syl Laskin exhaust stack is currently visible to the Hoyt Lakes population.

Two lakes are located within the vicinity of the proposed East Range Site. Colby Lake and Whitewater Lake are located directly south of the East Range Site. Numerous four-season residences are located on the shores of the lakes. There are no residences immediately north of the East Range Site due to active mining operations by CE.

Elongated bedrock mountains are located to the north-northwest of the eastern portion of the Mesabi Iron Range (including the towns of Biwabik, Aurora, and Hoyt Lakes). Embarrass Mountain is located approximately 4 miles to the northwest of the East Range Site, rising 1,940 feet above sea level. There are several lookout towers and a commercial skiing resort located on these mountains. The Giants Ridge Ski Area (1,844 feet above sea level) is located directly west of Embarrass Mountain.

Figure 3.2-8. View of East Range Site from Tailings Pile Looking East

East Range Corridors

The Mesabi Iron Range stretches north of the HVTL corridors and has topographic heights extending 500 feet above the surrounding area. The Messabe Mountain near Gilbert reaches an elevation of 1,840 feet above mean sea level. Farther north, Pike Mountain and Lookout Mountain have summit elevations of approximately 1,930 and 1,860 feet above mean sea level, respectively. Lookout stations on the summits provide views of the surrounding area. Alternative rail alignments and access roads would enter the East Range Site from the south through an area of forested land. Residential receptors near the East Range Site and associated utility and rail corridors are shown in Figure 3.2-9 and Figure 3.2-10.

3.2.3 Scenic Resources

There are many types of public land in northern Minnesota. Federal lands include National Parks, Forests, and Indian Reservation Lands. The Minnesota Department of Natural Resources (MNDNR) manages 90 percent of the state-owned lands, which include state parks and forests, wildlife management areas, scientific and natural areas, and state recreation areas (Minnesota State Legislature, 2006). These areas are used for a variety of purposes, including silviculture, recreation, and scientific study. Figure 3.2-11 shows the State Parks and other public lands in northern Minnesota. Certain state forests, such as Bowstring and Blackduck, are part of national forests (e.g., Chippewa National Forest). Public lands around the West and East Range locations are discussed in respective sections below. The Mesabi Trail, owned by the St. Louis and Lake Counties Regional Railroad Authority, extends 130 miles from Grand Rapids east to Winton along US 169 and SR 135, offering a wooded path for hiking, biking, skating, skiing, snow-shoeing, and limited snow-mobiling.

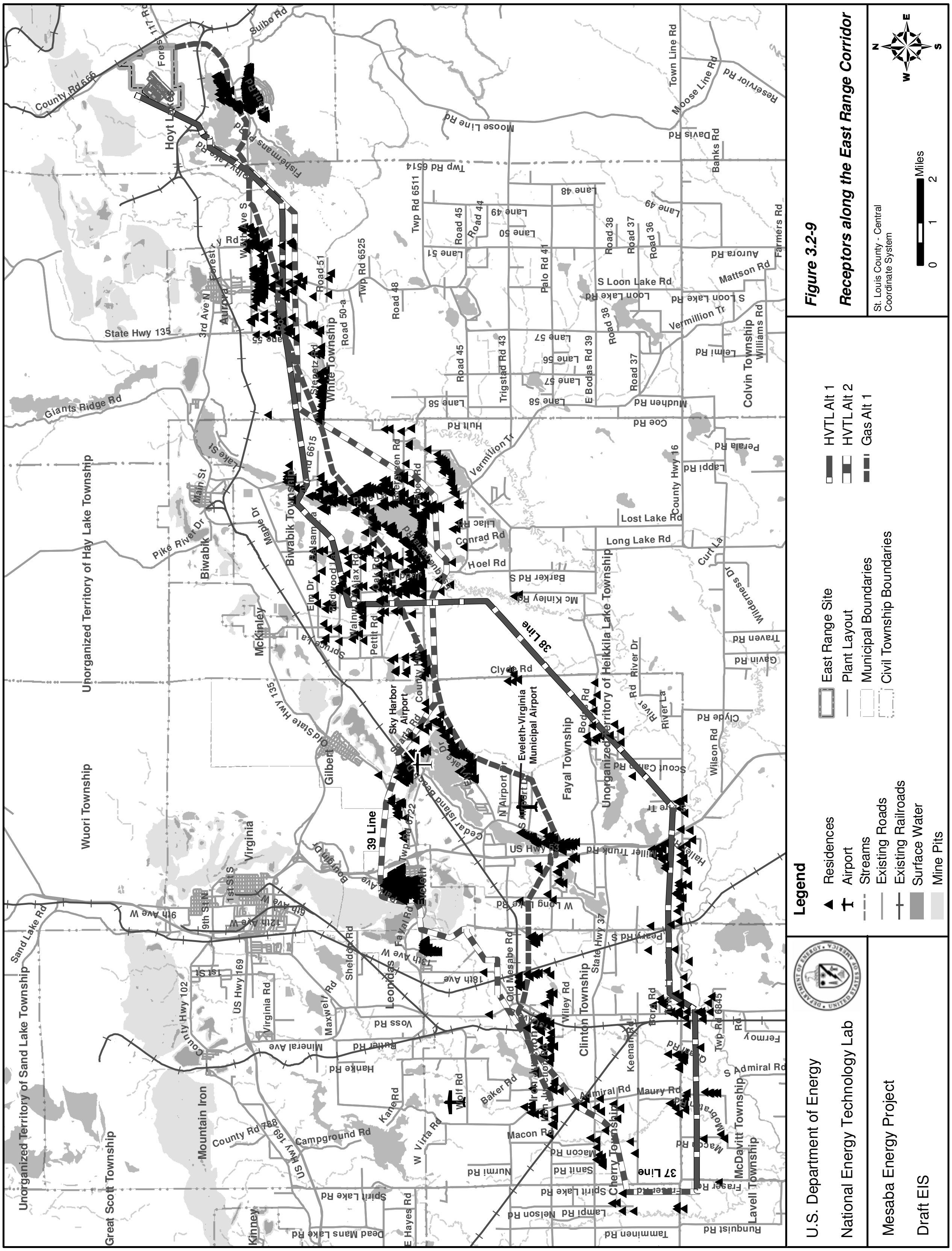
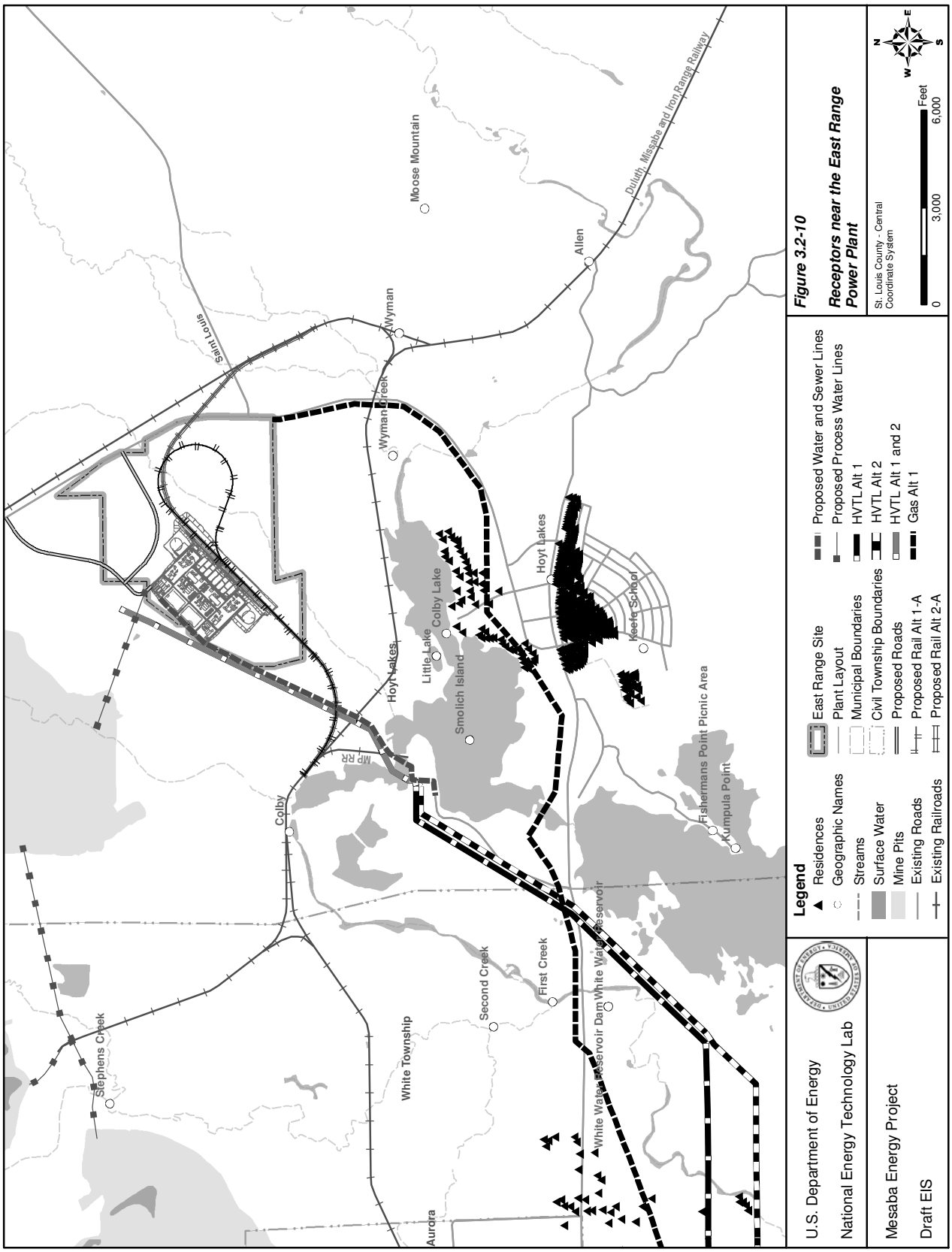
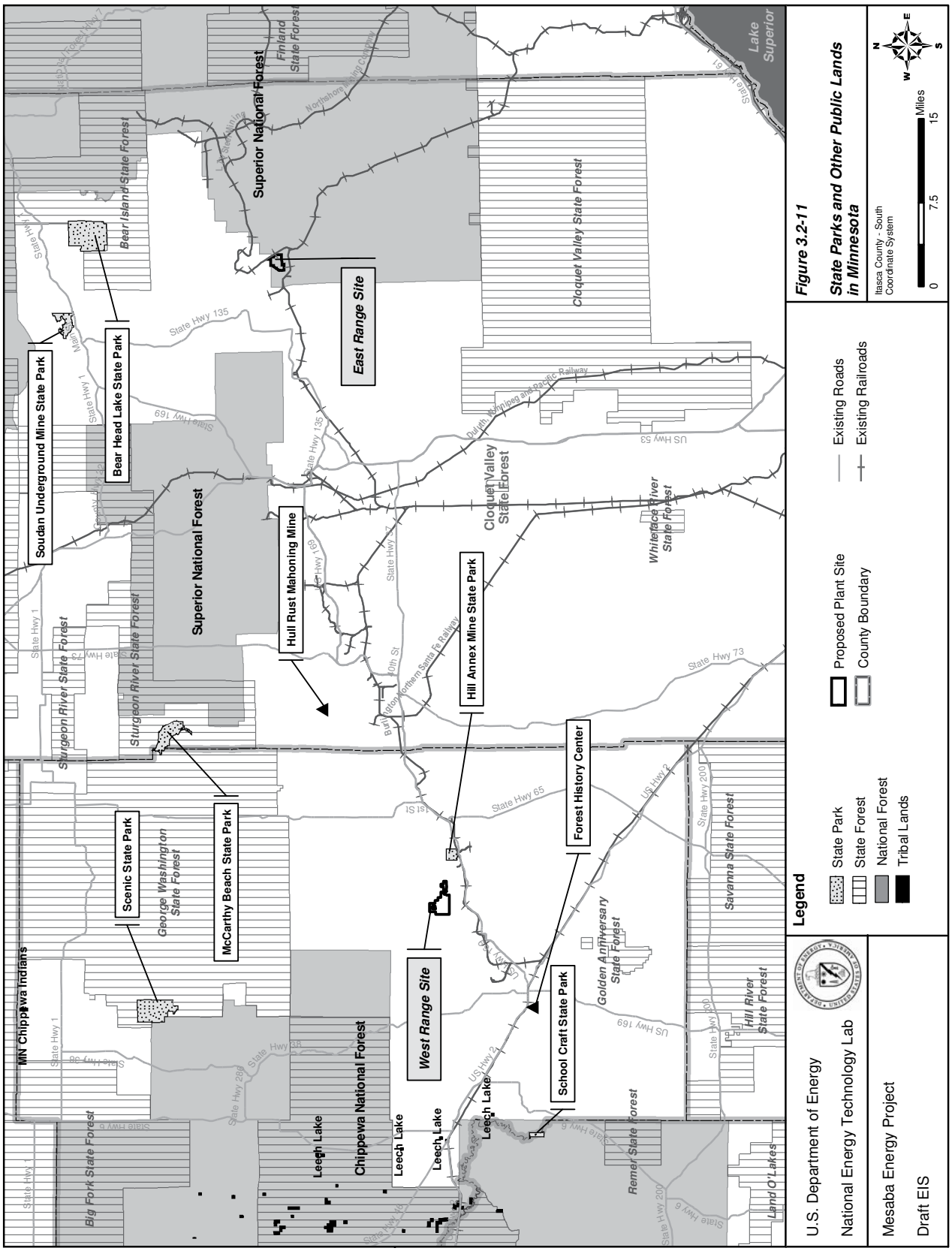


Figure 3.2-9
Receptors along the East Range Corridor
St. Louis County - Central Coordinate System
0 1 2 Miles
Legend
Residences
Airport
Streams
Existing Roads
Existing Railroads
Surface Water
Mine Pits
East Range Site
Plant Layout
Municipal Boundaries
Civil Township Boundaries
HVTL Alt 1
HVTL Alt 2
Gas Alt 1
U.S. Department of Energy
National Energy Technology Lab
Mesaba Energy Project
Draft EIS
38 Line
39 Line
37 Line
Biwabik Township
White Township
Fayal Township
Clinton Township
Colvin Township
McDavitt Township
Cherry Township
Lavell Township
Wuori Township
Great Scott Township
Unorganized Territory of Hay Lake Township
Unorganized Territory of Sand Lake Township
Unorganized Territory of Heikkila Lake Township
Eveleth-Virginia Municipal Airport
Sky Harbor Airport
Virginia
Gilbert
Eveleth
Leonidas
McKinley
Biwabik
Aurora
Hoyt Lakes
Mountain Iron
Kinney


Moose Mountain
Allen
Duluth, Missabe and Iron Range Railway
St. Louis
Wyman
Wyman Creek
Hoyt Lakes
Colby Lake
Little Lake
Smolich Island
Keefer School
MP RR
Colby
Fishermans Point Picnic Area
Kumpula Point
White Water Reservoir Dam
White Water Reservoir
First Creek
Second Creek
White Township
Stephens Creek
Aurora
Legend
Residences
Geographic Names
Streams
Surface Water
Mine Pits
Existing Roads
Existing Railroads
East Range Site
Plant Layout
Municipal Boundaries
Civil Township Boundaries
Proposed Roads
Proposed Rail Alt 1-A
Proposed Rail Alt 2-A
Proposed Water and Sewer Lines
Proposed Process Water Lines
HVTL Alt 1
HVTL Alt 2
HVTL Alt 1 and 2
Gas Alt 1
U.S. Department of Energy
National Energy Technology Lab
Mesaba Energy Project
Draft EIS
Figure 3.2-10
Receptors near the East Range Power Plant
St. Louis County - Central Coordinate System
0
3,000
6,000
Feet
N
E
S
W


Soudan Underground Mine State Park
Bear Head Lake State Park
Superior National Forest
Finland State Forest
Lake Superior
Bear Island State Forest
East Range Site
Cloquet Valley State Forest
Sturgeon River State Forest
Hull Rust Mahoning Mine
Whiteface River State Forest
Hill Annex Mine State Park
Scenic State Park
George Washington State Forest
McCarthy Beach State Park
Forest History Center
West Range Site
School Craft State Park
Golden Anniversary State Forest
Savanna State Forest
Hill River State Forest
MN Chippewa Indians
Chippewa National Forest
Leech Lake
Big Fork State Forest
Remer State Forest
Land O'Lakes
State Hwy 1
State Hwy 135
State Hwy 73
State Hwy 65
State Hwy 200
State Hwy 169
US Hwy 2
US Hwy 53
Duluth, Winnipeg and Pacific Railway
Burlington Northern Santa Fe Railway
10th St
1st St
Legend
State Park
State Forest
National Forest
Tribal Lands
Proposed Plant Site
County Boundary
Existing Roads
Existing Railroads
Figure 3.2-11
State Parks and Other Public Lands in Minnesota
Itasca County - South
Coordinate System
0
7.5
15
Miles
N
E
S
W
U.S. Department of Energy
National Energy Technology Lab
Mesaba Energy Project
Draft EIS

3.2.3.1 West Range Site and Corridors

West of Grand Rapids, large portions of land are part of the Chippewa National Forest. The Chippewa National Forest also includes the Leech Lake Indian Reservation. The Hill Annex Mine State Park is located to the east of the West Range Site. This state park features the mining history of the area, demonstrates mining equipment and operations, and provides views of flooded mine pits and surrounding lands from the top of the tailings piles. The Forest History Center features the north woods foresting and silviculture history. The center includes a 100-foot fire tower and a living history museum. Other state parks and forests are located 20 to 30 miles away from the West Range Site and potential corridors. Locally, Holman Lake provides a public recreation and swimming area within 2 miles south of the site. Table 3.2-1 lists some of the public lands and reservations in relation to the West Range Site. Section 3.10 also describes the publicly owned lands in the area.

Table 3.2-1. Public Lands in the Vicinity of the West Range

Name	Approximate Distance from the Site (miles)[1]	Location in relation to the Site
Hill Annex Mine State Park	5	Southeast
Forest History Center	15	Southeast
Chippewa National Forest	Closest edge is 20 miles	West-Northwest
Leech Lake Reservation	20	West
Golden Anniversary Sate Forest	20	Southwest
School Craft State Park	22	Southwest
George Washington State Forest	27	Northwest
Scenic State Park	26	Northwest

Note: [1]These sites are located outside of the 2-mile region of influence.

3.2.3.2 East Range Site and Corridors

The East Range Site is located adjacent to an active iron ore mining operation. The Syl Laskin Energy Center is also located south of the proposed East Range Site. A public landing and picnic spot, known as Birch Cove, is located on the southern border of Colby Lake overlooking the Syl Laskin plant (Figure 3.2-12).

Figure 3.2-12. View of Syl Laskin Energy Center from Birch Cove Park Looking North

Portions of the Superior National Forest are adjacent to Hoyt Lakes and a portion extends in to the city limits, and extends further north, south, and east. As an extension of the Superior National Forest, the Superior National Forest Scenic Byway extends from Aurora, through Hoyt Lakes, and along State Route 16 to Silver Bay at Lake Superior's north shore. The scenic byway is considered to be a scenic, rural passage through pine forests and the Mesabi iron mining towns (Explore Minnesota, 2006). Aside from the Superior National Forest, two other state parks are located within 30 miles of the East Range Site, as shown in Table 3.2-2. Section 3.10 describes the publicly owned land surrounding the East Range Site and corridors.

Table 3.2-2. Public Lands in the Vicinity of the East Range

Name	Approximate Distance from the Site (miles)	Location in relation to the Site
Superior National Forest	<1	East
Bear Head Lake State Park	16	North
Soudan Underground Mine State Park	20	Northwest

INTENTIONALLY LEFT BLANK

3.3 AIR QUALITY AND CLIMATE

This section describes the overall air quality within the region. Air quality is determined by the type and amount of pollutants emitted into the atmosphere, the size and topography of the air basin, and the prevailing meteorological conditions. The emissions from the Mesaba Generating Station (combined Phase I and II), except for particulate matter – 10 microns (PM_{10}), would be independent of the site selected.

3.3.1 Sensitive Air Quality Receptors

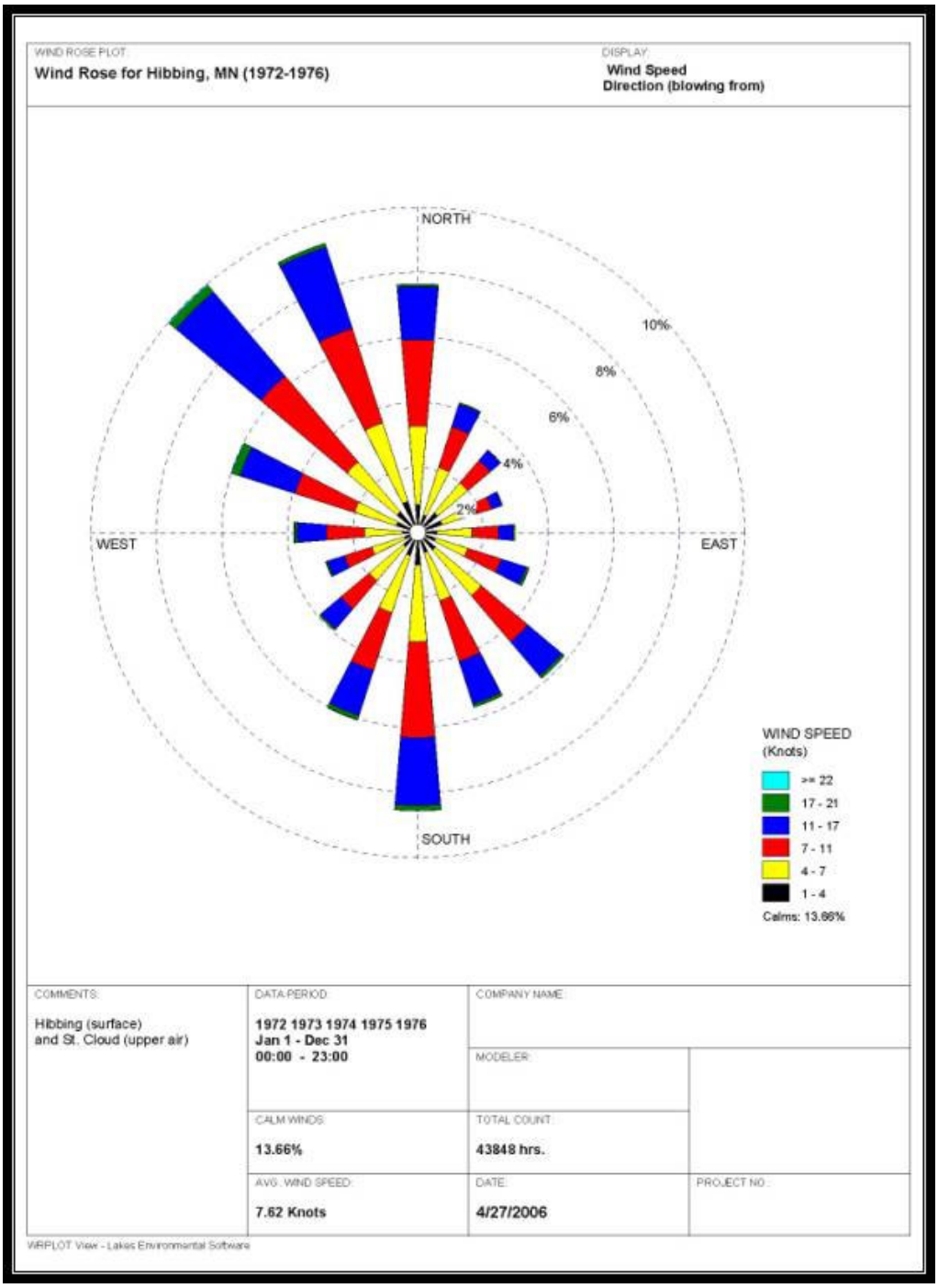
For the purposes of air quality analysis, any area to which the general public has access is considered a sensitive receptor, and includes residences, day care centers, educational and health facilities, places of worship, parks, and playgrounds. An Air Emission Risk Assessment (AERA) was conducted to assess whether air emissions from the Mesaba Energy Project could pose an unacceptable health risk to nearby residents (see Section 4.17).

The closest residence to the power plant footprint in the West Range Site is located 1.1 kilometers (0.7 miles) away. A farm is located approximately 1.7 kilometers (1.1 miles) west-southwest of the power plant footprint on the West Range Site. For the East Range Site, the nearest residences are located about one mile directly south of the Mesaba IGCC Power Plant Combustion Turbine Generator/Heat Recovery Steam Generator (CTG/HRSG) stack, in the City of Hoyt Lakes. There are no other significant receptors, such as schools, daycare centers, recreation centers, playgrounds, nursing homes or hospitals located within this distance. The primary emission point from either site will be the flare and CTG/HRSG stack. The closest residence to the flare and CTG/HRSG stack emission points on the East Range Site is located about 1.9 kilometers (1.2 miles) and 2.6 kilometers (1.4 miles) away, respectively.

3.3.2 Local and Regional Climate

Minnesota has a continental-type climate and is subject to frequent occurrences of continental polar air throughout the year, with occasional Arctic occurrence during the cold season. Occasional periods of prolonged heat occur during summer, particularly in the southern portion when warm air pushes northward from the Gulf of Mexico and the southwestern United States. Pacific Ocean air masses that move across the western United States produce comparatively mild and dry weather at all seasons (MCWG, 2006). Prevailing winds are from the northwest (approximately 10 percent of the observations) and the north-northwest (9 percent of the observations) at between 7 to 17 knots (8 to 20 miles per hour). Southerly winds occur in just over eight percent of the observations. Figure 3.3-1 provides a wind rose based on five years of hourly meteorological data (1972–1976) from Hibbing, Minnesota (surface) (MNDNR, 2006a). This wind rose is applicable to both the West Range and East Range sites.

Temperatures throughout the year are highly variable, with extremes ranging from 114°F to negative 60°F. Average temperatures range from 5.7°F in January to 67.4°F in July. From December through February, the maximum temperature is below 32°F for an average of 24 days per month. During the summer, the maximum temperature exceeds 90°F for an average of five to six days a year. Mean annual precipitation is 34 inches in southeast Minnesota and 19 inches in the northwest portion of the state. The number of days with precipitation per month varies from seven days in February to 13 days in June, with approximately two-thirds of the annual precipitation occurring between August and December.



Source: MNDNR, 2006a

Figure 3.3-1. Wind Rose Data at Hibbing, Minnesota

The area receives an average of approximately 56 inches of snow annually. Snow cover of one inch or more over Minnesota occurs on an average of about 110 days annually, ranging from 85 days in the south to 140 days in the north. Due to the abundance of small lakes in the region, fog is likely to form on and around the lakes during clear, calm conditions in the evening and early morning. Persistent fogging at either the West Range Site or the East Range Site is unlikely (MnDOT, 2006a).

3.3.3 Local and Regional Air Quality

The Clean Air Act (CAA) requires that the EPA establish National Ambient Air Quality Standards (NAAQS). Accordingly, EPA developed primary and secondary ambient air quality standards for six criteria pollutants. These pollutants are SO_2, CO, ozone (O_3), nitrogen dioxide (NO_2), lead (Pb), and inhalable particulates, which are also known as respirable particulate matter (PM). The PM_{10} standard covers particles with diameters of 10 micrometers or less and the $PM_{2.5}$ standard covers particulates with diameters of 2.5 micrometers or less. The NAAQS are expressed as concentrations of the criteria pollutants in the ambient air; that is, in the outdoor air to which the general public has access [40 CFR 50.1(e)]. Primary standards are set to protect the public health, including the health of sensitive populations such as asthmatics, children, and the elderly. Secondary standards are set to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

The Minnesota Pollution Control Agency (MPCA), which is responsible for monitoring air quality for each of the criteria pollutant and assessing compliance, has also promulgated rules governing ambient air quality in the State of Minnesota. These rules, codified in Minnesota Rules 7009.00800, further regulate concentrations of the criteria pollutants and include standards for H_2S and total suspended particulate matter (TSP). Table 3.3-1 lists the NAAQS and Minnesota Ambient Air Quality Standards (MAAQS).

Table 3.3-1. National and Minnesota Ambient Air Quality Standards

Pollutant	Averaging Period	Standard Value		Standard Type[(1)]	Notes
Carbon Monoxide	8-Hour	9 ppm	10 mg/m^3	Primary	Maximum concentration not to be exceeded more than once per year.
	1-Hour	35 ppm	40 mg/m^3	Primary	
	1-Hour [(2)]	30 ppm	35 mg/m^3	Primary and Secondary	
Nitrogen Dioxide	Annual Arithmetic Mean	0.05 ppm	100 µg/m^3	Primary and Secondary	Maximum annual arithmetic mean.
Ozone	8-Hour	0.08 ppm	235 µg/m^3	Primary and Secondary	Daily maximum 8-hour average.
Lead	Quarterly		1.5 µg/m^3	Primary and Secondary	Maximum arithmetic mean averaged over a calendar quarter.
Total Suspended Particulate (TSP) [(2)]	Annual Geometric Mean		75 µg/m^3	Primary	Maximum annual geometric mean.
			60 µg/m^3	Secondary	
	24-Hour		260 µg/m^3	Primary	Maximum concentration not to be exceeded more than once per year.
			150 µg/m^3	Secondary	
PM_{10}	Annual Arithmetic Mean [(3)]		50 µg/m^3	Primary and Secondary	Maximum annual arithmetic mean.
	24-Hour		150 µg/m^3	Primary and Secondary	Not to be exceeded more than once per year on average over 3 years.

Table 3.3-1. National and Minnesota Ambient Air Quality Standards

Pollutant	Averaging Period	Standard Value		Standard Type[1]	Notes
$PM_{2.5}$	Annual Arithmetic Mean		15 µg/m^3	Primary and Secondary	Not to exceed the 3-year average of the weighted annual mean concentrations.
	24-Hour		35 µg/m^3	Primary and Secondary	Not to exceed the 3-year average of the 98th percentile of 24-hour concentrations.
Sulfur Dioxide	Annual Arithmetic Mean	0.03 ppm	80 µg/m^3	Primary	Maximum annual arithmetic mean.
		0.02 ppm	60 µg/m^3	Secondary [2]	
	24-Hour	0.14 ppm	365 µg/m^3	Primary and Secondary	Maximum concentration not to be exceeded more than once per year.
	3-Hour	0.5 ppm	1,300 µg/m^3	Primary and Secondary [4]	
	3-Hour [5]	0.35 ppm	915 µg/m^3	Secondary	
	1-Hour [2]	0.5 ppm	1,300 µg/m^3	Primary	
Hydrogen Sulfide [2]	½-Hour	0.05 ppm	70 µg/m^3	Primary	½-Hour average not to be exceeded over 2 times per year.
	½-Hour	0.03 ppm	42 µg/m^3	Primary	½-Hour average not to be exceeded over 2 times in any 5 consecutive days.

(1) Primary standards set limits to protect human health; Secondary standards set limits to protect public welfare (i.e., decreased visibility; damage to animals, vegetation)
(2) Minnesota State Ambient Air Quality Standard only.
(3) Due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution, the EPA revoked the annual PM_{10} standard (effective December 17, 2006). However, it is still reflected in the State of Minnesota's regulations.
(4) Secondary standard for Air Quality Control Regions 128, 131, and 133
(5) For Air Quality Control Regions 127, 129, 130, and 132
Source: EPA, 2006a and MPCA, 2006a

3.3.3.1 Air Quality Management Plan

Attainment status for NAAQS is determined primarily by evaluating data from ambient air quality monitoring stations. The MCPA conducts ambient air quality monitoring throughout the state. Currently, there are no nonattainment areas in Minnesota. Attainment means air quality in the county meets the standards. An "unclassified" status means that no data exists that demonstrates non-compliance. The West Range Site and the East Range Site are located in Itasca and St. Louis counties, respectively. Monitoring results from the closest monitors to Itasca and St. Louis Counties are shown in Table 3.3-2. The two counties are in close proximity of each other and the monitoring sites are within the region of influence for both potential project sites.

The table includes the average ambient air concentrations over the past three years (2002-2005) for each pollutant and averaging period. Based on the monitored data, Itasca and St. Louis Counties are designated attainment or unclassified for each of the standards.

Table 3.3-2. Monitored Background Concentrations

Pollutant	Averaging Period	Monitored Background Concentration	Standard Value	Standard Type	Monitoring Station
Carbon Monoxide	8-Hour	1.6 ppm	9 ppm	Primary	314 West Superior Street, Duluth
	1-Hour	3.3 ppm	35 ppm 30 ppm(1)	Primary Primary and Secondary	314 West Superior Street, Duluth
Nitrogen Dioxide	Annual	0.004 ppm	0.05 ppm	Primary and Secondary	Carlton County
Ozone	8-Hour	0.066 ppm	0.08 ppm	Primary and Secondary	Voyageurs National Park
Lead	Quarterly	0.01 µg/m^3	1.5 µg/m^3	Primary and Secondary	Virginia City Hall
Total Suspended Particulate (TSP) (1)	Annual	16 µg/m^3	75 µg/m^3 60 µg/m^3	Primary Secondary	Virginia City Hall
	24-Hour	35.7 µg/m^3	260 µg/m^3 150 µg/m^3	Primary Secondary	Virginia City Hall
PM_{10} (2)	Annual	16 µg/m^3	50 µg/m^3	Primary and Secondary	Virginia City Hall
	24-Hour	35.7 µg/m^3	150 µg/m^3	Primary and Secondary	Virginia City Hall
$PM_{2.5}$	Annual	6.1 µg/m^3	15 µg/m^3	Primary and Secondary	Virginia City Hall
	24-Hour	19 µg/m^3	35 µg/m^3	Primary and Secondary	Virginia City Hall
Sulfur Dioxide	Annual	0.001 ppm	0.03 ppm 0.02 ppm (1)	Primary Secondary	Rosemount, MN
	24-Hour	0.005 ppm	0.14 ppm	Primary and Secondary	Rosemount, MN
	3-Hour	0.010 ppm	0.5 ppm 0.35 ppm	Primary and Secondary (3) Secondary (4)	Rosemount, MN
	1-Hour	0.019 ppm	0.5 ppm (1)	Primary	Rosemount, MN

(1) Minnesota State Ambient Air Quality Standard only.
(2) The EPA revoked the annual PM_{10} standard (effective December 17, 2006). However, it is still reflected in the State of Minnesota's regulations.
(3) Secondary standard for Air Quality Control Regions 128, 131, and 133
(4) For Air Quality Control Regions 127, 129, 130, and 132
Source: Excelsior, 2006b

3.3.3.2 Class I Areas

In addition to the NAAQS, national air quality standards exist for the Prevention of Significant Deterioration (PSD). The PSD requirements provide maximum allowable increases (expressed as increments) in concentrations of pollutants for areas that are already in compliance with the NAAQS. Allowable PSD increments currently exist for three pollutants, SO_2, NO_2, and PM_{10}. One set of allowable increments exists for Class II areas, which covers most of the United States and another set of more stringent allowable increments exists for Class I areas, which include many national parks and monuments, wilderness areas, and other areas as specified in 40 CFR 51.166(e). The allowable PSD increments are shown in Table 3.3-3.

Under the Clean Air Act, a **Class I area** is one in which only a small amount of new pollution is allowed. These areas include national parks, wilderness areas, monuments, and other areas of special national and cultural significance. **Class II areas** include all other clean air regions and allow moderate pollution increases.

Table 3.3-3. Allowable PSD Increments

Pollutant, averaging period	Allowable Increment (µg/m^3)	
	Class I Area	Class II Areas
SO_2, 3-Hour	25	512
SO_2, 24-Hour	5	91
SO_2, Annual	2	20
NO_X, Annual	2.5	25
PM_{10}, 24-Hour	8	30
PM_{10}, Annual	4	17

Source: 40 CFR 51.166(e), 2006

In addition to complying with the more stringent allowable PSD increments, proposed projects that are within 100 kilometers (62 miles) of Class I areas must evaluate impacts of the project on air quality related values (AQRVs) such as visibility, flora/fauna, water quality, soils, odor, and any other resources specified by the Federal Land Manager (FLM) (NPS, 2006). The closest Class I areas to the proposed Mesaba Energy Project sites include two areas administered by the USFS (the BWCAW and Rainbow Lakes Wilderness Area [RLW], located in northwestern Wisconsin); and two national parks (VNP and Isle Royale National Park [IRNP], located in Michigan). The distance from the proposed sites to the Class I areas are provided in Table 3.3-4.

Table 3.3-4. Distances to Class I Areas

Class I Area	Distance from West Range Site (kilometers (miles))	Distance from East Range Site (kilometers (miles))
BWCAW	100 (62)	40 (25)
VNP	120 (75)	90 (60)
RLW	190 (118)	170 (106)
IRNP	>300 (186)	>200 (124)

The West Range Site and East Range Site are similar regarding air quality; however the East Range Site is considerably closer to the Class I areas than the West Range Site.

3.3.3.3 Visibility and Regional Haze

In 1999, the EPA established the Regional Haze Program to improve visibility and air quality in national parks and wildlife areas. As part of this program, a network of monitors was set up by the Interagency Monitoring of Protected Visual Environments (IMPROVE) program to continuously record visibility and aerosol conditions for the protection of visibility in Class I areas. Specifically, these monitors record concentrations of ammonium sulfate, ammonium nitrate, coarse particulate matter, and variables to determine extinction coefficients and deciviews to measure visibility. The 1999 Regional Haze Program identifies certain older emission sources that have not been regulated under other provisions of the Clean Air Act. Those older sources that could contribute to visibility impairment in Class I areas may be required to install Best Available Retrofit Technology (BART).

Class I areas in northeastern Minnesota, that have monitors under the Regional Haze Program are located in the BWCAW near Ely and at VNP. Minnesota must submit to EPA a Regional Haze State Implementation Plan (SIP) by December 2007. The Regional Haze SIP must identify sources that cause or contribute to visibility impairment in these areas and must also include a demonstration of reasonable progress toward reaching the 2018 visibility goal for each of the state's Class I areas. Because the Mesaba Generating Station would be a new facility, it would not have to meet the BART requirement. However, to achieve reasonable progress toward the 2018 visibility goal, Minnesota may need to implement control measures on other sources (including new sources) in addition to BART and ensure that they do not hinder attainment of visibility goals. Any future control strategies on newer facilities, that the MPCA implements, would affect the Mesaba Generating Station. Currently, a new source of criteria and air toxics emissions is required to assess impacts to Class I areas visibility under the NEPA and PSD regulations. Section 4.3 addresses the impacts of the Mesaba Energy Project on Class I areas.

3.3.4 Pertinent Air Quality Regulations

Local, state, and Federal air quality regulations were reviewed to determine their applicability to the proposed Mesaba Energy Project. The CAA is the basis for Federal statutes and regulations that govern air pollution. Air quality regulations within the state of Minnesota are codified in the Minnesota Rules for the MPCA, Chapters 7001 to 7023 and 7027. The Minnesota Rules establish permit review procedures for all facilities that emit pollutants to the ambient air. New facilities are required to obtain an air quality permit before construction is initiated.

Federal and state regulations established as a result of the CAA and the Minnesota Rules that potentially apply to the Mesaba Energy Project and summarized in Table 3.3-5 include:

- Prevention of Significant Deterioration (PSD)
- New Source Performance Standards (NSPS)
- Minnesota Standards of Stationary Sources (MSSS)
- National Emission Standards for Hazardous Air Pollutants (NESHAP)
- Clean Air Interstate Rule (CAIR)
- Clean Air Mercury Rule (CAMR)
- Acid Rain Program
- Minnesota Acid Deposition Control
- Compliance Assurance Monitoring (CAM) Rule

- Minnesota Air Pollution Episodes Rules
- Regional Haze Rule and the Minnesota Regional Haze Program
- Chemical Accident Provisions
- General Conformity Rule

Table 3.3-5. Pertinent Air Quality Regulations

Regulation	Citation	Description
PSD	• 40 CFR 52.21 • Minn. R. 7007.3000.	The PSD is a pre-construction review and permit process for construction and operation of a new or modified major stationary source in attainment areas. A major source is a source for which the amount of any one regulated pollutant emitted equal to or greater than significance thresholds defined by the PSD rule. The required PSD review consists of the following elements: • A case-by-case best available control technology (BACT) demonstration, which takes into account energy, environmental, and economic impacts as well as technical feasibility. • An ambient air quality impact analysis to demonstrate that the allowable emissions from the proposed project will not cause or contribute to a violation of the applicable PSD increments and NAAQS. • An assessment of the direct and indirect effects of the proposed project on general growth, soil, vegetation, and visibility. Additionally, a source that might impact a Class 1 Federal area must undergo additional review. • An ambient air quality monitoring program for up to one year may be required if no other representative data are available and if the project impacts are greater than a monitoring de minimis level. • Public comment, including an opportunity for a public hearing. The Mesaba Energy Project is projected to have emissions above the PSD significance threshold for one or more of the regulated criteria air pollutants (see Section 4.3); therefore, PSD review is required under the regulations. An application for a Part 70/New Source Review Construction Authorization Permit for an air emission facility, which covers the Mesaba Generating Station sources, has been submitted to MPCA for review in accordance with the PSD regulations. The air permit application is filed for the West Range Site.

Table 3.3-5. Pertinent Air Quality Regulations

Regulation	Citation	Description
NSPS	40 CFR Part 60	The Federal NSPS are technology-based standards applicable to new and modified stationary sources of regulated air emissions. Where the NAAQS emphasize on air quality in general, the NSPS focus on particular sources of pollutants. The NSPS program sets uniform emission limitations for approximately 70 industrial source categories or sub-categories of sources (e.g., fossil fuel-fired generators, grain elevators, steam generating units) that are designated by size as well as type of process. The standards that apply to the Mesaba Energy Project are as follows: • Subpart A – General Provisions, which provides for general notification, record keeping, and monitoring requirements. • Subpart Da – Standards of Performance for Electric Utility Steam Generating Units For Which Construction is Commenced After September 18, 1978, which applies to any electric utility combined cycle gas turbine that combusts more than 73 MW (250 MMBtu/hour) heat input of fossil fuel in the steam generator. • Subpart Db – Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units, which covers the natural gas-fired auxiliary boiler because its heat input will be greater than 100 MMBtu/hr. • Subpart Dc – Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units, which covers the Tank Vent Boiler because it is a steam-generating unit that is less than 100 MMBtu/hr, but greater than 10 MMBtu/hr. Since this unit will burn syngas, it is considered a coal-fired unit for the purposes of this regulation. • Subpart HHHH – Emission Guidelines and Compliance Times for Coal-Fired Electric Steam Generating Units: Subpart HHHH was included as part of the Clean Air Mercury Rule promulgated on March 15, 2005 (70 FR 28606). • Subpart Y – Standards of Performance for Coal Preparation Plants: Coal handling capacity at the IGCC power station will exceed 200 tons per day, and is therefore subject to this NSPS. These standards were considered as part of the BACT analysis.
MSSS	Minn. R. ch. 7011	The following Minnesota Standards of Performance are also applicable to the Mesaba Energy Project: • Control of Fugitive Particulate Matter (Minn. R. 7011.0150), which applies to bulk material handling operations including coal, petroleum coke, flux and other materials. The rule prohibits the release of "avoidable amounts" of particulate matter and facilities are required to take reasonable precautions to prevent the discharge of visible fugitive emissions beyond the property line. • Standards of Performance for Stationary Internal Combustion Engines (Minn. R. 7011.2300), which applies to the emergency fire water pumps and the emergency generators, limits visible emissions from these units to 20 percent opacity and limits SO_2 emissions to 0.5 lb/MMBTU heat input unless a higher limit has been established through modeling. • Standards of Performance for Post-1969 Industrial Process Equipment (Minn. R. 7011.0715), which applies to the Mesaba Generating Station's coal, petroleum coke, and slag handling equipment that will generate particulate matter emissions. Since the Mesaba Generating Station is located outside of Minneapolis, St. Paul and Duluth, and is located more than one quarter mile from any residence or public roadway, the required control equipment efficiency standard to be applied is 85 percent. These standards were considered as part of the BACT analysis.

Table 3.3-5. Pertinent Air Quality Regulations

Regulation	Citation	Description
NESHAP	40 CFR Parts 61 and 63	Non-criteria pollutants that can cause serious health and environmental hazards are termed hazardous air pollutants (HAPs) or air toxics. The 1970 CAA Amendments required EPA to promulgate national emissions standards for hazardous air pollutants to protect the public health and welfare with an ample margin of safety. Due to the difficulty in establishing health risks for HAPs, EPA identified and regulated only eight pollutants: asbestos, benzene, beryllium, inorganic arsenic, mercury, radionulides, and vinyl chloride. The 1990 CAA Amendments, section 112, changed the regulatory approach for controlling HAPs, basing it instead on available control technology. Subsequently, a list of 188 compounds to be controlled as HAPS was developed. The 1990 CAA Amendments define two types of NESHAP emissions standards: maximum achievable control technology (MACT) and generally available control technology (GACT). Unlike the health-based standards established under the initial NESHAPs, the MACT standards are technology-based emission limits that take into account available methodologies for controlling emissions of targeted HAPs from each source category. In general, a source is subject to a MACT standard if it is in a source category regulated under 40 CFR 63 and part of a facility that is defined as a major source for HAPs. A source is defined as a major source for HAPs if it emits a single HAP in excess of 10 tons (9.1 metric tons) per year or an aggregate emission rate of over 25 tons (22.7 metric tons) per year of any combination of regulated HAPs. GACTs are less stringent emission standards based on the use of more standard technologies and work practices. HAP emissions for the proposed Mesaba Energy Project would not exceed the associated major source thresholds (see Section 4.3); therefore, MACT standards do not apply to the proposed facility.
CAIR	Section 110 of the CAA Amendments	On March 10, 2005, EPA issued the CAIR, a rule that will achieve the largest reduction in air pollution of SO_2 and NO_X. The goal of the rule is to permanently cap emissions of SO_2 and NO_X from electric generating units (EGU) in the eastern United States so as to address $PM_{2.5}$ and ground-level O_3 transport. CAIR would achieve large reductions of SO_2 and/or NO_X emissions across 28 eastern states (including Minnesota) and the District of Columbia. When fully implemented, CAIR is expected to reduce SO_2 emissions in these states by over 70 percent and NO_X emissions by over 60 percent from 2003 levels. CAIR is expected to help sources in Minnesota reduce emissions of SO2 by 36 percent and NO_X by 59 percent, by 2015. The MPCA is currently considering changes to the Minnesota Air Rules to address the CAIR. In June 2006, the MPCA published an annotated draft of a new chapter in the state rules that would address issues related to CAIR. As an EGU in the Minnesota, the Mesaba Energy Project would be subjected to the CAIR once promulgated by the MPCA.

Table 3.3-5. Pertinent Air Quality Regulations

Regulation	Citation	Description
CAMR	Section 111 of the CAA Amendments	In December 2000, EPA announced that it was "appropriate and necessary" to regulate and control emissions of mercury and other air toxics from coal- and oil-fired electric utilities under section 112 of the CAA Amendments (i.e., the MACT requirements). In January 2004, under the CAA, EPA was given the authority to regulate power plant mercury emissions by establishing performance standards or MACT, whichever the agency deems most appropriate. On March 15, 2005, EPA revised and reversed its December 2000 finding and issued the CAMR, which creates performance standards and establishes permanent, declining caps on mercury emissions from coal-fired power plants. The CAMR establishes "standards of performance" limiting mercury emissions from new and existing coal-fired power plants and creates a market-based cap-and-trade program. New coal-fired power plants ("new" means construction starting on or after January 30, 2004) will have to meet stringent new source performance standards in addition to being subject to the caps. As an electric utility steam-generating unit with more than 25 MWe output, the Mesaba Energy Project will be subject to the CAMR. In October 2005 (70 FR 62200), EPA agreed to reconsider certain aspects of its determination that regulation of electric utility steam generating units under section 112 of CAA was neither necessary nor appropriate, and removing coal- and oil-fired utility units from the list of source categories. However, EPA declined to issue a stay, and the CAMR remains in effect. The CAMR is a closely related action to the CAIR, which is discussed above. Together, the CAMR and the CAIR is expected to create a multi-pollutant strategy to reduce emissions throughout the United States.
Acid Rain Program	40 CFR Parts 72 through 78	The EPA established a program to control emissions that contribute to the formation of acid rain. The overall goal of the Acid Rain Program is to achieve significant environmental and public health benefits through reductions in emissions of SO_2 and NO_X, the primary causes of acid rain. The acid rain regulations are applicable to "affected units" as defined in the regulations. As a new utility unit, the Mesaba Generating Station is classified as an affected unit under 40 CFR 72.6(a)(3) because it utilizes fossil fuel-fired combustion to generate over 25 MW of electricity for sale and is therefore subject to the Acid Rain Program. The objectives of the program are achieved through a system of marketable allowances, which are used by utility units to cover their SO_2 emissions. One allowance means that an affected utility unit may emit up to one ton of SO_2 during a given year. Utilities cannot emit more tons of SO_2 than they hold in allowances. Allowances may be bought, sold, or traded, and any allowances that are not used in a given year may be banked and used in the future. Owners or operators of an affected unit are subject to the following Acid Rain Program requirements: • Acid Rain Permit Application, which must be submitted at least 24 months prior to the date of initial operation of the unit • SO_2 emission allowances, which are to be secured on an annual basis. • NO_X emission limitations. • Acid Rain Compliance Plan. • Continuous emissions monitoring requirements for NO_X, SO_2, CO_2, and opacity. Requirements under this program would be considered mitigation measures to reduce emissions from the IGCC power plant source.

Table 3.3-5. Pertinent Air Quality Regulations

Regulation	Citation	Description
Minnesota Acid Deposition Control	Minn. R. 7021.0050	This regulation applies to existing electrical generating facilities that have a total capacity greater than 1,000 MW. As Mesaba Energy Project, Phase I and II, will be new generating facilities, they will not be subject to this rule. However, under the Acid Rain Program, Mesaba Energy Project will be required to annually purchase SO_2 allowances in an amount equal to the total IGCC power plant's annual SO_2 emissions. The CAIR will supersede the Acid Rain Program when it becomes effective. Pursuant to Minnesota regulations, the Mesaba Energy Project's compliance with the new CAIR also constitutes compliance with the Minnesota's acid deposition requirements. The IGCC power plant would also be subject to the Reasonable Available Control Technology (RACT) requirements of Minn. R. 7021.0050, Subpart 5 because the total indirect heating capacity of the CTGs, tank vent boilers, and auxiliary boilers exceed 5,000 MMBTU/hr. However, since emissions from these units are subject to BACT requirements, no additional limitations are necessary to meet RACT.
CAM Rule	40 CFR Part 64	The CAM Rule will apply to facilities that have emission units located at major sources subject to Title V air quality permitting and which use control devices to achieve compliance with emission limits. It requires that these facilities monitor the operation and maintenance of their control equipment to evaluate the performance of their control devices and report if they meet established emission standards. If these facilities find that their control equipment is not working properly, the CAM rule requires them to take action to correct any malfunctions and to report such instances to the appropriate enforcement agency (i.e., State and local environmental agencies). Although a major source, the Mesaba Generating Station would not be subject to the CAM Rule because it will not be equipped with add-on air pollution control devices. However, the Mesaba Generating Station would be subject to similar requirements specified under the Acid Rain Provisions and the applicable NSPS.
Minnesota Air Pollution Episodes Rule	Minn. R. 7009.1000 – 7009.1110	Since the Mesaba Generating Station will have allowable emissions of greater than 250 tons per year of any single regulated pollutant, the plant is subject to Minnesota's Air Pollution Episode rules. The rules require preparation of an emergency action plan to be implemented in the event that the Commissioner of the MPCA makes an air pollution episode declaration. Requirements under this rule would be considered mitigation measures to reduce emissions from the Mesaba Generating Station sources.

Table 3.3-5. Pertinent Air Quality Regulations

Regulation	Citation	Description
Regional Haze Rule and the Minnesota Regional Haze Program	40 CFR Part 55, 51.300 – 51.309	In July 1999, EPA published the Regional Haze Rule to address visibility impairment in our nation's largest national parks and wilderness ("Class I") areas. Within its boundary, Minnesota has two Class I areas – the BWCAW and VNP. In addition, emissions from Minnesota may contribute to visibility impairment in other states' Class I areas, such as Michigan's IRNP and Seney Wilderness Area. By December 2007, Minnesota must submit to U.S. EPA a Regional Haze SIP that identifies sources that cause or contribute to visibility impairment in these areas. The Regional Haze SIP must also include a demonstration of reasonable progress toward reaching the 2018 visibility goal for each of the state's Class I areas. The Regional Haze Rule singles out certain older emission sources that have not been regulated under other provisions of the CAA. Those older sources that could contribute to visibility impairment in Class I areas may be required to install BART. Because the Mesaba Generating Station would be a new facility, it would not have to meet the BART requirement. However, under NEPA and PSD requirements a new source of criteria and air toxics emissions has to analyze its impacts to Class I areas. Section 4.3 addresses the impacts of the Mesaba Energy Project on Class I areas.
Chemical Accident Provisions	40 CFR Part 68 and Section 112(r) of the CAA Amendments	This regulation applies to stationary sources that will have more than a threshold quantity of the specific regulated toxic and flammable chemicals. It is intended to prevent accidental releases to the air and to mitigate the consequences of any such releases by focusing prevention measures on chemicals that pose the greatest risk to the public and the environment. Stationary sources covered by this regulation must develop and implement a risk management program that includes a hazard assessment, a prevention program, and an emergency response program. These elements are to be described in a risk management plan that must be submitted to EPA and state and local emergency planning authorities. The plan must also be made available to the public by the date that a regulated substance is first present in a process above a threshold quantity. The IGCC power plant is not expected to have any chemicals above the threshold amounts; however, more detailed calculations would be performed when the system design for the IGCC power plant is finalized. The Mesaba Energy Project is expected to comply with all applicable provisions of the regulation in a timely manner.

Table 3.3-5. Pertinent Air Quality Regulations

Regulation	Citation	Description
Clean Air Act General Conformity Rule	40 CFR Parts 6, 51 and 93,	An area that does not meet (or contributes to ambient air quality in a nearby area that does not meet) the primary or secondary NAAQS for a pollutant is referred to as a nonattainment area. The CAA requires states to submit to the EPA a SIP for attainment of the NAAQS. The 1977 and 1990 amendments to the CAA require comprehensive plan revisions for areas where one or more of the standards have yet to be attained. The 1990 Amendments to the CAA, Section 176(c)(1), required Federal actions to show conformance with the SIP. Federal actions are those projects that are funded by Federal agencies and include the review and approval of a proposed action through the NEPA process. Conformance with the SIP means conformity to the approved SIP's purpose of eliminating or reducing the severity and number of violations of the NAAQS, and achieving expeditious attainment of such standards. The need to demonstrate conformity is applicable only to areas that are not in compliance with the NAAQS or areas that were previously in nonattainment for one or more pollutants and are currently designated as maintenance areas. A Federal action will fall under the jurisdiction of either the General Conformity Rule or the Transportation Conformity Rule. The Transportation Conformity Rule covers highway and transit projects. The Mesaba Energy Project is a Federal action under the jurisdiction of the General Conformity Rule.

3.4 GEOLOGY AND SOILS

3.4.1 Geology

3.4.1.1 Regional Features

Physiography and Topography

The physiography surrounding the West and East Range Sites consists of rolling hills with forests, bogs, and lakes in glacial till over bedrock. The bedrock is a mixture of metamorphic and intrusive igneous rocks, and is considered to be among the oldest within the continent. Both the West Range and East Range Sites are located on the edge of the Giants Range physiographic area of Minnesota, within the Superior Upland of the Canadian Shield province (Wright, 1972). The Giants Range, also known as the Mesabi Iron Range, is a folded ridge of iron-rich rock that was exposed during erosion in the Mesozoic. The topography of the area has also been heavily modified by extensive glaciation events, the last of which occurred roughly 12,000 years ago. The regional physical relief varies from 600 feet above mean sea level (amsl) at Lake Superior to an elevation of 2,301 feet amsl at Eagle Mountain. The local landscape is also influenced by a number of 300- to 400-foot deep mine pits, large mine-pit tailing piles and basins, all associated with historical iron ore mining activity.

Climate

Minnesota has a continental climate and is frequently influenced by polar air masses. In Itasca and St. Louis counties, winters are very cold and summers are short and fairly warm. The short freeze-free time limits farmed crops to forage, small grains, and adapted vegetables. Snow covers the ground much of the time from late fall to early spring. The lowest recorded temperature in the area was in Embarrass (near the East Range Site) in 1996 at negative 63ºF. Early freezes, prior to snowfall, extend the frost depth to several feet. However, the frost depth recedes and seldom exceeds a few feet after the snow blanket is established. Frost depths, in the order of 6 feet or more, can occur in areas that are plowed or otherwise kept clear of snow.

Bedrock

The bedrock of northern Minnesota consists of primarily continental craton rocks overlain by metamorphosed sedimentary rocks that are intruded by igneous plutons and dikes. The predominant geological and physiological feature in the area is the Mesabi Iron Range, which is made of silica-rich chert and iron-rich hematite, magnetite and taconite over basal quartz sandstone. Table 3.4-1 describes the bedrock geology in the area in more detail

3.4.1.2 West Range Site and Corridors

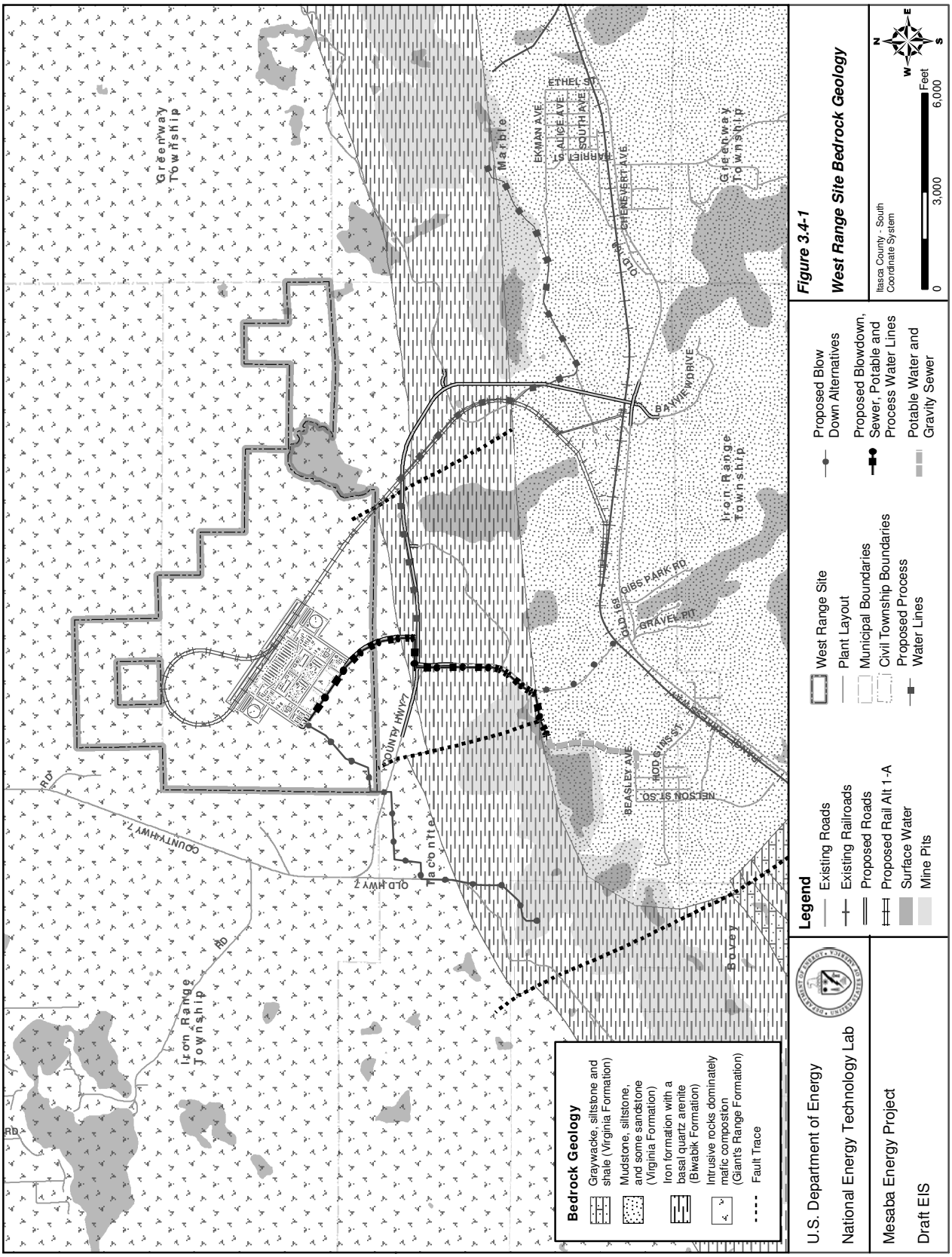
The West Range Site is located primarily on granite of the Giants Range batholith, just north of the Mesabi Iron Range bedrock (see Figure 3.4-1). At the project site, the elevations are approximately 1,430 feet amsl to 1,470 feet amsl.

All of the West Range corridors would cross portions of the Biwabik formation, the Virginia formation, and the Giant's Range batholith (at approach to the West Range Site). Between the Biwabik formation and the batholith is the Pokegama Quartzite. The Biwabik formation consists of layers of chert with iron rich minerals (hematite, taconite, and magnetite) and carbonate rocks. South of the Biwabik formation is the Virginia Formation, which is composed of argillite and clay-rich siltstone. The northern edge of the Virginia formation is located approximately 1.5 miles south of the proposed Mesaba Generating Station site. Portions of the Virginia and Biwabik formation are covered by the Coleraine Formation, an irregular sandstone and conglomerate layer deposited during the Cretaceous (Table 3.4-1). The first appearances of the Coleraine Formation occur approximately 1 mile from the power plant site.

Table 3.4-1. Bedrock Geology at the West and East Range Sites

Age	Group	Formations	Description	Member Description[a]	Location[a]
Cretaceous	N/A	Coleraine Formation	Irregular conglomerate composed of iron-formation clasts, and hematite-cemented sandstone; contains marine fossils	N/A	WR
Upper Proterozoic	Duluth Complex	Ultramafic intrusions, Bald Eagle Lake Intrusion; South Kiwishi Intrusion; Partridge River intrusion; Anorthositic series	Troctolite-gabbro, intruded by titaniferous peridodite	Ultra mafic, oxide-rich intrusions medium grained and layered	ER
Proterozoic	Animike Group	Virginia Formation	Interbedded carbonaceous shale, mudstone siltstone	Argillaceous Siltstone/greywacke	WR/ER
		Biwabik Formation	Ferruginous chert	Granular chert, iron silicates, hematite and carbonate rocks	WR/ER
		Pokegama Quartzite	Sedimentary rock assemblages	Upper: quartz arenite Middle: shale/siltsonte Lower: laminated shale	WR
Archean Eon	Wawa subprovince of the Superior province	Giant's Range Batholith/Granite	Tonalite to granite rocks in metavolcanic + metasedimentary host rocks	Sedimentary strata overlying greenstone-granite and diabasic dikes	WR/ER
		Mud Lake Sequence	Volcanic and intrusive rocks overlain by sedimentary rocks	Greywacke, slate and Metagabboric rocks	ER

[a]N/A=Not Applicable, WR=West Range Site, ER=East Range Site
Source: Jirsa et al., 2005


Greenway Township
Iron Range Township
Marble
Taconite
Bovey
ETHEL ST
EKMAN AVE
ALICE AVE
SOUTH AVE
CHENEVERT AVE
OLD HWY 7
BAYVIEW DRIVE
GIBS PARK RD
GRAVEL PIT
OLD HWY 169
BEASLEY AVE
NELSON ST SO
COUNTY HWY 7
OLD HWY 7
LAWA AVENUE
RD
Bedrock Geology
Graywacke, siltstone and shale (Virginia Formation)
Mudstone, siltstone, and some sandstone (Virginia Formation)
Iron formation with a basal quartz arenite (Biwabik Formation)
Intrusive rocks dominately mafic composition (Giant's Range Formation)
Fault Trace
Legend
Existing Roads
Existing Railroads
Proposed Roads
Proposed Rail Alt 1-A
Surface Water
Mine Pits
West Range Site
Plant Layout
Municipal Boundaries
Civil Township Boundaries
Proposed Process Water Lines
Proposed Blow Down Alternatives
Proposed Blowdown, Sewer, Potable and Process Water Lines
Potable Water and Gravity Sewer
Figure 3.4-1
West Range Site Bedrock Geology
Itasca County - South Coordinate System
0
3,000
6,000
Feet
N
E
S
W
U.S. Department of Energy
National Energy Technology Lab
Mesaba Energy Project
Draft EIS

All bedrock is covered by sand and gravel deposits left from the last glaciation. In some locations, organic soils have also developed on top of the glacial deposits. Table 3.4-2 describes the type of Quaternary sediments in more detail. The IGCC power plant would be located on glacial till of the Nashwauk Moraine Association. The corridors would cross portions of the Nashwauk and Sugar Hills Associations, glacial outwash, glacial lake sediment, glacial till, and peat (Hobbs and Goebel, 1982). Disturbed areas associated with mining activities are also located along the areas proposed for the corridors associated with the West Range Site.

Figure 3.4-2 shows the West Range IGCC power plant and its associated HVTL, pipeline, and transportation corridors in relation to the bedrock depth below ground surface. At the West Range Site, bedrock is closer to the surface near the proposed Mesaba Generating Station, increasing in depth further south. Bedrock is within 20 feet of the surface in three locations within the West Range Site. The bedrock is also within 20 feet of the surface in a location northeast of the Arcturus Mine. Southeast of the West Range Site is a bedrock valley that stretches northeast-southwest underneath Dunning Lake. The bottom of the bedrock valley reaches 200 feet below ground at its deepest. The rest of the bedrock immediately surrounding the IGCC power plant is within 50 feet of the ground surface.

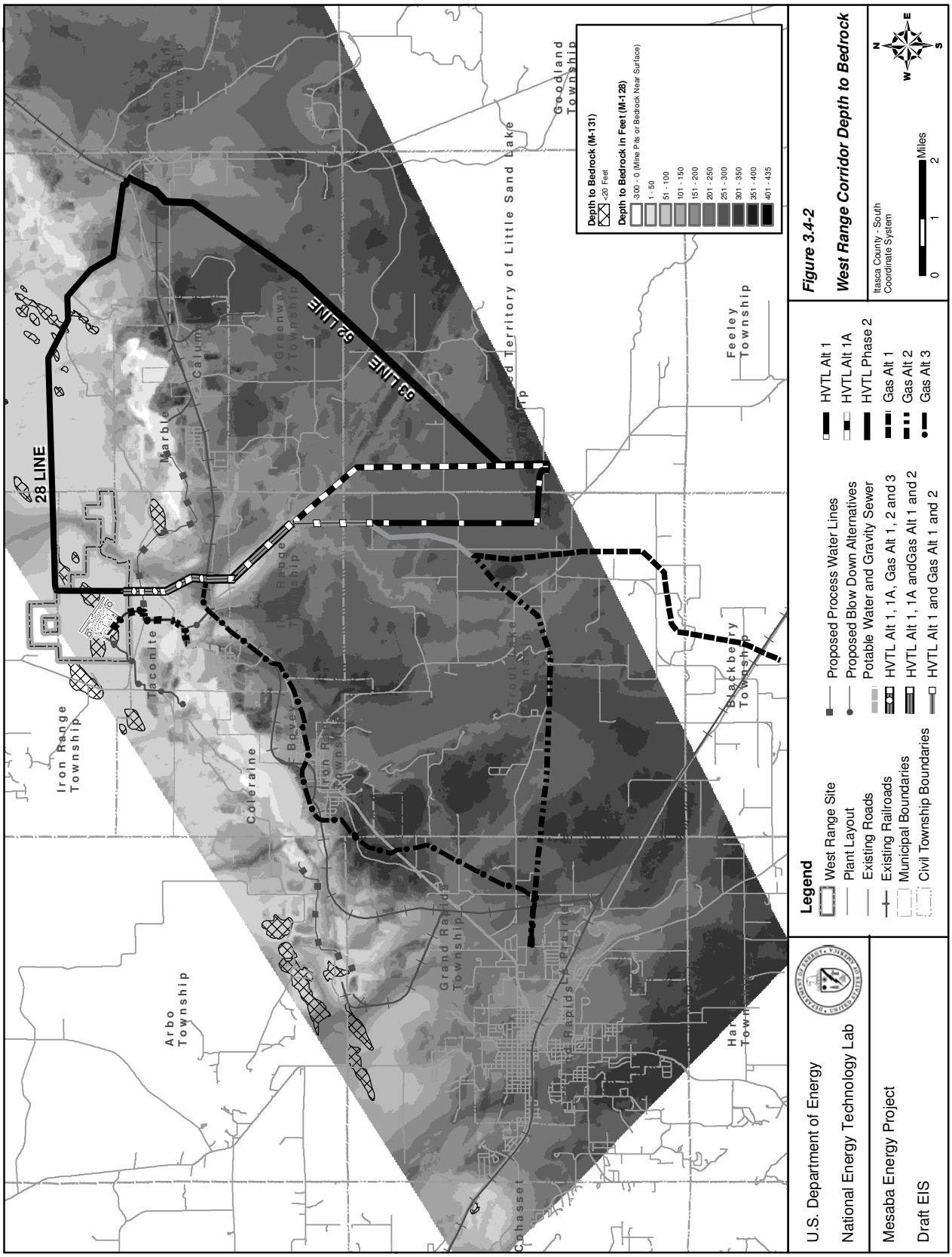
South of Taconite and Bovey, the bedrock depth gradually increases to 250 feet below the surface. There is a subsurface ridge within 50 feet of the ground located 1 mile east of Taconite, between Holmes Lake and Twin Lakes (Meyer et al., 2004) (see Figure 3.4-2). In areas east of the West Range Site, the bedrock depth is within 50 feet of the surface.

Table 3.4-2. Quaternary Geology at the West and East Range Sites

Association	Deposit Type	Description	Location
Nashuwauk Moraine Association	Ground moraine (Glacial till)	Till is brown to grey, non-calcareous drift; clasts are predominantly igneous and metamorphic rocks of the Canadian Shield	1,2,3,4,5,7,8,9,10
			12,13,14
Vermillion Association	Ground moraine (Glacial till)	Till is extremely stony and sandy and contains only trace amounts of clay.	--
			12,13,14,17,18
Sugar Hills Association	End moraine (Glacial till)	Locally deposited reddish colored lake sediments.	2,3,4,5,6,7,8,9,10
			12,13,14
Culver Moraine Association	End Moraine (Glacial till)	Till is non-calcarous, clay-rich with sporatic clasts of shale. Deposits form rolling and hilly topography including numerous lakes and potholes.	--
			11,12,13,14,15,16,17, 18,19
N/A	Glacial outwash (Alluvium)	Alluvium is sorted sand and gravel deposits.	2,3,4,5,7,8,9,10
			13,14
N/A	Gravel glacial lake sediment	Soft to medium stiff, stratified clay and silt deposits. Occasional cobbles and boulders also occur within the deposit. Often has high water table.	2,3,4,5,6,8,9,10
			12,13,14,
N/A	Peat	Holocene-age, soft and highly compressible organic deposits, with a high water table	2,3,5,7,8,9,10
			12,13,14,
N/A	Mine tailings pile	Piles contain overburden soil and glacial deposits from iron mining operations, typically consisting of glacial till mixed with rock fragments and low grade ore.	3,4,6
			13,15
N/A	Mine pit	Areas where overburden and iron deposits have been removed. Depths approach 400 feet. Includes abandoned and active mine pits.	3,4,6
			13,15

Note:
1. West Range IGCC Power Plant site
2. West Range HVTL WRA-1, WRA-1A, and WRB-2A
3. West Range Gas Pipeline Alternative 1, 2, and 3 corridors
4. West Range Process Water Pipeline Segments
5. West Range Process Water Blowdown Pipeline 1
6. West Range Process Water Blowdown Pipeline 2
7. West Range Portable Water and Sewer Pipelines
8. West Range Rail Line Alternative 1A
9. West Range Rail Line Alternative 1B
10. West Range Access Roads
11. East Range IGCC Power Plant site
12. East Range HVTL 38L corridor
13. East Range HVTL 39L/37L corridor
14. East Range Gas Pipeline 1 corridor
15. East Range Process Water Pipelines: 9N-6, 9S-6, 6-S-2WX, K-2WX-Site, 2WX-2W, 2W-2E, 3-2E
16. East Range Potable Water and Sewer Pipelines
17. East Range Rail Line Alternative 1
18. East Range Rail Line Alternative 2
19. East Range Access Roads

N/A = Not Applicable (not organized by Association)


28 LINE
62 LINE
63 LINE
Depth to Bedrock (M-131)
<20 Feet
Depth to Bedrock in Feet (M-128)
-300 - 0 (Mine Pits or Bedrock Near Surface)
1 - 50
51 - 100
101 - 150
151 - 200
201 - 250
251 - 300
301 - 350
351 - 400
401 - 435
Legend
West Range Site
Plant Layout
Existing Roads
Existing Railroads
Municipal Boundaries
Civil Township Boundaries
Proposed Process Water Lines
Proposed Blow Down Alternatives
Potable Water and Gravity Sewer
HVTL Alt 1, 1A, Gas Alt 1, 2 and 3
HVTL Alt 1, 1A andGas Alt 1 and 2
HVTL Alt 1 and Gas Alt 1 and 2
HVTL Alt 1
HVTL Alt 1A
HVTL Phase 2
Gas Alt 1
Gas Alt 2
Gas Alt 3
Figure 3.4-2
West Range Corridor Depth to Bedrock
Itasca County - South
Coordinate System
Miles
0
1
2
N
E
S
W
U.S. Department of Energy
National Energy Technology Lab
Mesaba Energy Project
Draft EIS
Iron Range Township
Coleraine
Taconite
Marble
Calumet
Greenway Township
Iron Range Township
Bovey
Trout Lake Township
Grand Rapids Township
Arbo Township
Cohasset
Grand Rapids
Harris Township
Blackberry Township
Feeley Township
Goodland Township
Unorganized Territory of Little Sand Lake

3.4.1.3 East Range Site and Corridors

The East Range Site would be located on vacant land north of Colby Lake and inside the city limits of Hoyt Lakes. The average elevation for the area is 1,500 feet amsl, with a north-south grade that gradually dips approximately 20 to 40 feet into shrub swamp wetland.

The bedrock underlying most of the proposed East Range Site and its associated corridors is the Virginia formation, which consists of interbedded argillite, argillaceous siltstone, and fine-grained feldspathic greywacke. This formation lies south of the Giants Range batholith and the Biwabik Iron Formation. The southeastern corner of the East Range Site is in the Partridge River Intrusion, part of the Duluth Complex, which consists of troctolite and locally grades to gabbro, with numerous inclusions of hornfels and anorthositic rocks (Figure 3.4-3, Table 3.4-1). Some areas proposed for the utility corridors are exclusively located in the Virginia Formation. The Biwabik Formation and the Mud Lake Sequence occur around Eveleth.

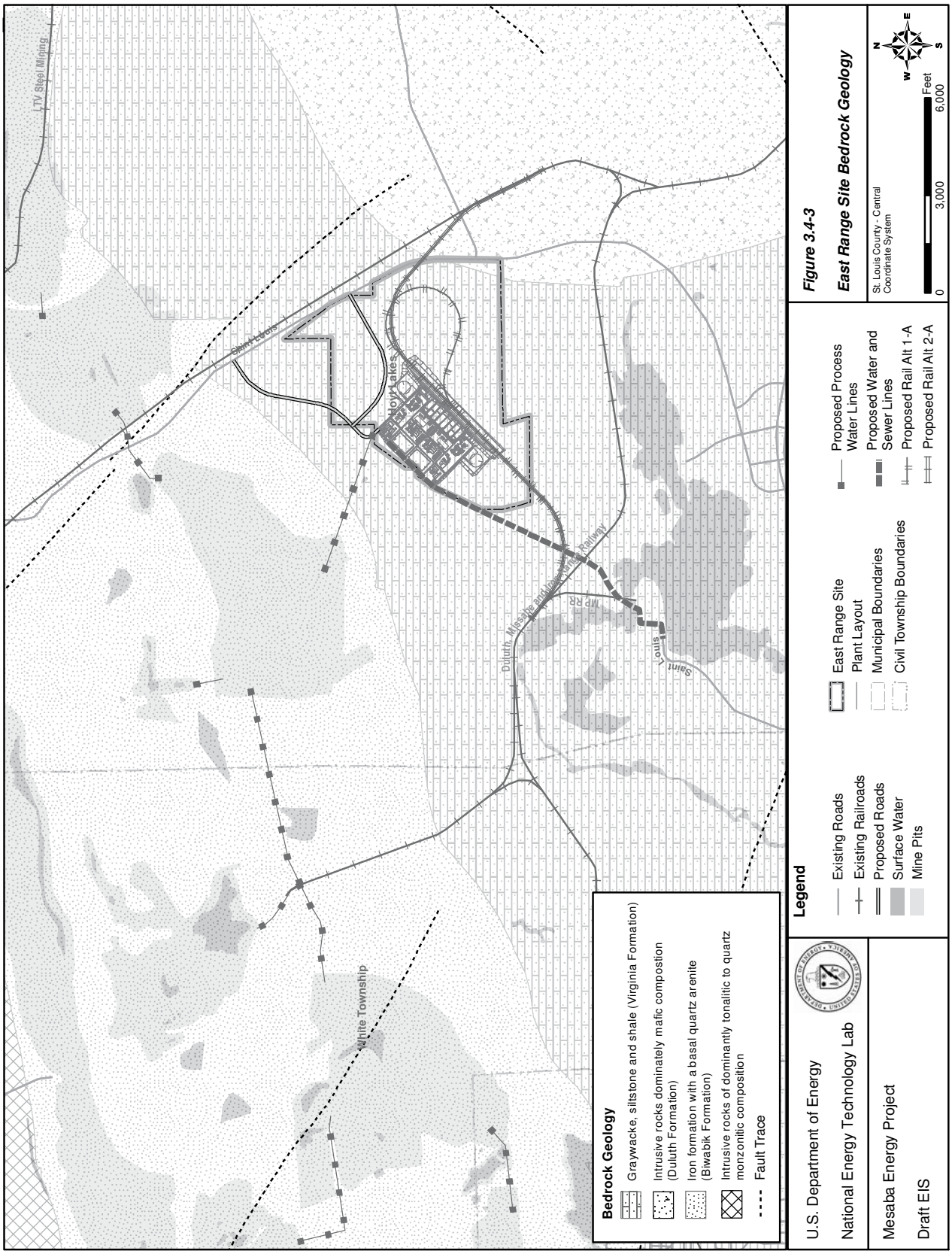
The bedrock depth is within 50 feet of the ground surface in the vicinity of the East Range Site, rail alignments, process water pipelines and access roads (Figure 3.4-4). Bedrock is exposed at the extreme southeast corner of the East Range Site and is 1 to 50 feet below the ground surface throughout most of the site. However, there are two areas where the depth to bedrock is 50 to 100 feet below the ground surface. Beneath the area of the proposed power plant footprint, the bedrock surface slopes downward from northwest to southeast. Along the proposed HVTL and natural gas corridors, the bedrock surface gradually slopes to the southwest. The bedrock is at its deepest southwest of Aurora, at over 200 feet below the ground surface. Near Eveleth, the bedrock depth gradually becomes shallower, until it is within 50 feet of the ground surface. There is no data for the area along the proposed HVTL corridors as they approach the Forbes Substation. In areas disturbed by mining activities, the bedrock depth is typically within 50 feet of the ground surface, but may vary locally from irregular fill.

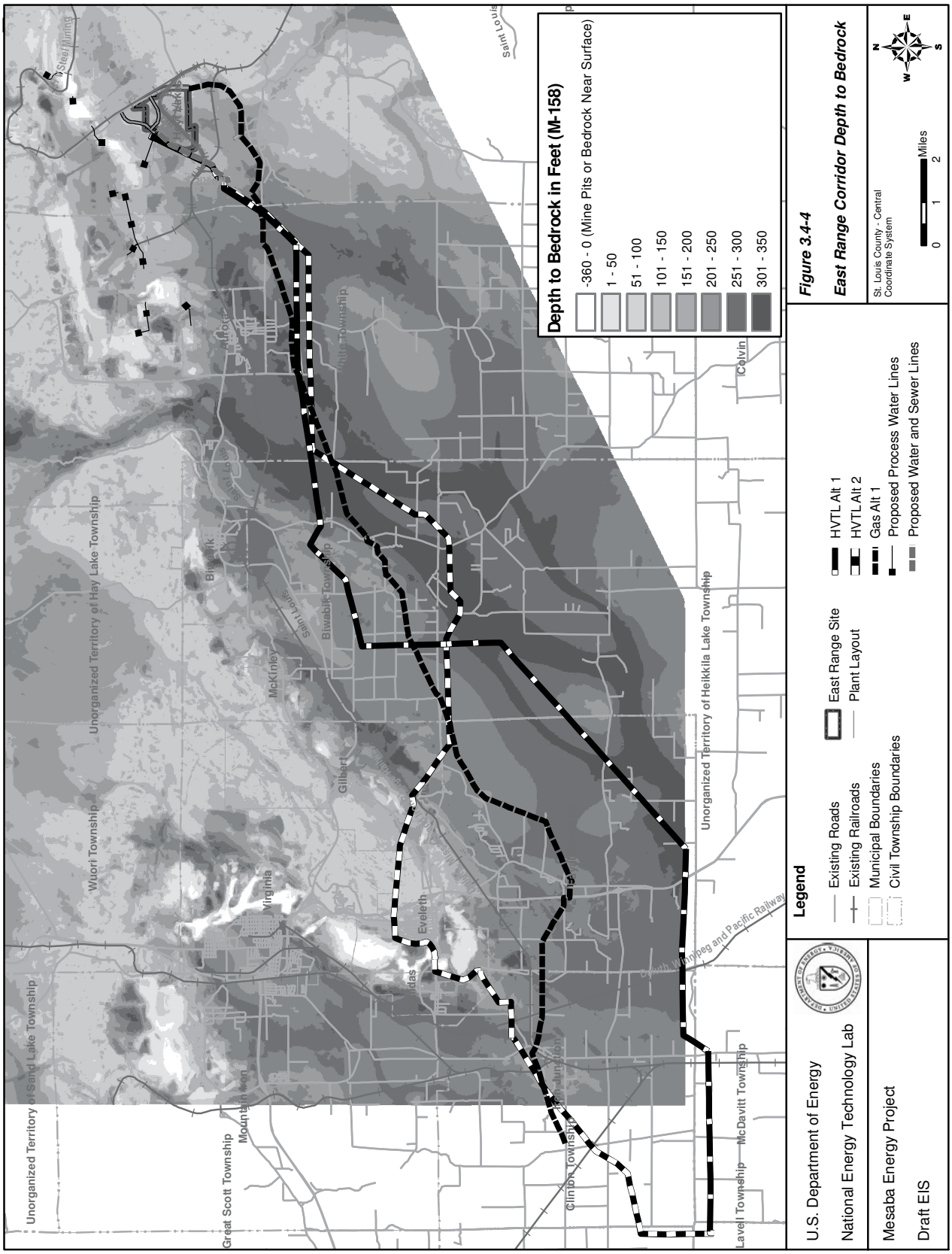
The area proposed for the East Range Site and associated corridors occur on the Culver Moraine Association, an end moraine of the Des Moines lobe. The East Range Site would be located on glacial till of the Culver Moraine Association, layered deltaic sediments, and reworked till deposits as described in Table 3.4-1 and Table 3.4-2. The corridor locations would traverse glacial till, glacial lake sediments and peat. Glacial till of the Vermillion and Nashwauk moraines and mine tailing piles would also be crossed in some areas along the corridors. From a point 200 feet east of the plant site boundary to the east end of the rail corridor, the underlying soils are glacial till of the Vermillion Association of the Rainy Lobe.

3.4.2 Mineral Resources and Mining

3.4.2.1 Regional Features

In the Mesabi Iron Range, iron ore is mined from the Biwabik formation from open pits. Mining operations remove the overburden (including the glacial deposits), any occurrences of the Coleraine Formation, and excess shale and quartzite in order to mine the iron-rich ore. Starting in 1945, many of the mining operations in the area were abandoned as the amount of high-quality ore declined. A typical abandoned mining area contains the pit and the tailings pile, as well as old access roads and a few pieces of old equipment. The area water table is close to the ground surface, and constant pumping was likely required to keep the pits dry when they were actively mined. However, once mining ceased, groundwater and other water inputs began filling the pits. Some abandoned mines in the region have reopened with the development of the taconite pellet process, which uses lower-grade ore. Other mineral resources commercially mined in northern Minnesota are crushed stone, sand and gravel for construction (USGS, 2004). Granite bedrock, as well as sand and gravel from glacial deposits are excavated by aggregate supply companies in Grand Rapids and Hibbing.


Bedrock Geology
Graywacke, siltstone and shale (Virginia Formation)
Intrusive rocks dominately mafic composition (Duluth Formation)
Iron formation with a basal quartz arenite (Biwabik Formation)
Intrusive rocks of dominantly tonalitic to quartz monzonitic composition
Fault Trace
White Township
Minntac
Hoyt Lakes
Skibo Road
Duluth, Missabe and Iron Range Railway
Saint Louis
MP RR
Legend
Existing Roads
Existing Railroads
Proposed Roads
Surface Water
Mine Pits
East Range Site
Plant Layout
Municipal Boundaries
Civil Township Boundaries
Proposed Process Water Lines
Proposed Water and Sewer Lines
Proposed Rail Alt 1-A
Proposed Rail Alt 2-A
U.S. Department of Energy
National Energy Technology Lab
Mesaba Energy Project
Draft EIS
Figure 3.4-3
East Range Site Bedrock Geology
St. Louis County - Central
Coordinate System
0
3,000
6,000
Feet
N
E
S
W


Depth to Bedrock in Feet (M-158)
-360 - 0 (Mine Pits or Bedrock Near Surface)
1 - 50
51 - 100
101 - 150
151 - 200
201 - 250
251 - 300
301 - 350
Legend
Existing Roads
Existing Railroads
Municipal Boundaries
Civil Township Boundaries
East Range Site
Plant Layout
HVTL Alt 1
HVTL Alt 2
Gas Alt 1
Proposed Process Water Lines
Proposed Water and Sewer Lines
U.S. Department of Energy
National Energy Technology Lab
Mesaba Energy Project
Draft EIS
Figure 3.4-4
East Range Corridor Depth to Bedrock
St. Louis County - Central
Coordinate System
Miles
0 1 2
N
W E
S
Unorganized Territory of Sand Lake Township
Great Scott Township
Wuori Township
Unorganized Territory of Hay Lake Township
Virginia
Eveleth
McKinley
Gilbert
Biwabik
Biwabik Township
Unorganized Territory of Heikkila Lake Township
Colvin
Clinton Township
Lavell Township
McDavitt Township
Duluth, Winnipeg and Pacific Railway

3.4.2.2 West Range Site and Corridors

The West Range Site has not been disturbed by mining activity. However, there are several abandoned mine pits to the southwest and southeast of the West Range site. The CMP is a flooded sequence of mines that stretches from Taconite to Coleraine. The GMMP connects the Arcturus Mine, the Hill Trumbull Mine, and the Hill-Annex Mine Pits during high water conditions. Surrounding these mine pits are mine tailing piles and basins, which are also located to the south, west and east of the West Range Site. Previous mining activity is presented in Figure 3.4-5. There are no mining activities occurring in the vicinity of the West Range Site.

3.4.2.3 East Range Site and Corridors

The proposed East Range site has not been disturbed by mining activity (Figure 3.4-6). There are two mine pits nearby that are located on CE property. One is located approximately 0.25 to 0.5 miles northwest of the proposed plant site and the other is north of the proposed plant site, across CR 666. Mine tailings piles also exist in two locations. One is on the west of the utility easement that forms the west edge of the proposed plant site, and the other is northeast of the proposed plant site, approximately 0.25 miles from CR 666.

Glacial deposits are also occasionally mined for aggregate rock in northern Minnesota; however, there are no rock quarries in the immediate vicinity of the East Range Site. The closest crushed rock supplier to the area is located in Hibbing.

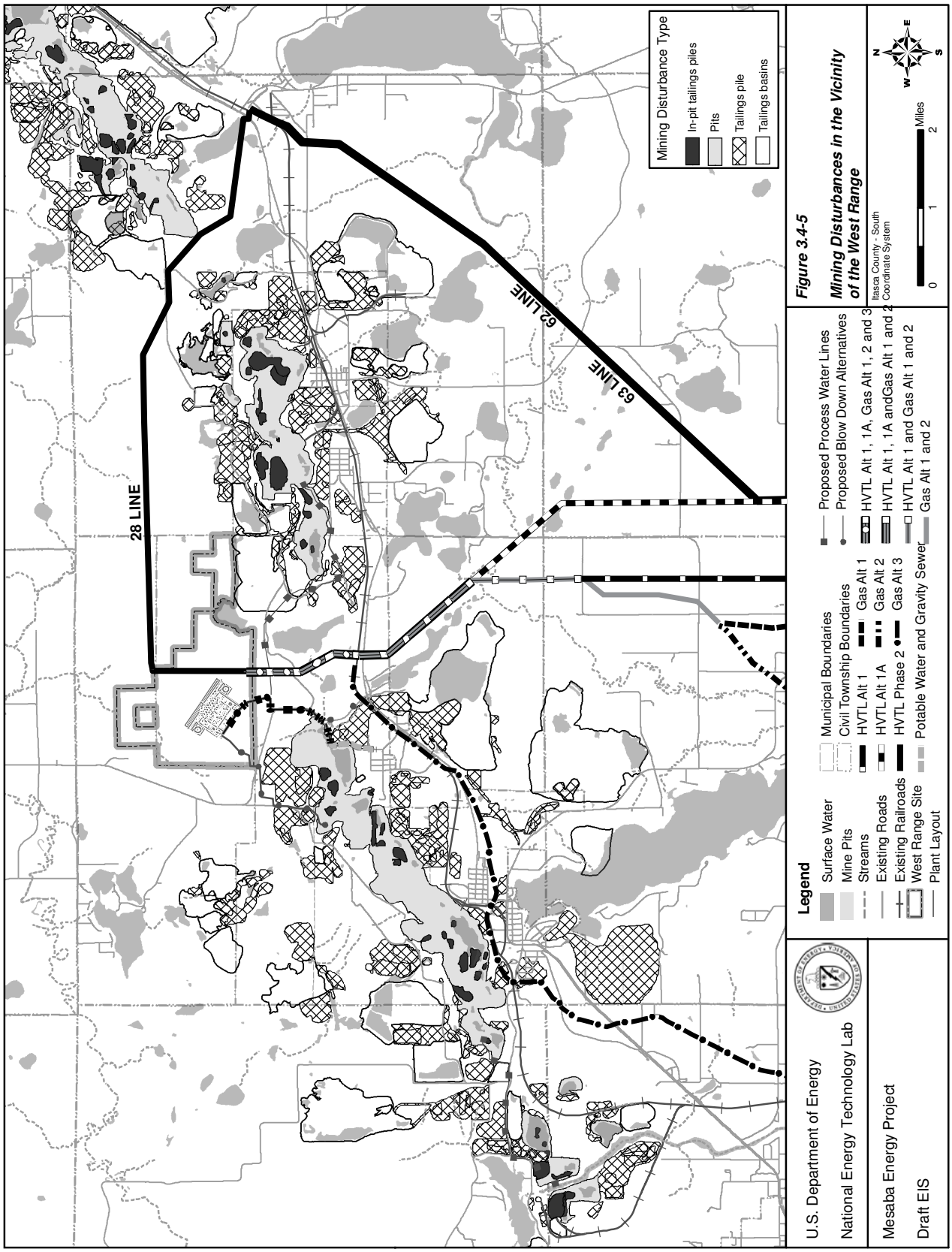
3.4.3 Seismic Activity

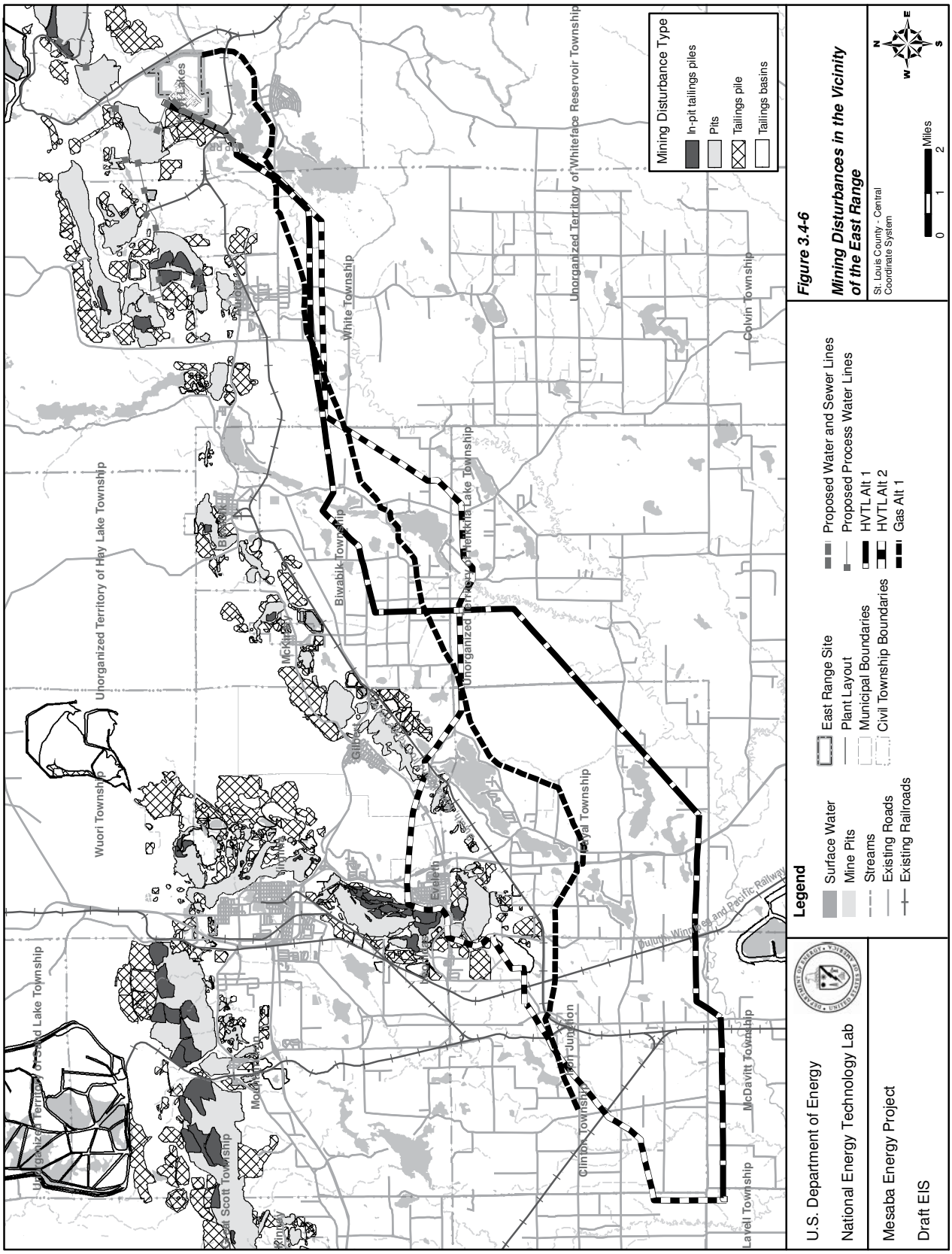
3.4.3.1 Regional Features

The structural geology of the Mesabi Range is complicated; faults in the Animike Group (1,600 million years ago) record several tectonic events that occurred within the last 1 billion years. The dominant structural feature of the Mesabi Range consists of a gently dipping fold that strikes east-northeast and dips 5 to 15 degrees southeast (USDI, 1965). Fault traces within the Mesabi Iron Range vicinity tend to strike northwest to southeast. A steeply dipping northeast trending fault is located at the eastern end of the HAMP, but it appears to be inactive. The faults surrounding the Mesabi Iron Range are traces of older tectonic movement, rather than recent causes of seismic activity.

South of the West and East Range Sites is the Morris fault, a primary structural feature in central Minnesota. This fault is part of a larger mid-continent structure, the Great Lakes Tectonic Zone (GLTZ) that extends from central South Dakota to the north shore of Lake Huron in Ontario, Canada. The Morris fault has been interpreted as a late Archean suture that joined two continental blocks over 2 billion years ago. This suture fused a 2,600 to 3,600 million year old gneiss terrane to a 2,650 to 2,750 million year-old greenstone-granite terrane located to the northwest (Chandler, 1994). The Animike Basin extends northeasterly from the northeast end of the Morris fault and is separated by the Penokean fold and thrust belt in central Minnesota.

Some studies have attributed most of the seismic activity in Minnesota to the Great Lakes Seismic Zone, of which the Morris fault is the eastern anchor (Chandler and Morey, 1989). However, more recent geophysical studies in Minnesota have considerably improved the understanding of the GLTZ and adjacent structures. These recent studies have identified northwest-southeast trending substructures (subfaults) trending off of the GLTZ and the suggestion is that the earthquakes concentrated along the GLTZ are related to places where the northeast trending GLTZ is intersected by the northwest-southeast trending substructures (Chandler and Morey, 1989). The primary reason for this interpretation is that the epicenters for earthquakes in the vicinity of the GLTZ occur away from the immediate vicinity of the GLTZ along the northwest trending subfaults.


28 LINE
62 LINE
63 LINE
Mining Disturbance Type
In-pit tailings piles
Pits
Tailings pile
Tailings basins
Legend
Surface Water
Mine Pits
Streams
Existing Roads
Existing Railroads
West Range Site
Plant Layout
Municipal Boundaries
Civil Township Boundaries
HVTL Alt 1
HVTL Alt 1A
HVTL Phase 2
Gas Alt 1
Gas Alt 2
Gas Alt 3
Proposed Process Water Lines
Proposed Blow Down Alternatives
HVTL Alt 1, 1A, Gas Alt 1, 2 and 3
HVTL Alt 1, 1A andGas Alt 1 and 2
HVTL Alt 1 and Gas Alt 1 and 2
Potable Water and Gravity Sewer
Gas Alt 1 and 2
U.S. Department of Energy
National Energy Technology Lab
Mesaba Energy Project
Draft EIS
Figure 3.4-5
Mining Disturbances in the Vicinity of the West Range
Itasca County - South
Coordinate System
Miles
0
1
2
N
E
S
W


Mining Disturbance Type
In-pit tailings piles
Pits
Tailings pile
Tailings basins
Unorganized Territory of Whiteface Reservoir Township
White Township
Colvin Township
Unorganized Territory of Hay Lake Township
Wuori Township
Biwabik Township
Unorganized Territory of Pike Lake Township
Gilbert
Eveleth
Virginia
Mountain Iron
Duluth, Winnipeg and Pacific Railway
Clinton Township
Laval Township
McDavitt Township
Lavell Township
Legend
Surface Water
Mine Pits
Streams
Existing Roads
Existing Railroads
East Range Site
Plant Layout
Municipal Boundaries
Civil Township Boundaries
Proposed Water and Sewer Lines
Proposed Process Water Lines
HVTL Alt 1
HVTL Alt 2
Gas Alt 1
Figure 3.4-6
Mining Disturbances in the Vicinity of the East Range
St. Louis County - Central Coordinate System
Miles
0
1
2
N
S
E
W
U.S. Department of Energy
National Energy Technology Lab
Mesaba Energy Project
Draft EIS

3.4.3.2 Earthquake History

The mechanism of seismicity in the central United States is poorly understood, but the prevalent model suggests that earthquakes occur by the modern stress field reactivating ancestral faults in Precambrian rocks (Chandler, 1994). Minnesota is considered to be one of the most seismically stable states in the United States; however, this does not mean that the area is earthquake free. Chandler (1994) reviewed historical documents and cited 19 earthquakes that have occurred in Minnesota since 1860. The largest earthquake in the last 50 years occurred near Morris, Minnesota, on July 9, 1975, and recorded a magnitude of 4.6 to 4.8 on the Richter scale. A similar magnitude quake (4.1) took place about 28 miles south of this location in Dumont on June 4, 1993. Both of these quakes occurred near the Morris fault within the GLTZ. However, there is no record of these quakes being felt in the vicinity of the West or East Range Sites. Other researchers have hypothesized that the 7.8 magnitude New Madrid quake of 1812 would have been felt throughout Minnesota, but due to a lack of population density no records exist for that quake in northern Minnesota (Mooney, 1979). A list of historical seismic activity within Minnesota for the last 100 years is presented in Table 3.4-3.

Table 3.4-3. Minnesota Earthquakes within the Last 100 Years

Epicenter (nearest town)	Month/Day/Year	Latitude	Longitude	Felt Area (km^2)	Maximum Intensity	Magnitude (Richter Scale)
Red Lake	2/6/1917	47.9	95.0	---	V	3.8
Staples	9/3/1917	46.34	94.63	48,000	VI-VII	4.3
Bowstring	12/23/1928	47.5	93.8	---	IV	3.8
Detroit Lakes	1/28/1939	46.9	96.0	8,000	IV	3.9-3
Alexandria	2/15/1950	46.1	95.2	3,000	V	3.6
Pipestone*	9/28/1964	44.0	96.4	---	---	3.4
Morris*	7/9/1975	45.50	96.10	82,000	VI	4.8-4.6
Milaca*	3/5/1979	45.85	93.75	---	---	1.0
Evergreen*	4/16/1979	46.78	95.55	---	---	3.1
Rush City*	5/14/1979	45.72	92.9	---	---	0.1
Nisswa*	7/26/1979	46.50	94.33	v. local	III	1.0
Cottage Grove	4/24/1981	44.84	92.93	v. local	III-IV	3.6
Walker	9/27/1982	47.10	97.6	v. local	II	2.0
Dumont*	6/4/1993	45.67	96.29	69,500	V-VI	4.1
Granite Falls*	2/9/1994	44.86	95.56	11,600	V	3.1

*Denotes earthquakes that were recorded instrumentally. All others and associated magnitudes based solely on intensity data from felt reports.
Source: Chandler, 1994

The closest earthquake epicenter to the Mesabi Iron Range is the 1928 Bowstring earthquake, whose epicenter is located approximately 25 miles to the northwest of the West Range Site. The magnitude of the Bowstring quake was estimated to be 3.8. Magnitude 3 earthquake shocks are barely perceptible by humans. Magnitude 5 shocks will be disturbing to nearby observers but will not do much damage. The Bowstring epicenter is located along one of the northwest trending fault lines emanating out from the iron range. However, the West Range and East Range Sites do not appear to be located on these fault lines.

3.4.4 Paleontological Resources

3.4.4.1 Regional Features

Fossils are found within sedimentary rocks of the appropriate age and type. The Mesabi Iron Range consists of mostly igneous and metamorphic rocks, which do not contain fossils. Only one of the sedimentary rock formations in the area is known to contain fossils. The Coleraine Formation is an irregular conglomerate composed largely of iron-formation clasts, hematite-cemented sandstone, and blue-green shale, and was formed within a marine environment. There are mostly invertebrate fossils in the form of shells preserved in the deposits; though fossilized shark's teeth, ocean snails, clams, and crocodile parts have been uncovered.

3.4.4.2 West Range Site and Corridors

The Coleraine Formation is found within isolated pockets between the Proterozoic and the glacial deposits in the area around the West Range Site. Because glacial deposits cover the majority of the area, the occurrences of the Coleraine Formation are restricted to areas with mining operations, where the overburden has been removed. The Coleraine Formation is primarily known from the walls of the HAMP, which is located in the Hill Annex Mine State Park. The state park also has tailings piles with waste rock excavated from the mining operations. It currently provides fossil-hunting tours to the public.

The West Range Site is located to the north of the assumed extent of the Coleraine Formation; however, the southern portion of the rail alignment and most of the HVTL lines would be located where the formation is hypothesized to be found. The true extent of the Coleraine formation is not known, particularly because it is not continuous.

3.4.4.3 East Range Site and Corridors

The Coleraine formation is not found in the vicinity of the East Range Site or its corridors.

3.4.5 Soils

3.4.5.1 Regional Features

Soil formation in northern Minnesota is dominated by erosion, glacial activity, and the type of parent material. The final retreat of the glaciers at the end of the Holocene left a thick layer of sediment carried from the north. Soil formation today in northern Minnesota occurs primarily on these glacial deposits and is modified by the large amount of glacial water trapped above the igneous bedrock. Wetlands are found in areas of low elevation and generate thick organic soils sequences. Upland areas tend to be well drained and can have a wide variety of clast size. Therefore, landscape position and parent material are some of the primary factors in the area soil formation.

The soil descriptions provided are categorized by their parent material because they are well correlated to the soil characteristics pertinent to the impact analysis. Further discussion of the West Range Site soil series and their attributes can be found in the Itasca County Soil Survey (USDA, 1987).

In some locations, soil surveys in northern Minnesota are still incomplete. The Soil Survey of Itasca County was completed in 1987, and the Natural Resources Conservation Service (NRCS) is currently preparing a soil survey for St. Louis County. Selected areas around Hoyt Lakes are depicted on preliminary maps, and limited soil descriptions are available. An earlier, rudimentary survey mapped soil landscape units around Hoyt Lakes in 1989. These data provide broad descriptions and lower resolutions than standard soil survey maps, and are only used as a baseline description. Since the soil survey information is in draft form, the East Range Site soil types are discussed qualitatively. The West Range and East Range Sites have a similar Quaternary history and topographic profiles, therefore, the soils could be considered similar.

3.4.5.2 West Range Site and Corridors

The West Range Site soils consist of nearly level to very steep, well-drained and somewhat poorly drained loamy and silty soils that formed in glacial till. Organic deposits also occur within the West Range Site, directly north and south of the footprint of the proposed IGCC power plant. Table 3.4-4 presents more detail about the soil series in the West Range Site and corridors. Where areas of wetness occur the soils are described as poorly drained till sediments and peat bogs. The HVTL corridors would cross recent organic deposits and soils formed from lacustrine deposits, glacial till, and glacial outwash. Given the length of the proposed HVTL corridors, there is not one predominant soil type. More information on the soil types is described in Table 3.4-4.

The organic soils have formed nearly level bogs, lake plains, and outwash plains. The depth of the peat extends to at least 6 feet, the maximum depth evaluated by the soil survey. There are numerous areas of compressible, highly organic soils with a groundwater table 3 feet or less below the surface. Shallow excavations in organic deposits are very unstable due to seeping water and cutbank cave-ins. Some organic materials are also found over sandy alluvial materials. These soils consist of 1 to 2 feet of peat underlain by loam, loamy sand, coarse sand, loamy coarse sand, sand, and silt loam. The depth to the seasonal high groundwater table ranges from 2 feet above to 3 feet below ground surface.

Lacustrine deposits are poorly drained and occur on flat and slightly concave slopes on glacial lake plains and outwash plains. They consist of silt loam, clay loam, loam, loamy very fine sand, and very fine sand. The water table is also very high in these soils, which severely impedes shallow excavations because of wetness and caving cutbanks. Glacial till soils are extremely variable, with their characteristics depending on the local topography and water table. The soils consist of silt loams to loamy fine sand, and are located on the tops of glacial moraines to flat glacial till plains. When digging in areas with a high water table, these soils are also unstable.

The majority of soils formed on glacial outwash deposits are well to excessively well-drained. These soils include loamy fine sand, fine sand, fine sandy loam, sandy loam, loamy sand, coarse sand, loamy coarse sand, sand, silt loam, and gravelly sand. The finer soils tend to be near the ground surface and become coarser with depth.

All of the natural gas pipeline alternatives would cross organic, glacial till, and glacial outwash deposits. Given the length of the proposed gas pipeline corridors, there is not one predominant soil type. Organic deposits and a high water table are primarily found along the southern corridor of the NNG Pipeline Alternatives 1 and 2, around Trout Lake, and approaching the town of Blackberry.The process water pipeline corridors would follow existing corridors that, when necessary, cross mine tailing deposits, also known as slickens. Slickens consist of mine tailings left over from the taconite concentration process. Process water pipeline segments 2 and 3 would cross glacial till with a water table deeper than 3 feet below ground surface. More information on these soil types is provided in Table 3.4-4. The Blowdown Pipeline Alternatives 1 and 2, and potable water and sewer pipelines all primarily cross well-drained glacial till.

The Rail Alignment Alternatives 1A and 1B both cross glacial till on their approach to the proposed IGCC power plant site. Alternative 1A would cross peat after branching from the CN rail line, and again within the West Range Site. The rail loop would be located on primarily poorly-drained organic and glacial till deposits. Alternative 1B would first cross mine tailing piles and slickens north of the Arcturus mine, then over a large area of peat and muck directly east of the power plant. The Alternative 1B rail loop would also be located on the organic soils adjacent to the Mesaba Generating Station.

The access roads 1 and 2 would primarily cross glacial till. Access Road 1 would cross a mine tailings pile and an old mine tailings basin directly north of US 169. The road would cross organic soils where it would join CR 7. Access Road 2 would cross more organic deposits when approaching the West Range Site.

Table 3.4-4. Soil Types along the West Range Site and Corridors

Parent Material	Drainage	Seasonal High Groundwater Table Depth	Potential for Re-vegetation	Location
Recent Organic Deposits	Poorly drained	2 ft below to 2 ft above ground surface	**Good**: wetland plants **Poor**: grasses, wild herbaceous plants, hardwood and coniferous trees	1,2,3,4,5,6,7,9
Recent Organic Deposits over Alluvium	Poorly drained	3 ft below to 2 ft above ground surface	**Good**: wetland plants **Poor**: grasses, wild herbaceous plants, hardwood and coniferous trees	1,2
Lacustrine Deposits	Poorly drained	1 to 3 ft below ground surface	**Good**: wild herbaceous plants, grasses and legumes, hardwood trees and coniferous plants **Fair to Good**: wetland plants **Fair**: grasses, legumes, hardwood trees and plants	2
Glacial Till	Variable; Very poorly drained to Well drained	Variable; 1 to greater than 6 feet below ground surface	Variable; slope and local drainage determines the potential for re-vegetation **Good**: grasses, legumes, wild herbaceous plants, hardwood trees **Fair to Good**: coniferous plants and wetland plants	1,2,3,4,5,6,7,8, 9,10
Glacial Outwash	Well to excessively drained; some locations are poorly drained	Greater than 6 ft below ground surface	**Good**: grasses and legumes, wild herbaceous plants, hard wood trees, and coniferous plants **Fair**: wild herbaceous plants **Poor**: wetland plants	2,3
Mine Pits and Tailings Piles	Tailings piles are well drained. Flooding of mine pits varies by location	Varies by location	**Poor**: grasses, legumes, wild herbaceous plants, hardwood tress, coniferous and wetland plants	4,9,10

Notes:
1. West Range IGCC Power Plant site
2. West Range HVTL WRA-1, WRA-1A, and WRB-2A
3. West Range Gas Pipeline Alternative 1, 2, and 3 corridors
4. West Range Process Water Pipelines
5. West Range Process Water Blowdown Pipeline 1
6. West Range Process Water Blowdown Pipeline 2
7. West Range Portable Water and Sewer Pipelines
8. West Range Rail Line Alternative 1A
9. West Range Rail Line Alternative 1B
10. West Range Access Roads

3.4.5.3 East Range Site and Corridors

Since the St. Louis County Soil Survey is not yet available publicly, soils at the East Range Site were assumed to be similar to the West Range Site due to their locations in similar climatic conditions and the similar parent materials. The depth to the water table at the East Range Site is not known.

A previous soil landscape study performed for the area was used to provide a limited characterization of the locations of organic deposits (Land Management Information Center, 1996). The East Range Site would be located on glacial till deposits. Initial studies of the soil indicate that the area has well-drained, sandy, light colored soil, which is consistent with the glacial parent materials. The HVTL 38L alternative route would traverse glacial till, glacial lake sediments and peat. The water table would be high around the peat deposits. Glacial lake deposits contain soft to medium stiff, stratified clay and silt deposits, and

tend to have a high groundwater table. Occasional cobbles and boulders are also encountered within the deposits. The HVTL 39L/37L alternative route would cross slickens from mine tailings piles around Eveleth, in addition to the glacial till, glacial lake sediments and peat. Mine tailings piles contain overburden soil from iron mining operations, which typically consists of glacial till. They also contain fragments of rock and low-grade iron ore. The ore is typically 3 to 10 inches in diameter, but can range in size from pebbles to large boulders. The tops of the tailings piles are typically flat and the side slopes are steep. Some piles are as much as 200 feet high. The Natural Gas Pipeline corridor would cross soils similar to those along the HVTL corridors.

The process water pipeline corridors would exist on CE property, and would cross soils disturbed from mining operations. The spoil from mining operations includes glacial till and fragments of rock or iron ore, and becomes incorporated into the preexisting soil column. A portion of all of the process water pipelines would cross mine deposits, and segments 6-S-2WX, K-2WX, 2WX-Site, and 2WX-2W would also cross glacial till.

The soils underlying Rail Line Alternatives 1A and 1B, the potable water and sewer pipelines, and the access road corridors would consist of glacial till. These soils are discussed in further detail above and in the West Range section (Section 3.4.5.2).

3.4.6 Prime Farmland

3.4.6.1 Regional Features

The Federal Farmland Protection Policy Act (Public Law 97 98; 7 U.S.C. 4201 et seq.) and the Minnesota Agricultural Land Preservation and Conservation Policy Act (M.S. 17.80-17.84) have been enacted in an effort to document the potential impacts to agricultural land through the NEPA process and to preserve land with the potential to consistently produce food and raw materials. The supply of high quality farmlands is limited; therefore, the U.S. Department of Agriculture (USDA) encourages the preservation of soils classified as "Prime Farmland," "Prime Farmland, if Drained," or "Farmland of Statewide Importance." The NRCS Handbook, part 622.06 (USDA, 2006) defines prime farmland as:

> *Land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is also available for other uses. It has the soil quality, growing season, and moisture supply needed to produce economically sustained high yields of crops when treated and managed according to acceptable farming methods, including water management. In general, prime farmlands have an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. They are permeable to water and air. Prime farmlands are not excessively erodible or saturated with water for a long period of time, and they either do not flood frequently or are protected from flooding.*

Minnesota Rule 4400.3450, Subpart 4 ("Prime Farmland Exclusion") provides that

> *No large electric power generating plant site may be permitted where the developed portion of the plant site, excluding water storage reservoirs and cooling ponds, includes more than 0.5 acres of prime farmland per megawatt of net generating capacity, or where makeup water storage reservoirs or cooling pond facilities include more than 0.5 acres of prime farmland per megawatt of net generating capacity, unless there is no feasible and prudent alternative.*

The provision does not apply to areas located within home rule charter or statutory cities, areas located within two miles of home rule charter or statutory cities of the first, second, and third class, or areas designated for orderly annexation under Minnesota Statutes § 414.0325 (Excelsior, 2006a).

Prime farmland or farmland of statewide importance may occur in a variety of parent materials, geomorphic locations and climates. In northern Minnesota, soils formed on lacustrine or glacial till parent materials are generally considered prime farmland. Soils that also contain surface water may also be considered "Prime Farmland, if Drained." Some soils are not considered prime farmland but may have properties that are recognized by the state as suitable for production of food, feed, fiber, or forage. The Minnesota state soil surveys identify soils that are considered prime farmland or farmland of statewide importance.

3.4.6.2 West Range Site and Corridors

Fourteen soil series found along the proposed West Range Site and utility corridors are classified as either "Prime Farmland," "Prime Farmland, if Drained," or "Farmland of Statewide Importance." These soils are primarily silt loams located on shallow slopes and are generally well drained.

The West Range Site footprint is primarily located on soils identified either as "Prime Farmland Soils," or "Prime Farmland, if Drained." For the West Range Site, soils that are within the site ownership boundary or within the utility corridor rights–of-way and have been designated as prime or statewide important farmland are shown on Figure 3.4-7. Some soils have a seasonally high water table, but qualify as prime farmland where they have been drained. There currently is no active farming in this area.

Prime and statewide important soils are ubiquitous in the area surrounding the West Range Site (Figure 3.4-7). All of the HVTL, pipeline, and transportation corridors would cross over sections of soils classified as "Prime Farmland," "Prime Farmland, if Drained," and "Farmland of Statewide Importance." Some corridors would cross land that has previously been disturbed from mining activities. The process water pipelines Segments 1, 2, and 3 would cross fewer farmland soils as they approach the mine pits. Rail Alignment Alternative 1B would also cross fewer prime and statewide important soils around the mine tailing piles to the east of the power plant.

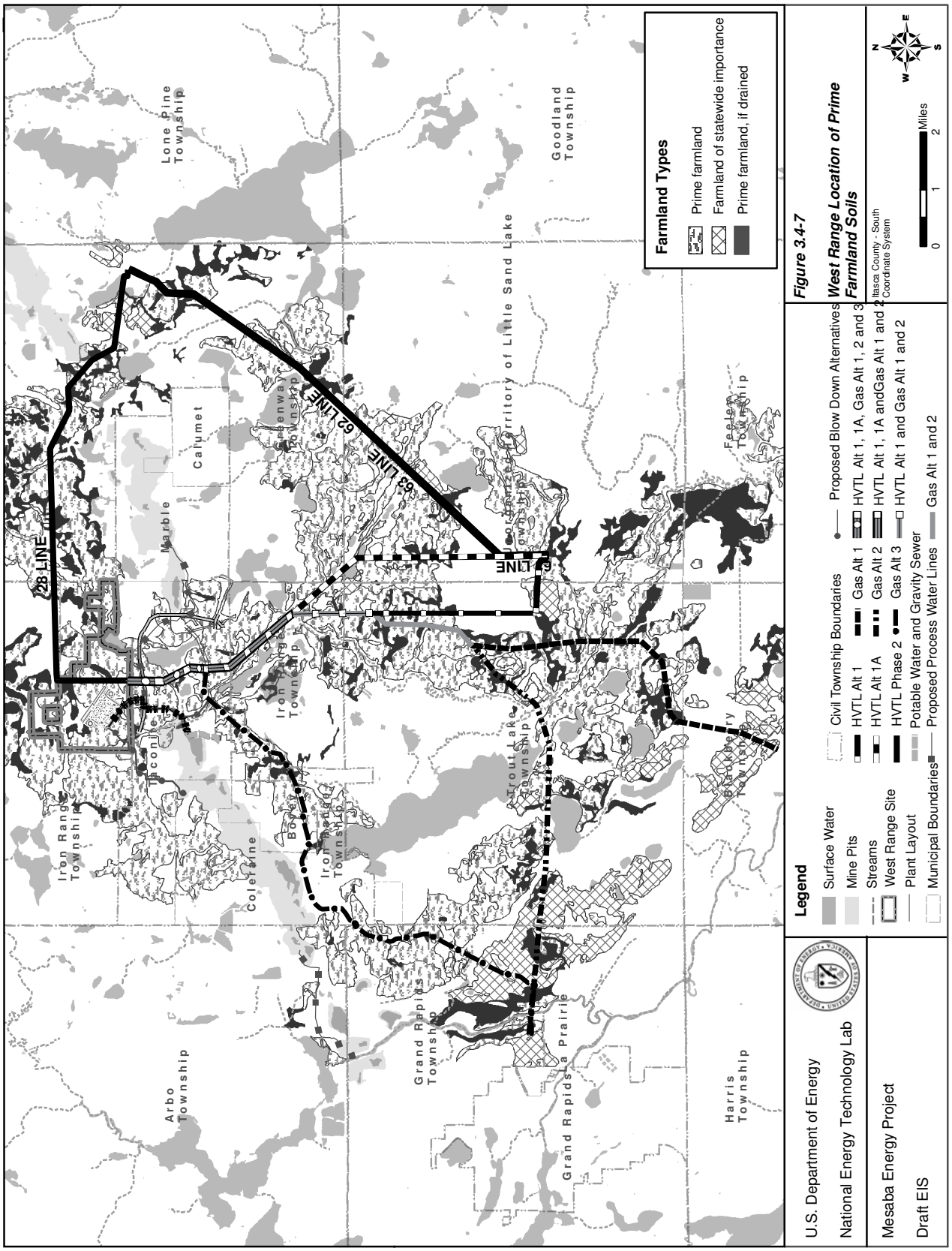
Facilities associated with the West Range Site that lie outside the City limits of Taconite and Marble (Taconite and Marble abut one another at the eastern-most boundary of Taconite and both are statutory cities) are limited to the LMP pumping station, Segment 1 of the Process Water Supply Pipeline, and the outfall at its point of termination of the Segment 1 pipeline (Excelsior, 2006a).

3.4.6.3 East Range Site and Corridors

The St. Louis County soil survey is currently being prepared, therefore, only preliminary soils data exists for parts of the county. However, the soils surrounding the East Range Site have been qualitatively analyzed from preliminary maps. Based on available mapping, two soil series are classified as "Farmland of Statewide Importance" soils within the vicinity of the East Range Site. No soils in the southern portion of St. Louis County are associated with the Prime Farmland classification. Since the soil survey data from St. Louis County are preliminary, the maps used in this analysis, as well as soil series classifications, are subject to change. In locations where the corridors cross tailing piles or disturbed mining areas, the presence of prime and statewide important soils is highly unlikely.

The area surrounding the East Range Site is an industrial region with several mining operations. Therefore, there is little farming activity surrounding the East Range site and no current farming practices are being conducted on the proposed project site.

The generating station footprint and many of the station's associated facilities are located entirely within the City limits of Hoyt Lakes, a statutory city. The Process Water Supply Pipeline Segment 7 is located within the City of Aurora, also a statutory city. Facilities associated with the East Range Site that lie outside the City limits of Hoyt Lakes or Aurora are Segment 6 and Segment 8 of the Process Water Supply Pipeline (Excelsior, 2006a).


Farmland Types
Prime farmland
Farmland of statewide importance
Prime farmland, if drained
Lone Pine Township
Goodland Township
Calumet
Marble
Territory of Little Sand Lake
Feeley Township
Iron Range Township
Coleraine
Iron Range Township
Iron Range Township
Trout Lake Township
Boundary Township
Arbo Township
Grand Rapids Township
Grand Rapids Prairie
Harris Township
28 LINE
62 LINE
63 LINE
5 LINE
Legend
Surface Water
Mine Pits
Streams
West Range Site
Plant Layout
Municipal Boundaries
Civil Township Boundaries
HVTL Alt 1
HVTL Alt 1A
HVTL Phase 2
Potable Water and Gravity Sewer
Proposed Process Water Lines
Proposed Blow Down Alternatives
Gas Alt 1
Gas Alt 2
Gas Alt 3
Gas Alt 1 and 2
HVTL Alt 1, 1A, Gas Alt 1, 2 and 3
HVTL Alt 1, 1A andGas Alt 1 and 2
HVTL Alt 1 and Gas Alt 1 and 2
Figure 3.4-7
West Range Location of Prime Farmland Soils
Itasca County - South Coordinate System
Miles
0
1
2
N
E
S
W
U.S. Department of Energy
National Energy Technology Lab
Mesaba Energy Project
Draft EIS

3.4.7 Suitable Formations for Geologic Sequestration of Carbon Dioxide

Excelsior is currently working with the University of North Dakota Energy and Environmental Research Center to assess CO_2 management options as part of the Plains CO_2 Reduction (PCOR) Partnership (see Section 2.2.1.3). The Phase I and Phase II Mesaba Generating Station would be designed as carbon capture adaptable, in the event that the CO_2 can be either commercially used under economically advantageous conditions, or sequestered in response to a nationally implemented climate change program that includes regulatory constraints on greenhouse gas emissions. It is anticipated that approximately one third of the carbon in the PRB feedstock could be captured with existing technology, with a subsequent reduction in capacity and plant efficiency.

Carbon is currently being sequestered in capped sandstone or limestone aquifers, frequently around areas with oil or gas production. Some of the closest areas for potential carbon sequestration around the Proposed Action would be in the oil fields or coal seams in the Williston Basin in northwestern North Dakota (approximately 400 miles from the proposed West Range Mesaba Generating Station). There is also potential for sequestration in saline formations within the Mississippian-Madison Saline Aquifer System in western North Dakota and northwest South Dakota, and also within the Lower Cretaceous Saline Aquifer System in central North Dakota and South Dakota (approximately 260 miles from the West Range Mesaba Generating Station). Additional information on these potential sinks and their estimated storage capacities is available in a December 2005 PCOR publication titled "Geologic Sequestration Potential of the PCOR Partnership Region" at http://www.netl.doe.gov/technologies/carbon_seq/partnerships/phase1/pdfs/MDJ-Geologic Sequestration Potential.pdf.

Excelsior prepared a "Plan for Carbon Capture and Sequestration" in October 2006 that explored the economic factors associated with selecting geologic sequestration options and locations. The most promising options would deliver the CO_2 by pipeline for enhanced oil recovery operations in the Williston Basin. The plan also evaluated injection into the Lower Cretaceous Saline Formation in eastern North Dakota. Although existing CO_2 pipelines would be utilized wherever feasible, new CO_2 pipeline would need to be constructed to transport CO_2 to the sequestration sites. Excelsior would continue to work with the PCOR Regional Partnership to explore possibilities for sequestering the CO_2 from the Mesaba Energy Project, such as collaborating on a potential Phase III demonstration project proposal under NETL's Carbon Sequestration Program.

Excelsior recently discussed potential carbon sinks in the Upper Midwest with Julio Friedmann, the Associate Program Leader of the Carbon Management Program at Lawrence Livermore National Laboratory and Harvey Thorleifson, Director of the Minnesota Geological Survey. Based on those discussions, Excelsior concluded that prospects do exist in Minnesota for geologic formations that may be appropriate for sequestration. At present, the geological understanding of these formations is limited and further study is necessary to determine their suitability for carbon sequestration.

A formation in eastern Minnesota called the Midcontinent Rift holds the potential to be suitable for carbon sequestration and comes within 100 miles of both proposed plant sites. It contains significant formations of sedimentary rock that may have adequate porosity for carbon sequestration. At this time, it is not certain whether such formations exist at a suitable depth and with a sufficient degree of geological seal for carbon sequestration to be feasible.

The geological formations and reservoirs that PCOR and other regional initiatives identify as carbon sequestration sinks (and quantify capacity thereof) have been relatively well characterized geologically as part of previous oil and gas exploration activities. Such characterization is expensive and therefore is generally (but not strictly) obtainable because of the economic opportunities that accompany fossil fuel exploration. Because of the lack of oil and gas exploration in the area, the Midcontinent Rift in Minnesota has not been characterized to the degree of other identified and confirmed sinks. Excelsior is exploring ways to facilitate this research. However, until this occurs, the potential to sequester carbon in Minnesota is uncertain.

3.5 WATER RESOURCES

Ready access to an abundant supply for water is an important consideration in siting power plants, as water is necessary for steam generation, cooling, and process water. The following sections describe the water resources (surface and groundwater) in the vicinity of the Mesaba Energy Project alternatives and the associated utility and transportation corridors.

3.5.1 West Range Site and Corridors

The following sections identify the prominent surface water features and describe the major drainage areas and watersheds associated with the West Range.

3.5.1.1 Surface Water Sources

The West Range Site lies in the northern region of the Upper Mississippi River Basin (UMRB) Watershed. Major surface water bodies in the vicinity of the Mesaba Generating Station are listed in Table 3.5-1. The major drainage areas throughout the Mesaba Generating Station and associated utility and transportation corridors are shown in Figure 3.5-1.

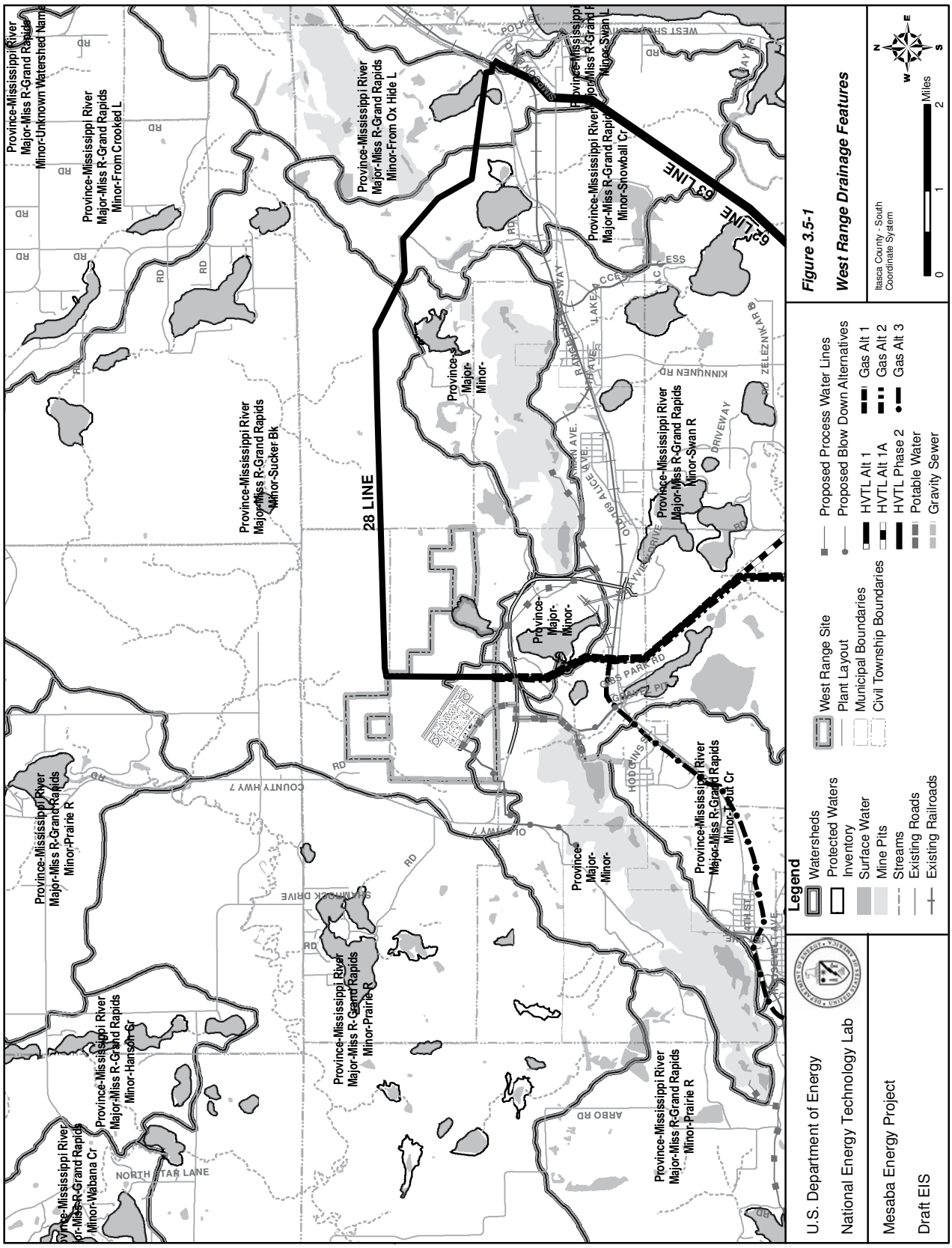
There are three primary watersheds within the vicinity of the West Range Site. The Prairie River watershed encompasses the northern portion of the project site. The southern portion of the Power Station lies in a sub-watershed that drains into the CMP. The CMP watershed does not have a surface hydrologic connection to the other watersheds since the CMP does not have a surface water outlet. The Swan River watershed is south of the CMP sub-watershed. Both the Prairie River and the Swan River drain to the Mississippi River.

There are a number of water features (natural lakes, water-filled mine pits, and rivers/streams) located in the area surrounding the proposed generating station. The primary natural lakes in the area include: Dunning Lake, adjacent to the east edge proposed generating station property; Big Diamond Lake, to the southeast of the proposed plant; and Holman Lake, to the south. As most of the taconite mining in the area has ceased, many of the pits created by these operations have filled in with water, some to the point that they have connected with adjacent pits. Specifically, these pits include the CMP, the HAMP Complex, and the LMP. A map of the locations of these water features near the proposed power station is provided in Figure 3.5-2. As the abandoned mine pits are being considered as sources of raw water for the power station, the current capacity of each is presented in Table 3.5-2.

Table 3.5-1. Surface Water Bodies

Surface Water	Watershed	FEMA[1] Designated Floodplain	Public Water[2]	Special Water[3]	MPCA Designated Impaired Water[4]	Target TMDL Study[5]	Source of Impairment
Big Diamond Lake	Swan River		X				
Canisteo Mine Pit (CMP)	**NA**						
Dunning Lake	Prairie River		X				
Greenway Mine Pit	Prairie River						
Hill-Annex Mine Pit (HAMP)	**Swan River**						
Holman Lake (Hill Lake)	**Swan River**		**X**				
Lind Mine Pit (LMP)	**Prairie River**						
Little Diamond Lake	Swan River		X				
Lower Panasa Lake	Swan River		X		X	NO	Mercury FCA[6]
Mississippi River		X	X	X	X	NO	Turbidity, Low oxygen Mercury FCA[6]
Oxhide Creek	Swan River		X				
Oxhide Lake	Swan River		X		X	NO	Mercury FCA[6]
Prairie River	**Mississippi River**	**X**	**X**				
Snowball Creek	Swan River		X				
Swan River	Mississippi River	X	X		X	NO	Fecal coliform Low oxygen Mercury FCA[6]
Trout Creek	Swan River		X				
Trout Lake	Swan River		X	X	X	NO	Mercury FCA[6]
Twin Lakes	Swan River		X				
Upper Panasa Lake	Swan River		X		X	NO	Mercury FCA[6]
West Hill Mine Pit	Prairie River						

[1] Federal Emergency Management Agency (FEMA)
[2] MNDNR Designated Public Water
[3] MPCA Designated Special Water
[4] MPCA Designated Impaired Water, 2006 EPA Draft 303(d) list of impaired waters. No data does not necessarily mean that the water body is not impaired. It may be that the water body has either not been sampled or there are not enough data to make an impairment determination.
[5] Total Maximum Daily Load
[6] Fish Consumption Advisory
Surface Waters shown in bold are being considered for either a process water source or receiving waters for discharges.
Source: Excelsior, 2006a


Province-Mississippi River Major-Miss R-Grand Rapids Minor-Unknown Watershed Name
Province-Mississippi River Major-Miss R-Grand Rapids Minor-From Crooked L
Province-Mississippi River Major-Miss R-Grand Rapids Minor-From Ox Hide L
Province-Mississippi River Major-Miss R-Grand Rapids Minor-Showball Cr
Province-Mississippi River Major-Miss R-Grand Rapids Minor-Sucker Bk
Province-Mississippi River Major-Miss R-Grand Rapids Minor-Swan R
Province-Mississippi River Major-Miss R-Grand Rapids Minor-Prairie R
Province-Mississippi River Major-Miss R-Grand Rapids Minor-Harrison Cr
Province-Mississippi River Major-Miss R-Grand Rapids Minor-Wabana Cr
Province-Mississippi River Major-Miss R-Grand Rapids Minor-Trout Cr
28 LINE
62 LINE
63 LINE
COUNTY HWY 7
OLD HWY 7
NORTH STAR LANE
ARBO RD
GRAVEL PIT
Legend
Watersheds
Protected Waters Inventory
Surface Water
Mine Pits
Streams
Existing Roads
Existing Railroads
West Range Site
Plant Layout
Municipal Boundaries
Civil Township Boundaries
Proposed Process Water Lines
Proposed Blow Down Alternatives
HVTL Alt 1
HVTL Alt 1A
HVTL Phase 2
Potable Water
Gravity Sewer
Gas Alt 1
Gas Alt 2
Gas Alt 3
Figure 3.5-1
West Range Drainage Features
Itasca County - South
Coordinate System
Miles
0
1
2
U.S. Department of Energy
National Energy Technology Lab
Mesaba Energy Project
Draft EIS

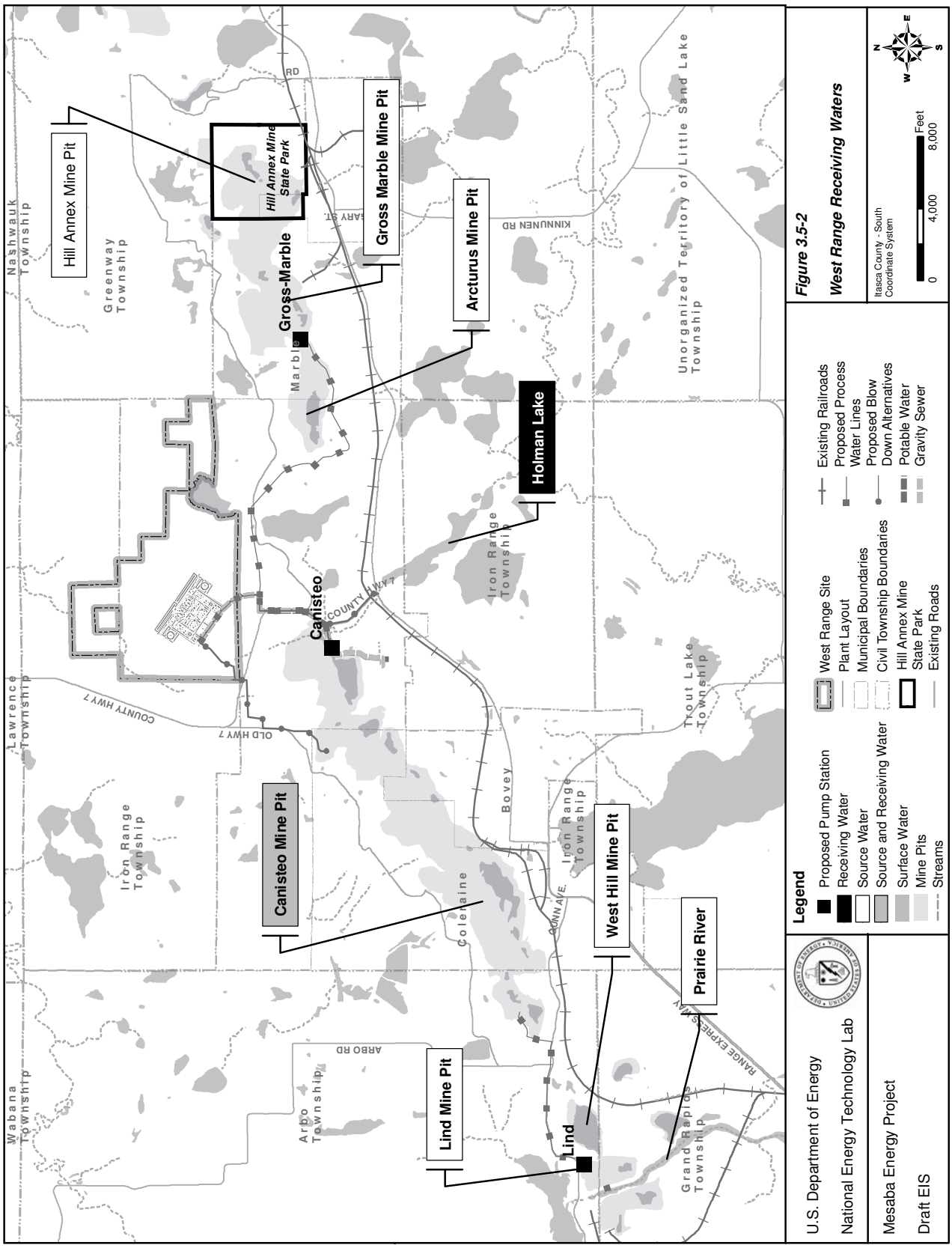

Hill Annex Mine Pit
Gross-Marble
Gross Marble Mine Pit
Arcturus Mine Pit
Holman Lake
Canisteo
Canisteo Mine Pit
West Hill Mine Pit
Prairie River
Lind
Lind Mine Pit
Hill Annex Mine State Park
Nashwauk Township
Greenway Township
Unorganized Territory of/Little Sand Lake Township
Lawrence Township
Iron Range Township
Trout Lake Township
Bovey
Coleraine
Wabana Township
Arbo Township
Grand Rapids Township
COUNTY HWY 7
OLD HWY 7
ARBO RD
KINNUNEN RD
DONNAVE.
RANGE EXPRESSWAY
Legend
Proposed Pump Station
Receiving Water
Source Water
Source and Receiving Water
Surface Water
Mine Pits
Streams
West Range Site
Plant Layout
Municipal Boundaries
Civil Township Boundaries
Hill Annex Mine
State Park
Existing Roads
Existing Railroads
Proposed Process
Water Lines
Proposed Blow Down Alternatives
Potable Water
Gravity Sewer
Figure 3.5-2
West Range Receiving Waters
Itasca County - South Coordinate System
0
4,000
8,000
Feet
N
E
S
W
U.S. Department of Energy
National Energy Technology Lab
Mesaba Energy Project
Draft EIS

Table 3.5-2. Capacity of West Range Mine Pits (November 2005)

Water Source	Water Surface Elevation (feet)	Surface Area (acres)	Estimated Volume (acre-feet)
CMP	1,309	1,400	150,000
HAMP Complex			
Hill-Annex Mine Pit	1,249	216	20,600
Arcturus Mine Pit	1,269	105	4,490
Gross/Marble Mine Pit	1,249	141	11,100
LMP	1,265	82	8,310

Source: Excelsior, 2006a

In addition, there are a number of existing operations that use some of these water features as source water. Table 3.5-3 presents a summary of existing MNDNR water appropriation permits in the vicinity of the West Range Site.

Table 3.5-3. Existing Water Appropriation Permits for Surface Waters Near The West Range Site

Permitee	Resource	Permitted		Reported Pumping (Million Gallons)				
		GPM	MG/Y	2000	2001	2002	2003	2004
Jackson, Allen	Mississippi River	250	13	ND	ND	2.2	ND	ND
Schwartz Redi Mix Inc.	West Hill-Annex Pit	900	39	ND	ND	ND	ND	21.6
MNDNR	Hill-Annex Tailing Basin	4,500	500	ND	ND	ND	ND	70.3
MNDNR	Hill-Annex Mine	7,000	3,416	ND	ND	621.1	1,550.3	1,374
U of MN	Prairie River	500	7	ND	ND	ND	ND	ND
U of MN	Prairie River	1,000	60	6.7	17	18.1	25.6	20.1
U of MN	Prairie River	1,000	60	7.8	ND	0.4	23.4	26.5
Blandin Paper Co.	Mississippi River	30,000	7,000	7,985	7,041	6,350	6,429	6,088
Jackson, Allen	Mississippi River	265	4	2.8	ND	ND	2.5	ND
Swan Lake Country Club	Oxhide Creek	540	10	4.6	8.5	9.2	8.4	5.8
City of Coleraine	Trout Lake	400	41	37	19.7	19.7	12.1	11.9

ND – No Data
Source: Excelsior, 2006a

The following sections provide more detail about the primary water bodies that are being considered as raw water sources or receiving waters for discharges from the West Range Mesaba Generating Station.

Canisteo Mine Pit Complex

The CMP Complex is made up of a number of abandoned mine pits. The CMP is situated northeast of the city of Grand Rapids and immediately north of the cities of Coleraine, Bovey, and Taconite. The entire mine pit complex is approximately 4.5 miles long and 0.5 miles wide and has a drainage area of

approximately 4,536 acres. The pit complex has a maximum depth of approximately 300 feet and a surface area of almost 1,400 acres. The water surface elevation in the mine pit on November 1, 2005 was 1,308.75 feet mean sea level (msl), which corresponds to a surface area of 1,393 acres and a water volume of 149,500 acre-feet.

The CMP Complex currently does not have a surface outlet. Water enters the complex through surface water runoff and groundwater inflow. Outflow consists only of groundwater seepage and evaporation. The amount of surface and ground water that currently enters the mine pit is greater than the amount of water lost by seepage and evaporation, which results in a net inflow of water. The water surface elevation has continued to rise since pumping of the CMP ceased in September 1985.

The CMP Complex has been modeled with the WATBUD model, which is a water balance model developed by the MNDNR, used to evaluate and predict water inflows and outflows for surface water bodies. The MNDNR has also monitored the water surface elevation in the mine pit and monitoring wells since 1989, and used these data to calibrate the WATBUD model and develop stage-storage relationships for the pit.

Using the stage-storage data from 1989 to 1995, the CMP had a net average inflow of 3,164 gallons per minute. From 1995 to present, recharge rates range from 810 gallons per minute to 4,190 gallons per minute, with an average of 2,580 gallons per minute. The stage-storage data has also indicated that the net inflow decreases as the level of the water in the pit reaches 1,300 feet msl, which is the elevation of the bedrock surrounding the pit. Results of the most recent (2005) modeling effort indicate that the CMP Complex will overflow within the next 4.5 to 8.5 years.

The U.S. Geological Survey (USGS) also conducted a study of the groundwater flow between the CMP and the surrounding aquifers (Jones, 2002). This study modeled the groundwater flows over varying CMP water level elevations (from 1,300 to 1,324 feet msl) and estimated the net inflow of groundwater into the CMP ranged from 628 gallons per minute at the 1,300 feet msl to 40 gallons per minute at the 1,324 feet msl. The 1,324 feet msl is the level at which the CMP will begin to overflow.

Jones (2002) found that some groundwater outflow from the CMP did occur at the 1,300 feet msl. The outflow occurred in the area between the CMP and Trout Lake (which is also the location of the two groundwater wells used by the City of Coleraine as their source from drinking water. The modeling also indicated that the net outflow drops to zero at CMP water levels at or below 1,292 feet msl.

Hill-Annex Mine Pit Complex

The HAMP Complex consists of the Arcturus, Gross-Marble, Hill-Trumbull, and Hill-Annex Mine Pits. These mine pits are located immediately north of the cities of Marble and Calumet, and cover an area of over three miles from east to west. The Arcturus, Gross-Marble, and Hill-Trumbull/Hill-Annex Mine Pits were separated by large volumes of waste material (tailings and overburden) deposited during the mining operations. Following the cessation of mining, the water levels in the pits began to rise, and the GMMP became connected to the Hill-Trumbull/Hill-Annex when the water surface elevation reached approximately 1,215 feet msl. The water surface elevation in the Arcturus is higher than that of the other pits, and has not developed a permanent surface connection to other pits; however water currently overflows out of the Arcturus into the GMMP. The stage in the GMMP and Hill-Trumbull/Hill-Annex pits were measured at 1,246.70 feet and Arcturus was measured at 1,268.51 feet on November 1, 2005 (Excelsior, 2006b).

Until 1979, mining operations kept the HAMP Complex completely dewatered. After that time, dewatering continued at several of the mine pits, while other pits began to fill with water after dewatering ceased. By 1981, all mining operations had ceased (Barr, 1987) and all the mine pits started filling with surface and groundwater. In 1988, the HAMP was established as a state park that offered tours of the mine pit features and facilities. The park, which is managed by the MNDNR, Division of Parks and Recreation, does operate a dewatering pump in order to keep the water level below some of the unique

features of the mine, but due to limited funding, the dewatering operations cannot be operated more than 5.5 months a year. As a result, the water level has risen above some of the mine features and facilities.

The current water level in the park allows the MNDNR to give boat tours of the pit during the summer months. There are mine features and several historic structures below the current water surface elevation that are viewed during these tours. According to the MNDNR's Draft Management Plan for the park, it is preferred to dewater the mine pit to an elevation between 100 and 150 feet below the current water surface elevation to expose historic structures and improve the interpretive quality of the site, as well as protect the historic structures on the pit rim. However, the dewatering of the pit to this level is currently cost prohibitive under the State Park's annual budget.

Inflows into the HAMP Complex include seasonal precipitation, surface and ground water components. Discharges from the system include evaporation, seepage (ground water outflow), and dewatering. The water levels in the HAMP Complex fluctuate as a result of the seasonal variations in evaporation, runoff, and dewatering. The dewatering operations at the HAMP by the MNDNR occur from the end of May until October, and the pumping averages 6,200 gpm while in operation.

Pumping records for the HAMP have been kept since 1973, and MNDNR staff continue to report dewatering volumes on a monthly basis, however stage data were not collected on a regular basis. Using the pumping records from 1973 to1979, when the HAMP was in operation, the estimated recharge rate was determined to range from 3,230 to 4,030 gallons per minute. Since these recharge rates are based on keeping the pit empty, they are likely the maximum rates and should decrease as the water level in the pit rises.

For the Arcturus Mine Pit (AMP), given that the pit was completely dewatered on January 1, 1979, and was completely full by 1999, an average recharge rate of 2,150 gallons per minute was calculated.

Prairie River

The Prairie River lies within the UMRB watershed and drains into the Mississippi River southeast of Grand Rapids and La Prairie. According to USGS data, the Prairie River watershed has an approximate drainage area of 360 square miles at the gauging station. The USGS also maintains a gauging station (gauge number 05212700) on the Prairie River, several miles upstream of its confluence with the Mississippi River. Prairie Lake lies on the Prairie River between the gauging station and the Mississippi River. Lake levels are controlled at an existing hydroelectric dam, located approximately 5 miles upstream of its confluence with the Mississippi River.

Flow data have also been collected at the gauging station from 1967 to 1983 and 2001 to present. Average monthly flow rates range from 50 to 200 cubic feet per second from August through March and range from 200 to 600 cubic feet per second range during the months of April, May, June, and July.

The Prairie River is being considered as a source of raw water for the West Range Power Station, and therefore, the raw water intake would be subject to the CWA rule 316(b) criteria regarding Cooling Water Intake Structures (CWIS). The rule specifies that, for CWIS on fresh water rivers, the maximum amount of water that can be taken is "5 percent of the mean annual flow or 25 percent of the 7Q10[1], whichever is the lesser."

The mean annual flow in the Prairie River is 319 cubic feet per second, and five percent of that flow is equal to 16 cubic feet per second. The 7Q10 in the Prairie River was determined to be 22 cubic feet per second, and 25 percent of that flow is equal to 5.5 cubic feet per second. Since 25 percent of the 7Q10 is the smaller amount, the maximum amount of water that can be appropriated from the Prairie River at one time is 5.5 cubic feet per second (2,468 gallons per minute). Only these data collected by MP at the

[1] The 7Q10 is the seven day low flow average with a 10-year recurrence interval.

Prairie Lake Dam from 1998 to 2004 were used in the determination of the mean annual flow and the 7Q10, since there was not a full year of record for 1997 and 2005.

Trout Lake

Trout Lake does not currently receive any surface water discharges from the CMP. Since the CMP water surface continues to rise, surface outlets for the CMP to Trout Lake have been evaluated by the MNDNR and Barr Engineering, and Trout Lake has been evaluated as a potential receiving water. The available studies (Excelsior, 2006b; Barr, 2004) identify a number of potentially negative and positive outcomes as a result of the CMP Complex discharging to Trout Lake.

Upper Panasa Lake

Upper Panasa Lake currently receives water from the HAMP Complex dewatering operations. The amount of water that is discharged ultimately to Upper Panasa Lake from the HAMP Complex is shown in Table 3.5-3. The impacts on Upper Panasa Lake resulting from the discharge water from the HAMP have not been studied.

Greenway Mine Pit

There are very little data on the Greenway Mine Pit (GMP). The pit has filled with water and has an outlet pipe that discharges to the Prairie River. Short Elliot Hendrickson, Inc. (SEH) personnel measured the pipe size, flow depth, and flow velocity at the pipe outlet (Excelsior, 2006b) and determined the outflow from the Greenway Mine Pit was approximately 1 cubic foot per second (450 gallons per minute) at the time of the field investigations.

West Hill Mine Pit

There are very little data on the West Hill Pit. The pit has filled with water and has an outlet pipe that discharges to the LMP. SEH personnel (November 2, 2005) measured the pipe size, flow depth, and flow velocity at the pipe outlet and determined the outflow from the West Hill Mine Pit was approximately 3.5 cubic feet per second (1,570 gallons per minute) at that the time of the field investigations.

Lind Mine Pit

There are very little data on the LMP. The pit has filled with water and has an outlet pipe that discharges to the Prairie River. SEH personnel (November 2, 2005) measured the pipe size, flow depth, and flow velocity at the pipe outlet and determined the outflow from the LMP was approximately 4 cubic feet per second (1,800 gallons per minute) at that time. A majority of the outflow comes from the West Hill Mine Pit (3.5 gallons per minute).

Holman Lake

Holman Lake is not being considered as a source for process water, but is being considered as a potential receiving water for cooling tower blowdown discharges. Holman Lake currently receives outflow from Little Diamond Lake, as well as surface water runoff. The lake previously received the dewatering discharge from the Canisteo Mine when the mine was operational. At that time, the water level in the lake was controlled by a concrete spillway. Currently, the water level is effected by a beaver dam built just upstream of the spillway. The lake is listed on MNDNR's Public Waters Inventory, but it is not currently designated for a particular water use classification, however there is a public swimming area on the eastern side of the lake. Some limited water quality information is available for Holman Lake.

3.5.1.2 Water Quality and Uses

The water needs of the Mesaba Generating Station at the West Range Site would be met by appropriating water out of the following nearby abandoned mine pits: the CMP, HAMP Complex, and the LMP. The Prairie River would also serve as a source of water supply and would be integrated into the mine pit water plan. The current water quality of each water source is summarized in Table 3.5-4. In

general, the current concentration of each constituent is based on the median concentration of available qualified water quality analyses.

Table 3.5-4. Current Water Quality for West Range Water Bodies

Constituent	Units	Water Quality Data				
		CMP	HAMP Complex	LMP	Prairie River	Holman Lake
Hardness	mg/L	308	229	n/a	n/a	n/a
Alkalinity	mg/L	180	163	178	76	186
Calcium	mg/L	55.3	59.1	73.2	50	50.2
Magnesium	mg/L	40.8	20.5	n/a	22	n/a
Iron	mg/L	<0.05	<0.05	n/a	n/a	0.75
Manganese	mg/L	<0.02	<0.02	n/a	n/a	0.04
Chloride	mg/L	5.15	5.2	4.9	1.3	8.4
Sulfate	mg/L	105	54.7	n/a	<5	10.1
TDS	mg/L	337	252	402	n/a	236
pH	mg/L	8.4	8.3	7.7	7.4	7.9
Aluminum	µg/L	<25	<25	n/a	91	n/a
Barium	µg/L	28.6	29.3	n/a	n/a	n/a
Cadmium	µg/L	<10	<10	n/a	n/a	n/a
Chromium (6+)	µg/L	<5	<5	n/a	n/a	n/a
Copper	µg/L	<10	<10	n/a	n/a	n/a
Fluoride	mg/L	n/a	n/a	n/a	n/a	n/a
Mercury	ng/L	0.9	0.9	0.8	0.59	<4.0
Nickel	µg/L	<5	<5	n/a	n/a	n/a
Selenium	µg/L	<2	<2	n/a	n/a	n/a
Sodium	mg/L	6.7	6.2	5.0	2.5	7.4
Specific Conductivity	umhos/cm	476	418	n/a	171	n/a
Zinc (3)	µg/L	<10	<10	n/a	n/a	n/a
BOD	mg/L	<2	<2	n/a	n/a	n/a
COD	mg/L	<2	<2	n/a	n/a	n/a
TOC	mg/L	1.9	1.8	n/a	n/a	n/a
TSS	mg/L	2	<1	n/a	n/a	n/a
Ammonia (as N)	mg/L	<0.1	<0.1	0.1	0.018	<0.1
Phosphorus	mg/L	<0.1	<0.1	0.01	0.029	0.01

n/a – no data available (not analyzed)
Source: Excelsior, 2006b

The natural surface water bodies within the project area are used for recreational purposes such as fishing, boating, and swimming. The CMP and the Greenway Mine Pit also host recreational uses, while the West Hill Mine Pit and the LMP do not have any known recreational uses.

3.5.1.3 Groundwater

Groundwater Quality and Quantity

The primary aquifer at the site is shallow Quaternary drift comprised of water-bearing sand and gravel deposits. Regionally, these aquifers occur beneath till and in ice contact features on the flanks of end moraines. End moraines are the ridge-like accumulation of till deposits marking a standstill position of a past or present glacier. Buried bedrock valleys in the region create variable thicknesses of Quaternary deposits. North of Taconite, Minnesota, Quaternary deposits range from approximately 10 to 40 feet thick, whereas, in the vicinity of the cities of Coleraine and Bovey (east of the site), Quaternary deposits are approximately 130 feet thick (USDI, 1965). Based on the results of geotechnical borings at the West Range Site, the unconsolidated deposits at the proposed facility consist of varying amounts of till and coarse alluvium, approximately 10 to 35 feet thick combined.

The West Range Site is located at a potentiometric high and groundwater recharge area for the shallow aquifer is due to the presence of the Giants Range Batholith (Excelsior, 2006b). A groundwater divide (where the groundwater flow direction is north and south with surface water features primarily influencing the direction of shallow flow) is present in the vicinity of the West Range Site. On the site itself, where the facility will be located, the groundwater flow direction of the shallow aquifer appears to be north and northwestward based on groundwater elevation data collected from the on-site groundwater monitoring wells. Ultimately, groundwater in the shallow aquifer at the site discharges to tributaries and surface water bodies that, subsequently, discharge into the Prairie River.

Immediately south of the West Range Site, a bedrock aquifer exists underlying the Quaternary deposits (Excelsior, 2006b). Bedrock in the area (Giants Range Batholith, Pokegama Quartzite, Biwabik Formation, and Virginia Formation) has very little primary porosity. However, secondary porosity in the form of fractures and leached zones has developed within Biwabik Formation allowing it to act as an aquifer (Excelsior, 2006b). Regional groundwater flow within the Biwabik Formation is south from the Giants Range Batholith toward the Swan River—a regional groundwater discharge feature. The groundwater flow direction of this bedrock aquifer specifically on the West Range site is interpreted to be south and southwest toward the CMP.

Mining activities in the area have influenced the natural groundwater system in the area (Excelsior, 2006b). Fractures and leached zones within the Biwabik Formation appear greatest near the mine pit complexes. The mine pits have been excavated below the water table and groundwater head of the Quaternary and bedrock aquifers. Local groundwater flow is influenced by the mine pits, directing flow towards the mine pit complexes (USDI 1965, Excelsior, 2006b). Since the cessation of mining activities, water levels in the mine pits have been increasing due to discharge of groundwater into the mined excavations.

Transmissivities and hydraulic conductivities of various shallow sand and gravel aquifers in the region have been estimated (Excelsior, 2006b). In studying the hydrogeology of the CMP area, the MNDNR and USGS installed 18 monitoring wells in the Quaternary drift aquifer(s) and performed pumping tests and hydraulic conductivity slug tests.

Average calculated transmissivities for sand and gravel aquifers ranged from 98 to 300 square feet per day. Average calculated hydraulic conductivities for the sand and gravel aquifers ranged from 2.2 to 68 feet per day (Excelsior, 2006b). Hydraulic conductivities for the four wells on the site ranged from 0.5 to 32.5 feet per day. Locally, well yields typically range from 300 to 500 gallons per minute for wells completed in the Quaternary drift deposits (Excelsior, 2006b), with yields up to 1,000 gallons per minute. The Biwabik Formation is a good source of groundwater for domestic use, and a fair source of supply for municipal and industrial use (Excelsior, 2006b). While the local aquifers have sufficient capacity to serve local municipal and residential groundwater users, these aquifers do not appear to have sufficient capacity to provide enough groundwater for the process water needs of the Mesaba Generating Station (over

15,000 gallons per minute peak requirements). Thus, a large number of wells would be required to pump enough water to meet the stations process water needs.

Although groundwater quantities and local aquifer capacities are limited (as far as being a source of process water supplies), it is feasible that one or more wells could be utilized for providing a potable water supply for the generating station. Indeed, several local public water supply wells are drilled into and utilize the Biwabik Formation.

Typically groundwater quality in the region has moderate dissolved solids content, is moderately siliceous, is very hard, and contains high levels of iron and manganese frequently above the maximum recommended limits of 0.3 milligrams per liter for iron and 0.05 milligrams per liter for manganese (USDI 1965, Excelsior, 2006b). Sand, ice-contact sand and gravel, and buried outwash aquifers have adequate yield (5 gallons per minute or more) and suitable quality for domestic use (total dissolved solids less than 1000 milligrams per liter) (Excelsior, 2006b). Of these, only buried outwash aquifers have suitable yield (900 gallons per minute or more) and quality (total dissolved solids less than 500 milligrams per liter, iron content less than 0.3 milligrams per liter, and hardness less than 180 milligrams per liter) for municipal or industrial use (Excelsior, 2006b).

Groundwater Depth and Recharge Sources

The potentiometric surface of the shallow Quaternary aquifer at the area is approximately 1350 to 1,400 feet msl (Excelsior, 2006b), approximately 10 to 60 feet below ground surface (bgs). Static groundwater elevations of the shallow aquifer(s) have been recorded by the Minnesota Department of Natural Resources in a series of monitoring wells in the area of the CMP, and from the time period between January 2001 and April 2005, the groundwater elevations ranged from 1280 to 1382 feet msl.

Groundwater flow is influenced by mine pits in the area (USDI, 1965); a potentiometric gradient exists between the surface water in mine pit lakes and groundwater in surrounding areas directing flow towards the mine pit complexes (Excelsior, 2006b). During periods of mine operation, dewatering in the mine pits reduced the amount of lateral flow (north to south) through bedrock and Quaternary deposits, and decreased potential vertical recharge to the bedrock aquifer south of the mine pits (Excelsior, 2006b).

Municipal wells for the cities of Bovey, Calumet, Coleraine, Marble, and Taconite are located south of the local mine pits (CMP and HAMP Complex). Table 3.5-5 summarizes the static water elevations and historic pumping in these wells.

Table 3.5-5. Pumping Groundwater Elevations City Municipal Wells

Date		Water Elevation	Pumping Rate	Duration
		ft msl	gpm	hours
	Marble 1			
1926	During mining operations	1150	300	-
1955		1164	350	-
1977		1105	248	2
1994	After mining operations ceased	1177	400	-
1999		1189	385	-
2000		1195	420	-
2001		1200	390	-
2002		1232	270	-
2003		1203	350	-

Table 3.5-5. Pumping Groundwater Elevations City Municipal Wells

Date		Water Elevation	Pumping Rate	Duration
		ft msl	gpm	hours
	Marble 2			
1955	During mining operations	1199	385	14
1965		1198	340	-
1977		1103	300	25
1989	After mining operations ceased	1236	270	-
1994		1193	300	-
1999		1196	330	-
2000		1201	360	-
2001		1203	310	-
2002		1207	-	-
2003		1221	220	-
	Bovey 1			
1953	During mining operations	1256	650	10
	Coleraine 1			
1918	During mining operations	1258	500	
	Coleraine 3			
1976	During mining operations	1243	1012	5
	Taconite 1			
1991	After mining operations ceased	1112	218	12

Average annual recharge to groundwater is approximately 5.7 to 7.6 inches (Excelsior, 2006b). Groundwater recharge to the shallow sand and gravel aquifer(s) is derived from precipitation infiltration and interconnections with surface water bodies (including mine pits that have filled with water). Groundwater recharge to the underlying Biwabik Formation bedrock aquifer is largely by vertical infiltration through the Quaternary deposits where the formation is not overlain by other bedrock (USDI, 1965). Lateral groundwater recharge occurs as groundwater travels south from the Giants Range Batholith.

Usage and Availability

Other than the four groundwater monitoring wells recently constructed, no wells are currently located on the property. However, numerous wells are located on surrounding properties. There are 23 domestic wells, 11 monitoring wells, three "other use" wells, and two public supply non-community transient wells in the area. The domestic supply wells are concentrated along CR 7, US 169, and north of Big Diamond Lake. These domestic wells utilize the Quaternary sand and or gravel aquifers.

Wells are also located adjacent to the CMP and the HAMP Complex. The wells adjacent to the mine pits are used for:

- Community Supply (10)
- Dewatering (1)
- Domestic (19)
- Industrial (2)

- Monitoring (38)
- Municipal (2)
- Public Supply (2)
- Other (7)

Public water supply wells for the cities of Bovey, Calumet, Coleraine, Marble, and Taconite are constructed in Quaternary and Biwabik Formation aquifers. Wells for the cities of Bovey and Coleraine are completed in the same unit of ice stratified Quaternary drift (USDI, 1965). The wells receive limited amounts of recharge through infiltration and receive some recharge from Trout Lake (USDI, 1965). According to the County Well Index and DNR State Water Use Database System of Water Appropriations Permits, the City of Bovey has one municipal well (Unique No. 228834). This well has a 16-inch diameter casing completed in sand and gravel Quaternary deposits. The static water elevation was 1,268 feet msl at the time of installation (1953). This groundwater level was recorded when the CMP was dewatered for mining activities. The City of Bovey is permitted to pump the well at a rate of 35.0 million gallons per year. The reported volume of groundwater pumped from this well in 2004 was 29.6 million gallons per year.

The City of Coleraine has two wells (Coleraine 1 and 3: Unique Nos. 241430 and 110457, respectively). Coleraine 1 is completed at a depth of 75 feet within undivided Quaternary drift. Coleraine 1 had a static water level of 1,283 feet msl at the time of well installation (1918). Coleraine 3 is 100 feet deep. It is completed within sand, gravel, and boulder Quaternary deposits. Coleraine 3 had a static water level of 1267 feet msl at the time of well installation (1976). The City of Coleraine is permitted to pump 80 million gallons per year from both wells. The reported pumped volume in 2004 was 52.2 million gallons per year for Calumet 1; there was no reported pumping in 2004 for Coleraine 3.

The cities of Marble, Calumet, and Taconite each have two public water supply wells. These six wells draw water from the Biwabik Formation bedrock aquifer. Marble 1 (Unique No. 228842) is 300 feet deep. The static water level was 1224 feet msl at the time of well installation (1926). Marble 2 (Unique No. 228846) had a static water level was 1258 feet msl at the time of installation (1955). The city of Marble is permitted to pump 49.0 million gallons per year from both of the wells. The reported volume of groundwater pumped for both wells in 2004 was 12.8 million gallons per year.

Calumet 2 (Unique No. 228839) was completed at a depth of 155 feet in the Virginia and Biwabik formations. The static water elevation was 1178 feet msl at the time of installation (1943). Calumet 3 (Unique No. 228838) is 203 feet deep. It is completed in the Virginia and Biwabik formations. The City of Calumet is permitted to pump 22.0 million gallons per year from both wells. The reported volume of groundwater pumped in 2004 was 5.8 million gallons per year for Calumet 2 and 6.2 million gallons per year for Calumet 3.

The City of Taconite Well 1 (Unique No. 241489) is 384 feet deep and is completed in the Biwabik Formation bedrock aquifer. The approximate static groundwater elevation in the well at the time it was constructed (1936) was 1,273 feet msl. Taconite No. 2 (Unique No. 495997) is 394 feet deep and also utilizes the Biwabik Formation aquifer. Its static water elevation was 1290 feet msl at the time of installation (1991). The City of Taconite is permitted to pump 20 million gallons per year (total) from both wells. The reported volume of groundwater pumped in 2004 was 7.9 million gallons per year for Taconite 1 and 7.3 million gallons per year for Taconite 2.

The cities of Bovey, Calumet, Coleraine, Marble, and Taconite rely on groundwater resources for public water supplies. Each city has public water supply wells open to either the shallow sand and gravel aquifer (the cities of Bovey and Coleraine) or the Biwabik Formation bedrock aquifer (cities of Calumet, Coleraine, Marble, and Taconite). Due to the close proximity of these local public water supply wells to

surface water bodies, a hydrologic connection may exist between the groundwater captured by the wells and local surface waters and mine pits. Due to the relatively high tritium concentrations detected by the Minnesota Department of Health (MDH) in the groundwater pumped from some of these public water supply wells, the source water aquifers (Quaternary sand and gravel deposits and the Biwabik Formation) appear to recharge quickly (i.e., 50 years or less) and are therefore more sensitive to land surface activities and more vulnerable to potential contamination.

Permits

No groundwater use or withdrawal permits currently exist for the Mesaba Energy Project. As previously mentioned in Section 2.5.2.3, MNDNR Water Appropriation Permits for groundwater withdrawal/use have been issued to local municipalities for public water supply systems (the cities of Bovey, Calumet, Coleraine, Marble, and Taconite). Regionally, groundwater appropriation permits have also been issued to mining companies for dewatering and farms for agricultural purposes and irrigation.

Four well permits were obtained from the MDH for constructing the four groundwater monitoring wells installed on the West Range Site in July 2005. These permits will be reissued annually by the MDH to the facility as long as the wells are still necessary and utilized.

Should groundwater be used for a potable water supply for the facility, a well permit from the MDH will be required. If the amount of groundwater pumped from a well for potable water supplies exceeds 10,000 gallons per day or 1 million gallons per year, a Water Appropriation Permit will be required from the MNDNR.

During construction of Phase I and Phase II, dewatering may be necessary that will temporarily lower the shallow water table aquifer in small localized areas. If the dewatering is expected to exceed 10,000 gallons per day or 1 million gallons per year, a Water Appropriation Permit will be attained from the MNDNR.

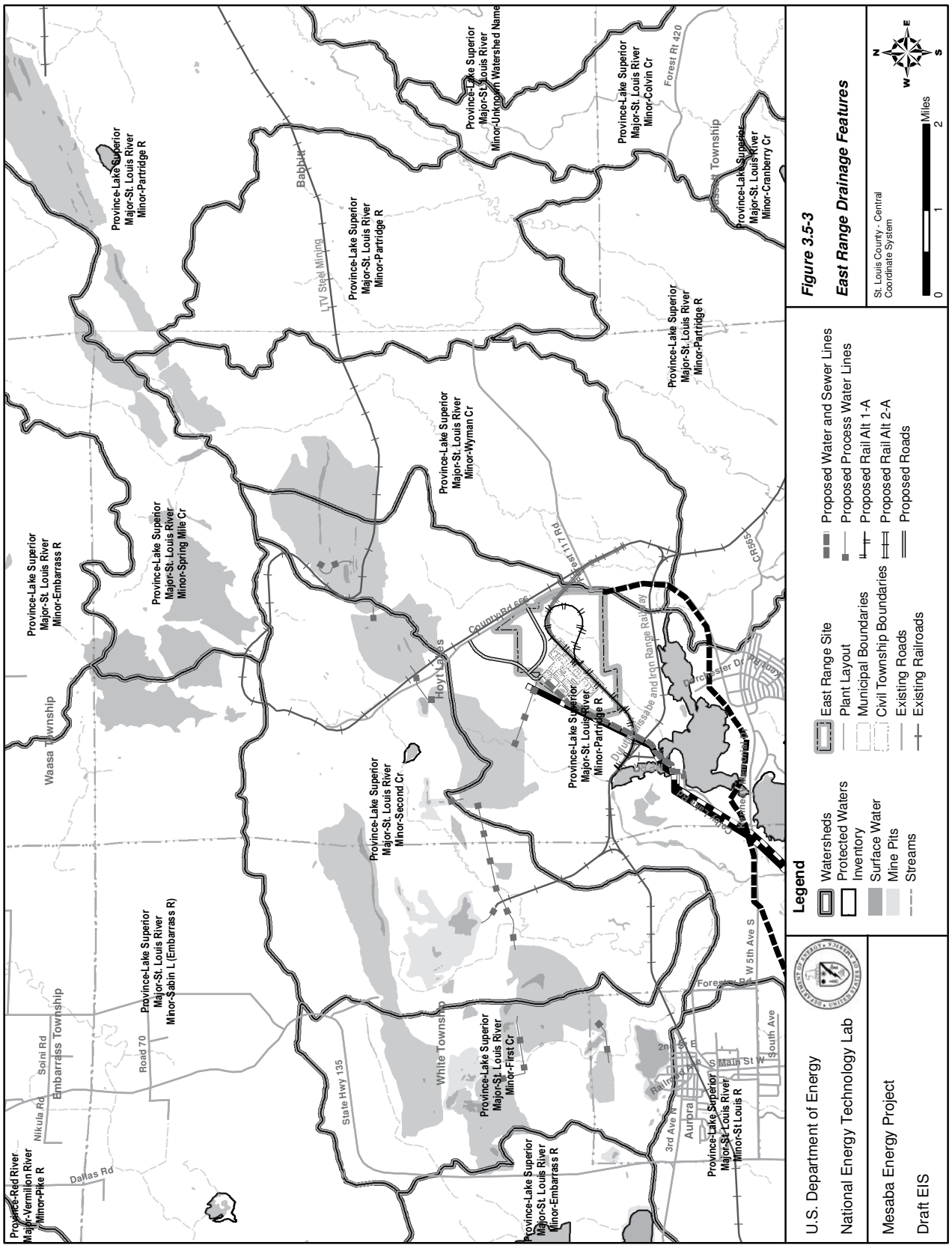
Any necessary discharges from the facility will be properly managed in accordance with the NPDES permits issued for plant, and applicable state and local regulations to prevent degradation of source water aquifers used for public water supplies.

3.5.2 East Range Site and Corridors

The following sections identify the prominent surface water features, and describe the major drainage areas and watersheds, land uses, soil classifications, and abandoned mine pits associated with the West Range.

3.5.2.1 Surface Water Sources

Major watersheds throughout the project area are shown in Figure 3.5-3. The drainage area boundaries shown on Figure 3.5-3 were delineated from the USGS maps of the area. This map, and therefore the drainage area boundaries, does not represent the altered hydrology in this area that has taken place due to mining activities in recent years. The East Range Site lies within the northwest region of the Lake Superior Watershed. The major surface water bodies in the vicinity of the project site are shown in Figure 3.5-4 and listed in Table 3.5-6.


Province-Red River Major-Vermilion River Minor-Pike R
Province-Lake Superior Major-St. Louis River Minor-Embarrass R
Province-Lake Superior Major-St. Louis River Minor-Spring Mile Cr
Province-Lake Superior Major-St. Louis River Minor-Partridge R
Province-Lake Superior Major-St. Louis River Minor-Unknown Watershed Name
Province-Lake Superior Major-St. Louis River Minor-Colvin Cr
Province-Lake Superior Major-St. Louis River Minor-Cranberry Cr
Province-Lake Superior Major-St. Louis River Minor-Wyman Cr
Province-Lake Superior Major-St. Louis River Minor-Second Cr
Province-Lake Superior Major-St. Louis River Minor-First Cr
Province-Lake Superior Major-St. Louis River Minor-Sabin L (Embarrass R)
Province-Lake Superior Major-St. Louis River Minor-St Louis R
Province-Lake Superior Major-St. Louis River Minor-Embarrass R
Waasa Township
Embarrass Township
White Township
Babbitt
Aurora
Hoyt Lakes
LTV Steel Mining
Dillon Mississippe and Iron Range Railway
Nikula Rd
Soini Rd
Dallas Rd
Road 70
State Hwy 135
County Rd 666
Forest Rt 420
CR685
W 5th Ave S
2nd Ave N
3rd Ave N
S Main St
Legend
Watersheds
Protected Waters Inventory
Surface Water
Mine Pits
Streams
East Range Site
Plant Layout
Municipal Boundaries
Civil Township Boundaries
Existing Roads
Existing Railroads
Proposed Water and Sewer Lines
Proposed Process Water Lines
Proposed Rail Alt 1-A
Proposed Rail Alt 2-A
Proposed Roads
Figure 3.5-3
East Range Drainage Features
St. Louis County - Central Coordinate System
Miles
0
1
2
N
E
S
W
U.S. Department of Energy
National Energy Technology Lab
Mesaba Energy Project
Draft EIS

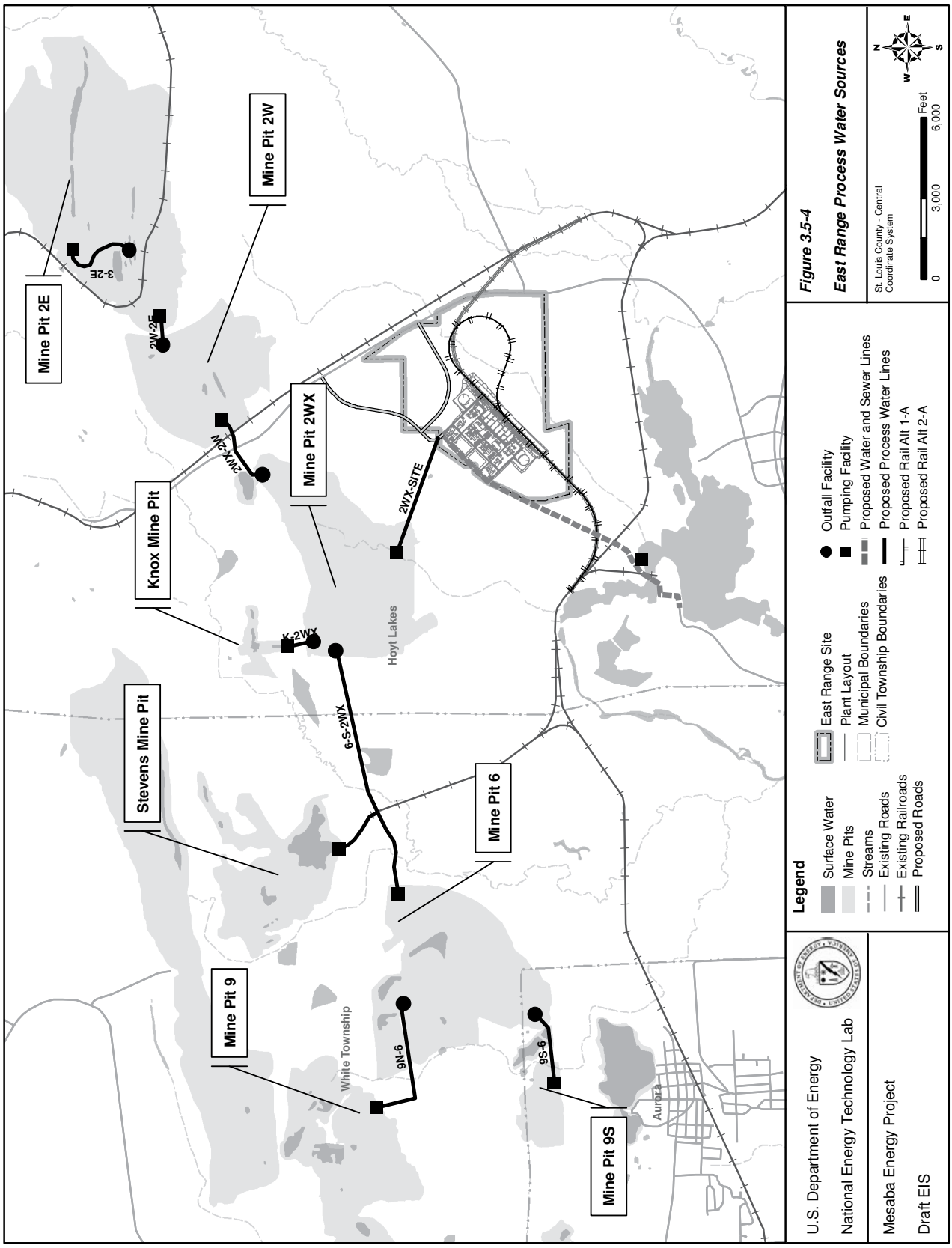

Mine Pit 2E
3-2E
2W-2E
Mine Pit 2W
Knox Mine Pit
2WX-2N
Mine Pit 2WX
2WX-SITE
K-2WX
6-S-2WX
Hoyt Lakes
Stevens Mine Pit
Mine Pit 6
Mine Pit 9
9N-6
White Township
9S-6
Mine Pit 9S
Aurora
Legend
Surface Water
Mine Pits
Streams
Existing Roads
Existing Railroads
Proposed Roads
East Range Site
Plant Layout
Municipal Boundaries
Civil Township Boundaries
Outfall Facility
Pumping Facility
Proposed Water and Sewer Lines
Proposed Process Water Lines
Proposed Rail Alt 1-A
Proposed Rail Alt 2-A
Figure 3.5-4
East Range Process Water Sources
St. Louis County - Central
Coordinate System
0
3,000
6,000
Feet
N
E
S
W
U.S. Department of Energy
National Energy Technology Lab
Mesaba Energy Project
Draft EIS

Table 3.5-6. East Range Surface Water Bodies

Surface Water	Watershed	FEMA[1] Designated Floodplain	Public Water[2]	Special Water[3]	Impaired Water[4]	Target TMDL Study[5]	Impairment
St. Louis River	Lake Superior	X	X		X	2011	Mercury FCA[6]
Partridge River	St. Louis River	X	X				
2WX Pit	**Partridge River**						
2E Pit	**Partridge River**						
3 Pit	Partridge River						
Wyman Creek	Partridge River		X	X			
5S Pit	Wyman Creek						
6 Pit							
Colby Lake	**Partridge River**		**X**		**X**	**2011**	**Mercury FCA[6]**
Whitewater Reservoir	Partridge River	X	X		X	2011	Mercury FCA[6]
First Creek	Partridge River	X	X				
St. James Mine	First Creek			X			
9S Pit	**First Creek**						
Donora Mine / 9N	**First Creek**						
1W / 1 Pit	First Creek						
Little Mesaba Lake	First Creek						
Second Creek	First Creek	X	X				
Stephens Creek	Second Creek						
Stevens Mine	**Second Creek**						
Knox Mine	**Second Creek**						
2W Pit	**Second Creek**						

1 Federal Emergency Management Agency
2 MNDNR Designated Public Water
3 MPCA Designated Special Water
4 MPCA Designated Impaired Water, 2006 EPA Draft 303(d) list of impaired waters
5 Total Maximum Daily Load
6 Fish Consumption Advisory
Surface Waters shown in bold are being considered for either a raw water source or receiving waters for discharges.
Source: Excelsior, 2006a

Most surface water runoff eventually flows into Colby Lake or the Partridge River. Mining activities within this drainage area have significantly altered the regional hydrology. Changes to the hydrology in the watershed include removal of trees and soil, creation of mine pits and other depressions, and changes in topography.

There are a number of mine pits in the vicinity of the East Range Site (see Figure 3.5-4). In locations where mining activities have ceased, these mine pits are filling with water from both groundwater infiltration and surface water runoff. In 2004, the MNDNR completed a study that evaluated the water

levels in several of the abandoned mine pits. Data was collected and modeled (using the WATBUD model) for pits 2E, 2W, 2WX, and 6, in order to predict when the pits would overflow and what the average and peak overflow rates would be. In addition, hydrologic changes to Colby Lake, Whitewater Reservoir, and St. James Pit were evaluated as part of the study. Pits 5N, 5S, 9N, and 9S were not included in the study, as they have reached their static water levels (i.e., they would not overflow like the pits near the West Range Site).

Though water levels in several of the pits may rise, unlike the Canisteo and Hill-Annex Mine Pits, there is no immediate need to control water levels in any of the pits on the East Range Site. Therefore, water supplies from any of the individual East Range pits can be pumped as necessary to meet demands of the generating station.

3.5.2.2 Water Quality and Uses

The current water surface elevation, water surface area and estimated water volume in the following mine pits affected by the Proposed Action are summarized in Table 3.5-7.

Table 3.5-7. Abandoned Mine Pit Water Sources

Water Source	Bottom Elevation[1] (ft)	Water Surface Elevation[2] (ft) (11/2005)	Surface Area[3] (acres) (11/2005)	Estimated Volume[3] (acre-ft) (11/2005)
2E	1,427	1,492.2	84	1,700
2W	1,282	1,413	183	13,430
2WX	1,331	1,405.4	322	8,880
6	1,276	1,426.6	207	18,850
3	1,522	1,586.7	ND	ND
5N	ND	ND	ND	ND
5S	ND	ND	ND	ND
9N / Donora	1,493	1,547.2	ND	ND
9S	1,396	1,475.2	ND	ND
Stephens	1,377	ND	ND	ND
Knox	1,362	ND	ND	ND

[1] Bottom elevations are based on blast maps and aerial contour mapping provided by Cliffs-Erie.
[2] Water surface elevations are based on field surveys provided by Cliffs-Erie.
[3] Surface area and estimated volumes were obtained from the MNDNR March, 2004 East Range Hydrology Report.
ND – No data
Source: Excelsior, 2006a

Lakes in the vicinity of the East Range Site are used primarily for recreational purposes, such as fishing, boating, and swimming. Most of the mine pits are located on property owned by mining interests and therefore have little public recreation activity. Cooling water for the Syl Laskin Power Plant comes from Colby Lake. Water from Whitewater Reservoir is used to augment water levels in Colby Lake when needed. Limited water quality information is available for the water sources for the East Range Site. Analytical data supplied by Excelsior Energy for two of the mine pits is presented in Table 3.5-8. The concentration of each constituent shown is based on the median concentration of available qualified water quality analyses.

Table 3.5-8. Water Quality Data for East Range Water Sources

Constituent	Units	Water Quality Data	
		Mine Pit 2WX	Mine Pit 6
Hardness	mg/L	n/a	n/a
Alkalinity	mg/L	310	411
Calcium	mg/L	23.2	46.7
Magnesium	mg/L	73.5	253.5
Chloride	mg/L	17.1	10.6
Sulfate	mg/L	n/a	n/a
TDS	mg/L	449	1,585
pH	mg/L	8.5-8.6	7.7-8.6
Mercury	ng/L	0.9	0.65
Sodium	mg/L	28.7	51.5
Specific Conductivity	umhos/cm	711	1,678
TOC	mg/L	1.8	1.9
TSS	mg/L	<2	<3.3
Ammonia (as N)	mg/L	<0.1	<0.1
Phosphorus	mg/L	<0.1	<0.1

3.5.2.3 Groundwater

Groundwater Quality and Quantity

The surface geology at the site consists of Quaternary outwash and brown silty till. The primary aquifer at the site is shallow outwash deposits comprised of fine to coarse grained sand and gravel. The static water level in wells near the proposed site is approximately 10 to 40 feet bgs.

Underlying the Quaternary deposits at the site is argillite and greywacke of the Virginia Formation. The formation ranges in total thickness from 0 to 2,000 feet. Although the formation typically has a low yield, fractures in the top of the unit may be used for domestic or stock wells. The Virginia Formation is typically used in conjuncture with iron formation aquifers that contain larger water supplies (Excelsior, 2006b). North of the site, the Biwabik formation is upper most bedrock where the Virginia Formation is not present. Secondary porosity in the form of fractures and leached zones has developed within Biwabik Formation allowing it to act as an aquifer (Excelsior, 2006b). The total thickness of the Biwabik formation in the area ranges from 0 to 800 feet. Regional groundwater flow within bedrock in the area is south, from a bedrock high created by the Giants Range Batholith. The Duluth Complex is the upper most bedrock west of the site. Gabbro of the Duluth Complex is massive with low porosity and permeability and therefore a poor source of water. However, where fractures create secondary porosity, the formation may be used for domestic or stock supply wells.

Typically groundwater quality in the region is of the calcium magnesium bicarbonate type (Excelsior, 2006b). In some areas water from the argillite, greywacke, and gabbro is sodium-softened. In other areas, water from these units is of sodium chloride type, deep wells may produce saline water. Water in the Biwabik formation is of good quality and suitable for use without softening or iron removal and is lower in total dissolved solids than other sources. Water from the Quaternary drift aquifer is also of the calcium magnesium bicarbonate type. Total dissolved solids from the Quaternary aquifer have been measured as high as 1,800 milligrams per liter. Surface contamination has impacted the surface aquifer in some locations, and where this has occurred, high nitrogen concentrations are the most common contaminant. As well as bedrock aquifers, water produced from drift may have high iron content (Excelsior, 2006b).

Groundwater Depth and Recharge Sources

The potentiometric surface of the shallow Quaternary aquifer at the area is approximately 1440 to 1490 feet msl, approximately 10 to 40 feet bgs (Excelsior, 2006b). The static water level for the bedrock aquifer is approximately 10 to 40 feet bgs. Groundwater flow at and in the vicinity of the site is likely southwest towards Colby Lake.

Usage and Availability

No wells are currently located on the East Range Site. However, numerous wells are located on surrounding properties and include 18 monitoring wells and one domestic well. The monitoring wells are owned by St. Louis County and MP; the domestic well is also owned by MP. The wells range in depth from 14 to 90 feet and are completed in unconsolidated deposits.

Permits

No groundwater use or withdrawal permits currently exist for Phase I and Phase II. Water Appropriation Permits have been issued by the MNDNR to CE for wells located within Township 59 North, Range 14 West, Section 29. Three permits were issued for pumping up to 10,512 millions of gallons per year to the corporation; however there is no reported pumping for the last four years. No unique well numbers are reported for the permits.

Available drawdown for the Quaternary drift aquifer is approximately 5 to 100 feet; the available drawdown for the bedrock aquifer is approximately 100 to 200 feet. Yields for wells completed in the Quaternary drift reach 10 gallons per minute for domestic wells and 1400 gallons per minute for public supply wells.

3.6 FLOODPLAINS

This section discusses the existing floodplain conditions for the affected areas of the two site alternatives. Width, depth, and velocity of streams and rivers vary based on their position within the watershed. Waterways in the upper portion of the watershed generally can be characterized as first order steams lacking an active floodplain and can have varying water depths. As a stream migrates towards base level, the stream order typically increases in proportion to the size of the watershed and result in the development of a noticeable floodplain and potential flooding.

Since flooding events can be very costly natural disasters, the Federal Emergency Management Agency (FEMA), through the National Flood Insurance Program (NFIP), enables property owners to purchase insurance protection against losses from flooding. The prerequisite for eligibility in the NFIP is that the potentially affected community must adopt and enforce a floodplain management ordinance to reduce future flood risks, particularly with respect to new construction. Therefore, the FEMA Flood Insurance Study (FIS) floodway maps were used to determine locations of potential flood hazards associated with the Proposed Action.

3.6.1 Local Hydrology Features

3.6.1.1 West Range Site

The West Range Site is in the Upper Mississippi River Basin (UMRB) Watershed. Local watersheds consist of the Prairie River and Swan River sub-watersheds. Both the Prairie River (to the north and west of the site) and the Swan River (to the south) are tributaries to the Mississippi River. The project area also contains numerous small streams and wetland areas that drain into tributaries of the Mississippi River.

3.6.1.2 East Range Site

The East Range Site lies in the St. Louis River Watershed, located in the northwest quadrant of the Lake Superior Watershed. The Partridge River, to the south and east of the site, and the Embarrass River (to the west of the site) join with the St. Louis River, which ultimately drains into Lake Superior. The site also contains many small streams, natural and man-made lakes, and wetland areas that drain into local waterways.

3.6.2 Flood Hazard Areas

Floodplain management activities of the National Flood Insurance Program (NFIP) include the development of Flood Insurance Rate Maps (FIRMs) for flood insurance rating purposes. A FIRM is a map that outlines flood risk zones within communities for insurance purposes. FIRMs are issued, published, and distributed by FEMA to a wide range of users including: private citizens, community officials, insurance agents and brokers, lending institutions, and other Federal agencies. A FIRM is usually issued following a FIS prepared by FEMA that summarizes the analysis of flood hazards within the subject community.

FISs include detailed engineering studies to map predicted flood elevations at specified flood recurrence intervals. Generally, FISs are concerned with peak discharges in streams and rivers for the 100- and 500-year storm events and includes engineering analyses of flood elevations for each flood recurrence interval. Based on the results of the engineering analyses flood risk zones are assigned for insurance purposes. The 100-year floodplain is defined as areas that have a 1.0 percent annual chance of flooding. The 500-year floodplain is defined as areas that have a 0.2 percent annual chance of flooding.

FEMA has adopted a maximum allowable increase of water surface elevation of 1.0 foot for a 1.0 percent annual chance (100-year recurrence interval) flood event as the national standard for floodplain management purposes. However, several states and municipalities have adopted more stringent criteria with a less than 1.0-foot allowable increase of water surface elevations.

3.6.2.1 West Range Site Floodplains

The City of Taconite (FEMA Community Number 270209) and Itasca County (FEMA Community Number FM270200, Panels 0675A, 0700A, and 0800A) are the only areas within the vicinity of the site that have published FEMA FIRM panels. The Cities of Coleraine, Bovey, Marble, and Calumet are unmapped; therefore, FEMA does not have defined flood hazard zones within those communities.

According the FIRM panels, the 100-year floodplains in the vicinity of the West Range Site are found along the major rivers, including the Mississippi, Prairie, and Swan Rivers. The floodplains along these rivers are generally about 1,500 feet wide, but extend to almost 1 mile wide in some areas. The exception to this are two large floodplains that are more than 10 square miles in size; one located on the Prairie River at Prairie Lake; and the other on the Swan River just north of its confluence with the Mississippi River. The nearest identified 100-year floodplain is approximately 1 mile northwest of the West Range Site, along the Prairie River. These floodplains are shown in Figure 3.6-1.

The only 500-year floodplains found in the area are located in Grand Rapids, along the Mississippi River.

3.6.2.2 East Range Site Floodplains

Table 3.6-1 describes the communities and corresponding FIRM panels in the vicinity of the East Range Site.

Table 3.6-1. Communities with Potentially Affected Floodplains near the East Range Site

Community	FEMA Community Number	FIRM Panel
St. Louis County	27137	N/A
City of Biwabik	270418	No Map
City of Eveleth	270422	Refer to St. Louis County* 950
City of Hoyt Lakes	270575	No Map
City of Iron Junction	270580	0001
City of Mountain Iron	270424	0002
City of Virginia	270426	No Map
St. Louis County	270416	825, 925, 950, 975, 1050

The City of Hoyt Lakes and the City of Virginia do not have published FEMA FIRM panels; therefore there are no FEMA-defined floodplains within the jurisdictional boundaries of either of these two cities. Most of the 100-year floodplains in this area are along the St. Louis, Partridge, and Embarrass Rivers, as shown in Figure 3.6-2. The nearest identified 100-year floodplain is roughly 1 mile south-southwest of the East Range Site, along the Partridge River. There are no 500-year floodplains depicted on the FEMA maps in the area that would be affected by the East Range Site.

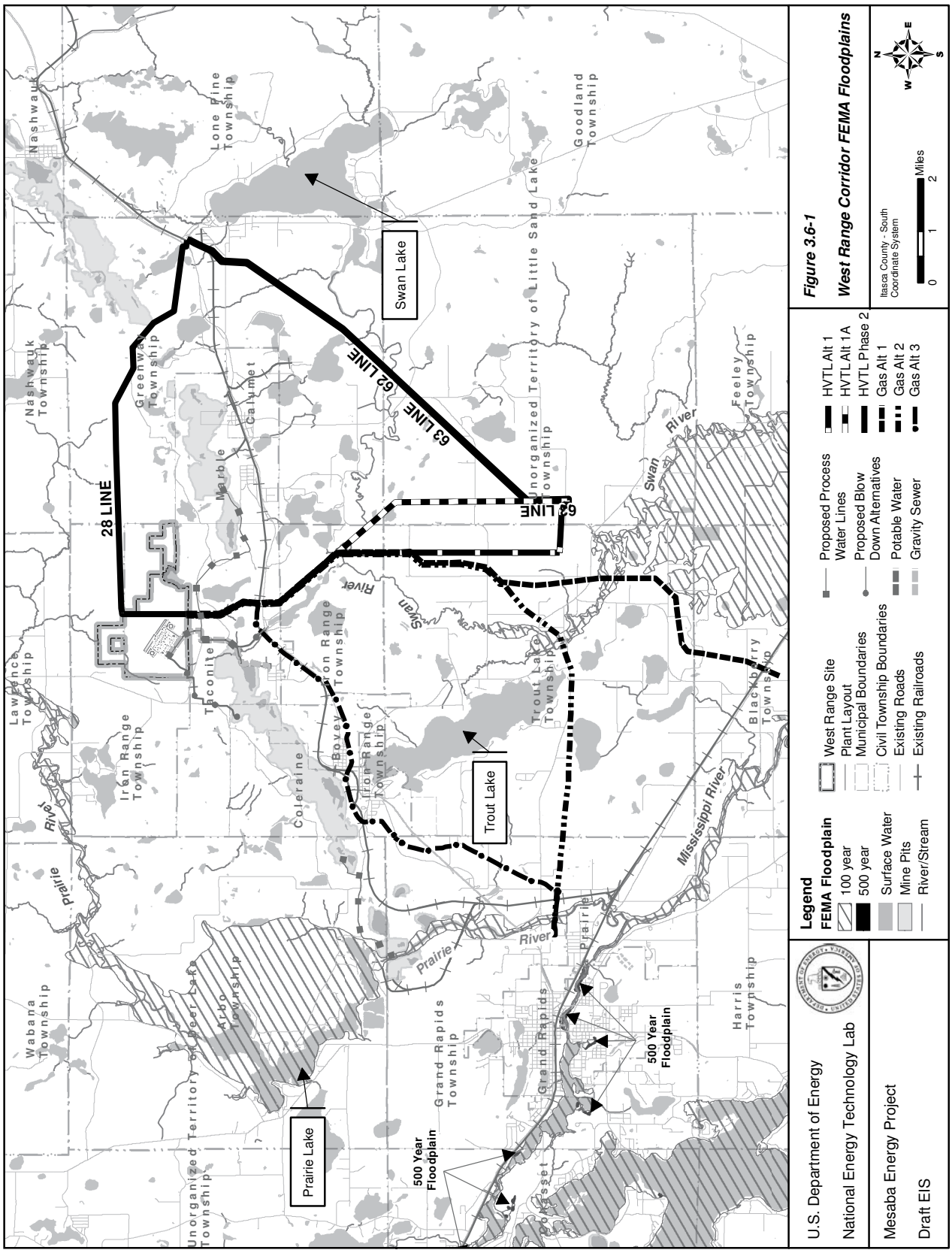
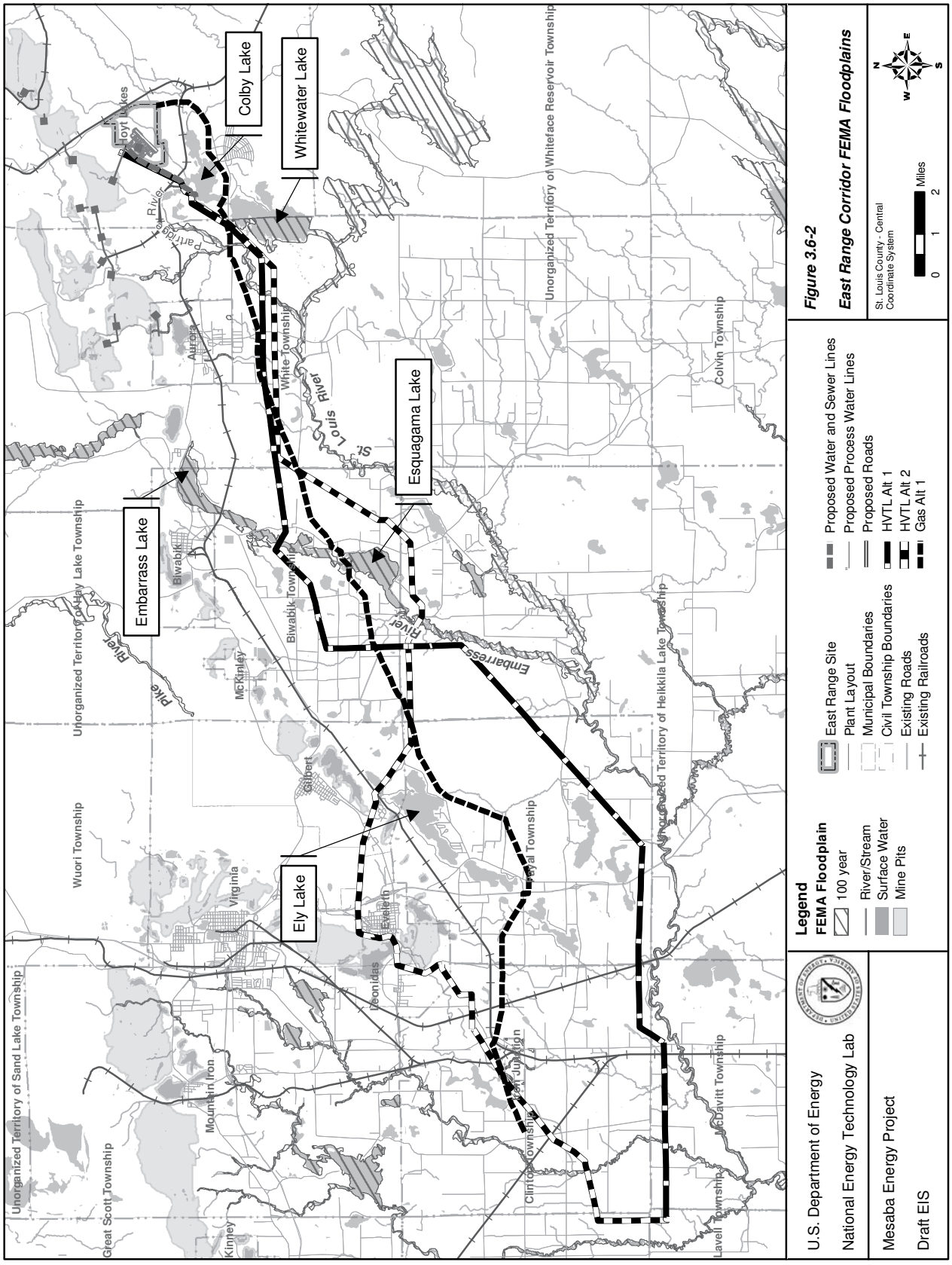


Figure 3.6-1
West Range Corridor FEMA Floodplains
Legend
FEMA Floodplain
100 year
500 year
Surface Water
Mine Pits
River/Stream
West Range Site
Plant Layout
Municipal Boundaries
Civil Township Boundaries
Existing Roads
Existing Railroads
Proposed Process Water Lines
Proposed Blow Down Alternatives
Potable Water
Gravity Sewer
HVTL Alt 1
HVTL Alt 1A
HVTL Phase 2
Gas Alt 1
Gas Alt 2
Gas Alt 3
Itasca County - South Coordinate System
Miles
0
1
2
U.S. Department of Energy
National Energy Technology Lab
Mesaba Energy Project
Draft EIS
28 LINE
62 LINE
63 LINE
Swan Lake
Trout Lake
Prairie Lake
500 Year Floodplain
500 Year Floodplain
Nashwauk Township
Lone Pine Township
Goodland Township
Greenway Township
Marble
Calumet
Unorganized Territory of Little Sand Lake
Feeley Township
Swan River
Lawrence Township
Iron Range Township
Taconite
Bovey
Coleraine
Trout Lake Township
Blackberry Township
Wabana Township
Unorganized Territory of Deer Lake
Arbo Township
Grand Rapids Township
Grand Rapids
Harris Township
Mississippi River
Prairie River


Colby Lake
Whitewater Lake
Embarrass Lake
Esquagama Lake
Ely Lake
Unorganized Territory of Sand Lake Township
Great Scott Township
Wuori Township
Unorganized Territory of Hay Lake Township
Biwabik
Aurora
Virginia
Gilbert
Eveleth
Mountain Iron
Kinney
McKinley
Biwabik Township
White Township
Unorganized Territory of Whiteface Reservoir Township
Colvin Township
Unorganized Territory of Heikkila Lake Township
Normanna Township
Clinton Township
McDavitt Township
Lavell Township
Pike River
Embarrass River
St. Louis River
Partridge River
Floyd Lakes
Legend
FEMA Floodplain
100 year
River/Stream
Surface Water
Mine Pits
East Range Site
Plant Layout
Municipal Boundaries
Civil Township Boundaries
Existing Roads
Existing Railroads
Proposed Water and Sewer Lines
Proposed Process Water Lines
Proposed Roads
HVTL Alt 1
HVTL Alt 2
Gas Alt 1
U.S. Department of Energy
National Energy Technology Lab
Mesaba Energy Project
Draft EIS
Figure 3.6-2
East Range Corridor FEMA Floodplains
St. Louis County - Central
Coordinate System
Miles
0
1
2
N
E
S
W

3.7 WETLANDS

3.7.1 Introduction

Wetlands are defined under the CWA as follows:

> *Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas.*

Wetlands have unique characteristics that set them apart from other ecosystems. These unique characteristics include a substrate that is saturated or inundated with water for part of the growing season, soils that contain little or no oxygen, and plants adapted to wet or seasonally saturated conditions. The variety of wetland types found in the region result from differences in topography, soils, climate, water chemistry, hydrology, and other factors including human disturbance. Wetlands serve many functions, including the storage and slow release of surface water, rain, snowmelt, and seasonal floodwaters to surface waters. Additionally, wetlands provide wildlife habitat, sediment stabilization/retention functions, and perform an important role in the nitrogen cycle. They also help to maintain stream flow during dry periods, and provide groundwater recharge functions. Wetlands are among the most productive ecosystems in the world, comparable to rain forests and coral reefs. Many species of wildlife, including a large percentage of threatened and endangered species, depend on wetlands for their survival. Wetlands are important for their scientific and educational opportunities and can provide open space for recreation where public access is available.

3.7.2 Regulatory Framework

Wetlands in the region are regulated by several regulatory agencies, including the USACE, EPA, the Minnesota Board of Water and Soil Resources (BWSR), and the MNDNR. Federally regulated wetlands are governed by Section 404 and Section 401 of the Clean Water Act and are characterized as wetlands hydrologically connected or adjacent to Navigable Waters of the U.S. The MPCA currently performs Section 401 water quality certifications for the state. The Minnesota Wetland Conservation Act (WCA) regulates state waters and wetlands (Minnesota Rules Chapter 8420), while the Itasca County Soil and Water Conservation District, and St. Louis County administer the WCA locally. Other state wetland regulations include designated Protected Waters and Protected Waters Wetlands regulated by the MNDNR (Minnesota Rules 6115.0010 to 6115.0810). The Ordinary High Water Level, as established by the MNDNR, of Protected Waters Wetlands defines the upper extent of jurisdiction by the MNDNR on these protected habitats. Development-related projects in Minnesota involving wetland impacts may require wetland encroachment permits or approvals from the above-listed regulatory agencies.

Utility ROWs crossing water bodies listed as protected waters or wetlands by the MNDNR Protected Waters Inventory (PWI) require Licenses for Utility Crossings of Public Lands and Waters under Minnesota Statutes 84.415 and subsequent Minnesota Rules Chapter 6135. The MNDNR Division of Land and Minerals is the administrative agency that issues 25 and 50-year licenses, which may be renewed at the end of the licensing period if both parties (i.e., the project applicant and the MNDNR) wish to renew these licenses. The MNDNR Commissioner establishes the renewal fee and time period of the renewed license(s).

Pursuant to the Supreme Court Decision made in the *Solid Waste Agency of Northern Cook County (SWANCC) v. The United States Army Corps of Engineers* (531 U.S. 159), it has been determined that isolated wetlands are not subject to regulation by the USACE. Wetlands that are hydrologically isolated from Navigable Waters of the United States and are not classified as MNDNR Protected Waters Wetlands may be regulated by the WCA Local Government Unit (e.g., county, soil, and water conservation district).

A formal jurisdictional review of wetland boundaries would be required to definitively establish the regulatory status of wetlands.

For regulatory purposes, the types of wetlands that may be impacted by a project will dictate how the wetland is regulated and subsequently what type of mitigation would be required for impacts to the wetland. For example, impacts to undisturbed tamarack bogs may have more stringent regulatory requirements than disturbed wetlands in urban settings. The MNDNR uses the U.S. Fish and Wildlife Service (USFWS) Circular 39 *Wetlands of the United States* (Shaw and Fredine, 1956) wetlands inventory to classify wetland types in the state, as described below. Wetlands were also characterized using the USFWS publication *Classification of Deepwater Habitats of the United States* (Cowardin et al., 1979). The majority of the wetlands identified at each alternative site have a connection to interstate commerce; however, some wetlands appear to be isolated.

3.7.3 Wetland Classification Systems

USFWS Circular 39 *Wetlands of the United States* (Shaw and Fredine, 1956) is a wetland classification inventory developed by the USFWS, which was initiated due to the steady decline of wetland habitats available to wildlife. The purpose of the Circular 39 wetland inventory is to identify the correlation between wetlands and wildlife, and identify areas susceptible to habitat loss from activities such as draining, filling or otherwise human-related alteration of water resource habitats. Aerial photographs, USGS topographic maps, charts of the U.S. Coast and Geodetic Survey, Federal and state agency mapping, soil maps, and county highway maps were used to provide information identifying the locations of wetlands for the inventory (Shaw and Fredine, 1956).

The USFWS inventory identified 20 types of wetland habitats used by wildlife, which primarily focused on waterfowl habitat. Wetland habitats identified by Circular 39 were grouped into four categories: 1) Inland Fresh Areas (Types 1-8); 2) Inland Saline Areas (Types 9-11); 3) Coastal Fresh Areas (Types 12-14); and, Coastal Saline Areas (Types 15-20). Inland Fresh Areas are the only wetland group occurring in Minnesota. There are eight wetland types associated with the Inland Fresh Area group; a summary describing the wetland types is presented in Table 3.7-1.

Table 3.7-1. Wetland Types and Definitions in Minnesota

Wetland Type	Definition
Type 1 – Seasonally flooded basin or flat	Soil is covered with water or is waterlogged during variable seasonal periods but usually is well-drained during much of the growing season. Vegetation varies greatly according to season and duration of flooding from bottomland hardwoods (floodplain forests) to herbaceous plants.
Type 2 – Wet meadow	Soil is usually without standing water during most of the growing season but is waterlogged within at least a few inches of surface. Meadows may fill shallow basins, sloughs, or farmland sags, or these meadows may border shallow marshes on the landward side. Vegetation includes grasses, sedges, rushes and various broad-leaved plants. Other wetland plant community types include low prairies, sedge meadows, and calcareous fens.
Type 3 – Shallow marsh	Soil is usually waterlogged early during the growing season and may often be covered with as much as 6 inches or more of water. These marshes may nearly fill shallow lake basins or sloughs, or may border deep marshes on the landward side. These are common as seep areas on irrigated lands. Vegetation includes grass, bulrush, spikerush, and various other marsh plants such as cattail, arrowhead, pickerelweed, and smartweed.
Type 4 – Deep marsh	Soil is usually covered with 6 inches to 3 feet or more of water during growing season. These deep marshes may completely fill shallow lake basins, potholes, limestone sinks and sloughs, or they may border open water in such depressions. Vegetation includes cattail, reeds, bulrush, spikerush, and wild rice. In open areas, pondweed, naiad, coontail, water-milfoil, waterweed, duckweed, waterlily, or spatterdock may occur.

Table 3.7-1. Wetland Types and Definitions in Minnesota

Wetland Type	Definition
Type 5 – Shallow open water	Shallow ponds and reservoirs are included in this type. Water is usually less than 10 feet deep and fringed by a border of emergent vegetation similar to areas of Type 4.
Type 6 – Shrub swamp	Soil is usually waterlogged during growing season and is often covered with as much as 6 inches of water. These occur mostly along sluggish streams and occasionally on flood plains. Vegetation includes alder, willow, buttonbush, dogwood, and swamp-privet.
Type 7 – Wooded swamp	Soil is waterlogged at least within a few inches of surface during growing season and is often covered with as much as 1 foot of water. These occur mostly along sluggish streams, on old riverine oxbows, on flat uplands, and in ancient lake basins. Forest vegetation includes tamarack, arborvitae, black spruce, balsam fir, red maple, and black ash. Deciduous swamps frequently support beds of duckweed and smartweed. Other wetland plant community types include lowland hardwood swamps and coniferous swamps.
Type 8 – Bogs	Soil is usually waterlogged. These occur mostly in ancient lake basins, on flat uplands and along sluggish streams. Vegetation is woody or herbaceous or both, usually on a spongy covering of mosses. Typical plants are heath shrub, sphagnum moss, and sedge. In the North, leatherleaf, Labrador tea, cranberry, and cottongrass are often present. Scattered, often stunted, black spruce and tamarack may occur.

Source: Shaw and Fredine, 1956

During subsequent review and production of this Draft EIS, the USACE St. Paul District requested that wetlands be characterized by community type using *Wetland Plants and Plant Communities of Minnesota and Wisconsin* (Eggers and Reed, 1997). Such characterization will be provided in the Final EIS.

3.7.4 Wetland Identification and Mapping Methodology

Wetlands were identified and delineated at the West Range Site, the East Range Site, and the associated utility and transportation corridors. Identification of potential wetlands was completed in three successive stages: (1) desktop review; (2) on-site screening; and (3) field delineation. Field investigations for the presence of wetlands could not be conducted in areas where access to private land was not granted. These areas consist of the majority of the utility and transportation corridors. Therefore, only a desktop review for approximating the potential presence and extent of wetlands was conducted in areas with restricted access.

3.7.4.1 Desktop Review

Materials reviewed for the desktop review for potential wetlands included: the National Wetlands Inventory (NWI) maps, USGS topographic maps, aerial photography, and the MNDNR PWI. Additional resources reviewed included:

- Itasca County Soil Survey (Note: a Soil Survey has not been completed for St. Louis County);
- Preliminary plans for the West Range and East Range Sites; and
- Local land-use maps.

These resources were compiled to produce a preliminary map of potential wetlands superimposed on aerial photography using Geographic Information Systems (GIS) applications. The map was then used as a preliminary field map to identify and locate potential wetlands and other waters of the United States. The preliminary wetland map was also used for initial site planning and facilities location.

The Desktop Review was also used to identify and gather preliminary estimates of potential wetlands impacted by the proposed transportation and utility corridors in areas where field surveys were limited due to restricted access.

3.7.4.2 On-Site Screening

The on-site investigations consisted of a preliminary wetland field reconnaissance to verify the location, and extent of potential water resources identified during the desktop review. The wetland reconnaissance was performed in early June 2005 at the West Range Site and in late summer 2004 at the East Range Site.

3.7.4.3 Field Delineation

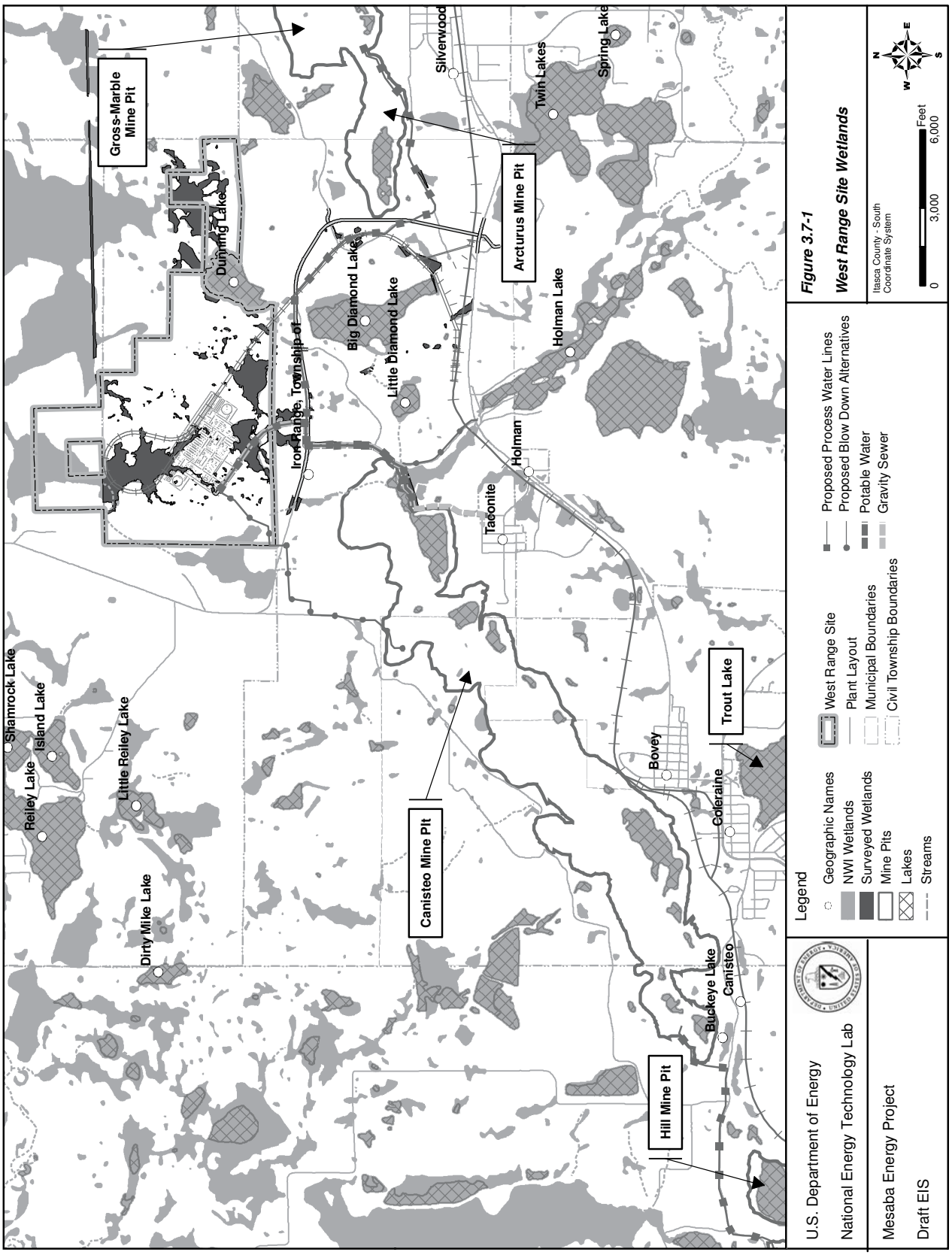
The majority of the West Range Site was delineated in the summer of 2005 (Figure 3.7-1). Potential wetlands were delineated at the East Range Site in October 2004 and August 2005 (Figure 3.7-2). The results of these delineations are described in Sections 3.7.5 and 3.7.6. The locations of specific wetlands that may be impacted by proposed project features are described in Section 4.7.

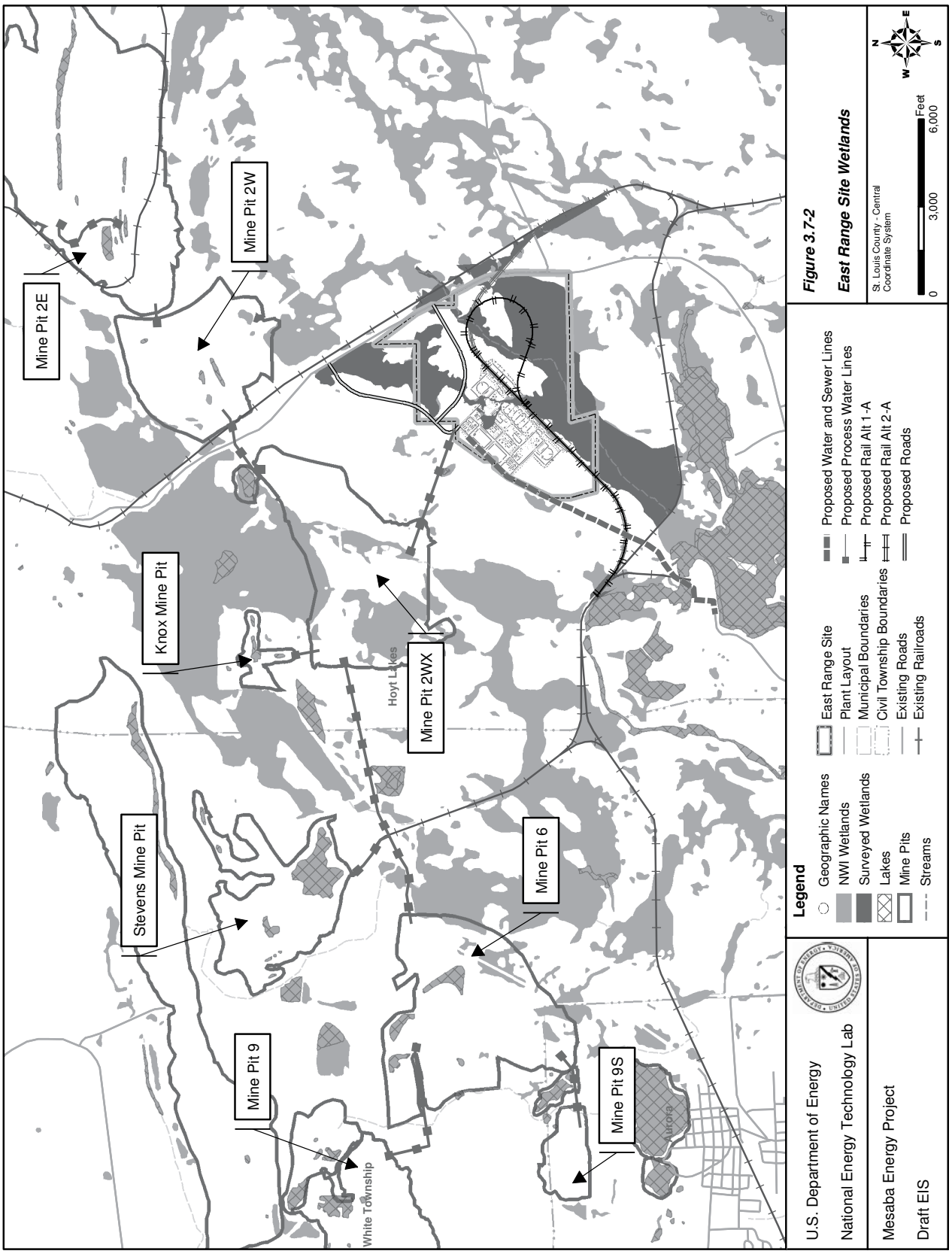
The field investigations identified areas meeting wetland criteria as defined in the USACE Wetland Delineation Manual (USACE, 1987), herein referred to as the "1987 Manual." The 1987 Manual requires all wetland criteria, hydrophytic (wetland) vegetation, hydric (wetland) soil, and wetland hydrology to be present in order for an area to qualify as a jurisdictional wetland. Wetland hydrology is one of the major components that characterize wetlands. Consequently, wetlands are characterized by soil inundation or saturation within a major portion of the root zone (typically within 12 inches of the surface) (USACE, 1987).

The Routine On-site Determination Methodology (RODM) described in the 1987 Manual was applied during the wetland delineation effort. Field notes were taken at representative points within each wetland to characterize the aquatic resource habitat. Collected data were transcribed on to the wetland data sheets, highlighting plant species, hydrologic conditions, and a description of hydric soil characteristics. The boundary of each wetland was delineated with a surveyor's tape or wire stakes labeled "Wetland Boundary," and marked with a sequential alphanumeric nomenclature. The wetland boundaries were then recorded with a Trimble Pro XR or XRS Global Positioning System (GPS). The collected GPS data were processed and incorporated into project plans and GIS.

Each delineated wetland was categorized according to the wetland types presented in the USFWS Circular 39 publication *Wetlands of the United States* (Shaw and Fredine, 1956). Those data and the wetland classification for each wetland were recorded on the wetland data sheets.

A two-person team of wetland scientists delineated boundaries of the wetlands. Up to four teams were used to delineate wetlands at the West Range Site and one two-person team delineated the wetland boundaries at the East Range Site. Access to the East Range and West Range was conducted by foot and/or by all-terrain vehicles.


Gross-Marble Mine Pit
Arcturus Mine Pit
Canisteo Mine Plt
Hill Mine Pit
Trout Lake
Silverwood
Twin Lakes
Spring Lake
Holman Lake
Holman
Taconite
Big Diamond Lake
Little Diamond Lake
Dunning Lake
Iron Range, Township of
Shamrock Lake
Island Lake
Reiley Lake
Little Reiley Lake
Dirty Mike Lake
Buckeye Lake
Canisteo
Coleraine
Bovey
Legend
Geographic Names
NWI Wetlands
Surveyed Wetlands
Mine Pits
Lakes
Streams
West Range Site
Plant Layout
Municipal Boundaries
Civil Township Boundaries
Proposed Process Water Lines
Proposed Blow Down Alternatives
Potable Water
Gravity Sewer
Figure 3.7-1
West Range Site Wetlands
Itasca County - South
Coordinate System
0
3,000
6,000
Feet
N
E
S
W
U.S. Department of Energy
National Energy Technology Lab
Mesaba Energy Project
Draft EIS


Mine Pit 2E
Mine Pit 2W
Knox Mine Pit
Stevens Mine Pit
Mine Pit 2WX
Mine Pit 6
Mine Pit 9
Mine Pit 9S
Hoyt Lakes
White Township
Aurora
Legend
Geographic Names
NWI Wetlands
Surveyed Wetlands
Lakes
Mine Pits
Streams
East Range Site
Plant Layout
Municipal Boundaries
Civil Township Boundaries
Existing Roads
Existing Railroads
Proposed Water and Sewer Lines
Proposed Process Water Lines
Proposed Rail Alt 1-A
Proposed Rail Alt 2-A
Proposed Roads
U.S. Department of Energy
National Energy Technology Lab
Mesaba Energy Project
Draft EIS
Figure 3.7-2
East Range Site Wetlands
St. Louis County - Central
Coordinate System
0
3,000
6,000
Feet
N
E
S
W

Plant Identification

Plant taxonomy keys, field guides, and regional botanical experience were used to identify upland and wetland plants. The botanical nomenclature and wetland indicator status for each plant identified was verified by referencing the USFWS National List of Plant Species that Occur in Wetlands, Region 3 – North Central (Reed, 1988). The wetland indicator classification is presented below:

- OBL – Obligate wetland plant species; occurs with an estimated 99 percent probability in wetlands.
- FACW – Facultative wetland plant species; estimated 67 – 99 percent probability of occurrence in wetlands.
- FAC – Facultative plant species; equally likely to occur in wetlands and non-wetlands (uplands), 34 to 67 percent probability in wetlands.
- FACU – Facultative upland plant species; 67 to 99 percent probability of occurrence in non-wetlands, 1 to 33 percent probability in wetlands.
- UPL – Obligate upland plant species; not found in wetlands with a 99 percent probability.
- NI – No Indicator; insufficient information exists to determine indicator status.

Positive (+) and negative (-) signs added to a plant's botanical nomenclature indicates a preference toward the higher (+) or lower (-) end of the identified percentage range.

Hydric Soils

Wetland soils were examined for hydric traits and recorded on the data sheets. The mineral and subsoil were extracted from pits excavated with a tile spade or as cores from soil probes. Soil profiles were evaluated from ground surface to a maximum depth of 24 inches. The soil matrices were assigned a chroma color using the Munsell Soil Color Charts. Hydric soil indicators generally consisted of observations of gleying (reducing environment), presence of organic soils (histosols), a low chroma (color) soil matrix, iron or manganese concretions, sulfidic odors, and other indicators of a reducing or oxidizing environment. The USDA, Natural Resource Conservation Service (NRCS) describes a hydric soil as "a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part."(USDA-NRCS, 2006). Consequently, wetlands are characterized by soil inundation or saturation within a major portion of the root zone (typically within 12 inches of the surface) (USACE, 1987).

Wetland Hydrology

Evidence of subsurface wetland hydrology was determined by examining soil cores and/or soil pits to confirm soil saturation and groundwater hydrology. Primary wetland hydrology indicators are recorded on the datasheets as direct observations of surface inundation, watermarks, drift lines, sediment deposits on plants and woody debris, and drainage patterns. Secondary wetland hydrology indicators include state or nationally listed hydric soils, oxidized root channels, water stained leaves, the FAC-neutral test (used to determine the presence of wetland hydrology by describing the plant community as being dominated by either wetland or upland plant species), multiple trunks on woody plants, observations of buttressing, fluted tree trunks, elevated root structures and topographic depressions. When no primary indicators were observed, two or more secondary wetland hydrology indicators were used to confirm wetland hydrology.

3.7.5 Wetlands within the West Range Site Buffer Land and Utility and Transportation Corridors

A total of 106 wetlands and associated corridors were delineated at the West Range Site and its respective corridors (in areas where access was granted) during the 2005 field season. Wetlands in the vicinity of the West Range Site are shown in Figure 3.7-1 and listed in Table 3.7-2. A description of

specific wetlands that may be impacted by proposed project features in the West Range Site and associated corridors is included in Section 4.7.3.

Table 3.7-2. Summary of Delineated Wetlands within the West Range Site

Wetland Type	Total Area (acres)
Type 7	156.56
Type 3/6/8	78.26
Type 3	3.96
Type 6	21.82
Type 3/7	1.43
Type 3/6	1.08
Type 2/6/7	9.12
Type 5	3.03
Type 5/6/7	45.95
Type 2	0.03
Type 6/8	6.48
Type 6/7	1.2
Type 3/7/8	2.61
Type 4/6	1.46
Type 8	4.36
Total	**337.35**

Note: Wetland types with multiple characterizations describe certain wetland complexes that exhibited the characteristics of multiple types in different locations within the wetland complex.
Source: Excelsior, 2006b

Results of the wetland delineations, and review of NWI mapping indicates that a suite of wetland types occur within the West Range Site and associated utility/transportation corridors. Dominant wetland habitats consist of Type 3 shallow marsh, Type 6 scrub-shrub swamp, and Type 7 forested swamp. The most common wetland type encountered at the West Range Site and along the utility/transportation corridors is characterized by the Circular 39 classification nomenclature as forested swamp (Type 7). As described in Table 3.7-1, Type 7 wetlands typically possess mixed forest communities vegetated by deciduous conifers (tamarack), needle leave evergreen (spruce and fir) and hard or softwood deciduous trees. These areas are generally characterized as lowland hardwood and coniferous swamps. Type 8 bog habitat occurs as a wetland component within larger wetland systems or was found in association with Dunning Lake. Type 4 (deep marsh) and Type 5 (shallow open water) occur on-site, but with less frequency than Types 3, 6, and 7 wetlands. No Type 1 seasonally saturated wetlands, occurred within the West Range Site or its associated corridors based on the 2005 wetland delineation. As shown in Table 3.7-2, approximately 337 acres (137 hectares) of wetlands were delineated at the West Range Site.

The wetland types occurring within the existing utility or transportation corridors vary from emergent to forested. A majority of the wetlands can be characterized as Type 3 and Type 6 wetlands. The majority of wetlands identified have a connection to interstate commerce; however, some appear to be isolated wetlands. Table 3.7-3 indicates that approximately 66 acres (26 hectares) of wetlands, which are either shown on the NWI mapping or were field delineated, lie within the utility and transportation corridors associated with the West Range Site.

Table 3.7-3. Summary of Delineated Wetlands within Utility and Transportation Corridors (West Range Site)

Wetland Type	Total Area (acres)
Type 6	7.92
Type 5	3.86
Type 6/7	1.52
Type 3	37.86
Type 3/6	4.18
Type 8	6.78
Type 7	3.17
Type 2	0.7
Type 3/4	0.49
Total	**66.48**

Notes: Wetland types with multiple characterizations describe certain wetland complexes that exhibited the characteristics of multiple types in different locations within the complex. The acreages in this table reflect information that was collected from NWI mapping and field delineations. In areas where access was not granted field delineations were not conducted and the NWI was relied upon.
Source: Excelsior, 2006b

3.7.5.1 Descriptions of Wetland Types for the West Range Site

A discussion describing the wetland habitats occurring at the West Range Site is presented in the sections below. Although not all of the utility and transportation corridors have been field surveyed, the descriptions provide a summary of typical habitat that could be encountered.

Type 1 Seasonally Flooded Basin or Flat

Type 1 wetlands were not encountered at either the West Range Site nor at the East Range Site, though Type 1 wetlands occur within the utility and transportation corridors.

Type 1 seasonally flooded basins or flats are generally characterized by having soils covered with water, or water-logged, during variable seasonal periods, but usually are well drained during much of the growing season. This type is found both in upland depressions and in overflow bottomlands. Along river courses flooding occurs in late fall, winter, or spring. In the uplands, basins or flats may be filled with water during periods of heavy rain or melting snow. Vegetation varies greatly according to the season and the duration of flooding. It includes bottom-land hardwoods as well as some herbaceous growths. Where the water has receded early in the growing season, smartweeds, wild millet, fall Panicum (*Panicum dichotomiflorum*), tealgrass (*Eragrostis hypnoides*) chufa (*Cyperus esculentus*), redroot cyperus (*Cyperus erythrorhizos*), and weeds such as marsh elder (*Iva* sp.), ragweed (*Ambrosia* sp.), and cocklebur (*Xanthium* sp.) are likely to occur. Shallow basins that are submerged only temporarily usually develop little or no wetland vegetation (Shaw and Fredine, 1956).

Type 2 Wet Meadow

Type 2 wet meadow wetlands were primarily restricted to existing linear corridors (powerline) and ROWs on the West Range Site. These wetlands are a result of ROW construction and maintenance. The right-of-way was constructed through or across a wetland and mowing maintains the land cover as a herbaceous wet meadow. Canada blue-joint grass (*Calamagrostis canadensis*) is the dominant vegetative

cover within the wet meadow habitats. Sedges (*Carex* sp.), woolgrass (*Scirpus cyperinus*), sensitive fern (*Onoclea sensibilis*), and goldenrods (*Solidago* sp.) are also common.

Type 2 wetlands typically had surface organic soils underlain by sandy clay loam, clay loam, sandy loam, and less frequently, loamy sands. Hydric soil indicators most frequently encountered in Type 2 wetlands include a histic epipedon, depleted matrices in subsurface mineral soils, gleying in subsurface soils, low chroma in mineral soils, and occasionally high organic content at the surface of sandy soils. The primary hydrology indicator in the Type 2 wet meadows were soils that were saturated to the surface.

Type 3 Shallow Marsh

Type 3 shallow marsh wetlands were observed most frequently throughout the West Range Site and existing utility and roadway corridors, and were most often associated with Type 6 and Type 7 wetlands forming a complex of wetland types. Type 3 wetlands were dominated by herbaceous species, such as sedges and/or grasses, and were either temporarily flooded basins or seasonally flooded marshes. The most commonly observed herbaceous vegetation throughout the site was Canada blue-joint grass. Several species of sedges observed include wiregrass sedge (*Carex lasiocarpa*), inflated sedge (*C. intumescens*), slender sedge (*C. tenera*), pointed broom sedge (*C. scoparia*), Tuckerman's sedge (*C. tuckermanii*), and lake sedge (*C. lacustris*). Other dominant herbs include woolgrass, broad-leaf cattail (*Typha latifolia*), sensitive fern, fowl manna grass (*Glyceria striata*), marsh marigold (*Caltha palustris*), blue-flag iris (*Iris versicolor*), woodland horsetail (*Equisetum sylvaticum*), jewelweed, (*Impatiens capensis*), and bugleweed (*Lycopus americanus*).

Type 3 wetlands typically had surface organic soils underlain by sandy clay loam, clay loam, sandy loam, and less frequently, loamy sands. Hydric soil indicators most frequently encountered in Type 3 wetlands include a histic epipedon, depleted matrices in subsurface mineral soils, gleying in subsurface soils, low chroma colors in mineral soils, and occasionally high organic content at the surface of sandy soils. Most of the Type 3 wetlands hydrology were saturated at the surface or were inundated with up to six inches of water.

Type 4 Deep Marsh and Type 5 Shallow Open Water

Types 4 and 5 wetlands were less commonly observed, but were dispersed throughout the West Range Site. Most of these wetlands appeared to be formed through beaver activity. Other Type 4 and 5 wetlands were located along fringe areas of Dunning Lake. These habitats typically contained herbaceous and/or open water and ranged from semi-permanently flooded to permanently flooded.

Type 4 and 5 wetlands were dominated by broad leaved cattail, Canada blue-joint grass, blue-flag iris, white water lily (*Nymphaea odorata*), and water hemlock (*Cicuta maculata*). For those Type 4 and 5 wetlands around Dunning Lake, vegetation included herbaceous and/or woody fringes surrounding the deeper open water habitat. Woody species observed with herbaceous vegetation in these areas typically included speckled alder (*Alnus rugosa*), black ash (*Fraxinus nigra*), and black spruce (*Picea mariana*).

Type 6 Shrub Swamp

Type 6 wetlands are widespread throughout the study area. These wetlands ranged in size and hydrologic connectivity from small, isolated depressions to large swamps embedded within larger wetland complexes having multiple wetland types. Type 6 wetlands were often present with Type 3 shallow marsh habitats. Typically, Type 6 wetlands were dominated with shrub canopies comprised of monocultures of speckled alder or mixtures of alder (*Alnus* sp.), young black ash, and the occasional willow species (*Salix* sp.). Sweet gale (*Myrica gale*) and red-osier dogwood (*Cornus sericea*) were also occasionally observed in the Type 6 wetland communities.

Type 6 wetland soils typically consisted of deep organic soil, or similar to Type 3 wetlands, soil with a histic epipedon over sandy or clayey soil. Deep, dark peat and mucks were most commonly observed within larger wetland complexes. Other hydric soil indicators observed commonly included depleted

matrices in subsurface mineral soils, gleying in subsurface soils, low chroma colors in mineral soils, and occasionally high organic content at the surface of sandy soils. Type 6 wetlands typically had soils saturated to the surface and/or standing water.

Type 7 Wooded Swamp

Type 7 wetlands were also common throughout the West Range Site. These habitats were generally comprised of pure stands of black ash or with mixed stands of black ash, black spruce, balsam poplar (*Populus balsamifera*), balsam fir (*Abies balsamea*), and quaking aspen (*P. tremuloides*). A shrub layer of speckled alder and young trees was observed occasionally. The herbaceous layer was typically dominated with species common to the Type 3 wetlands areas, such as Canada blue-joint grass, sedges, marsh marigold, and jewelweed.

The size of these wetlands varies from small, isolated depressions to large complexes with multiple wetland types. These wetlands are classified as broad-leaved deciduous semi-permanently flooded, seasonally flooded, or saturated wetlands depending on their landscape position. Many of the small, isolated depressions are found in the heavily forested areas west of the existing utility ROW that bisects the site. These wetlands appear to be ephemeral with seasonal flooding in the spring or early summer; surface water evaporation follows in mid-summer leaving the wetland saturated for much of the remaining growing season. In contrast, the large forested swamps are typically found in a complex of wetland types, including shallow marsh, scrub-shrub, and sometimes bog habitats. These large complexes provide much of the natural drainage through the site and are hydrologically connected to other upstream and downstream resources outside of the project area.

Soils in the Type 7 wetlands were similar to Type 6 wetland habitat with deep organic muck forming a histic epipedon over sandy or clayey soils. In some of the large wetland complexes the soils consisted of deep peat and muck soils. The small, isolated wetlands typically had soils with dark surface horizons of muck or mineral soils over depleted subsurface clay loams. The Type 7 wetlands were typically saturated to the surface or were inundated with a few inches to several feet of standing water.

Type 8 Bogs

Type 8 bogs and fens are common to this region of Minnesota. There are several areas of Type 8 bog habitat throughout the West Range Site and its respective utility corridors. Conifers dominate the majority of the bog habitat.

The dominant vegetation associated with bog habitat included black spruce and tamarack *(Larix laracina*). In the understory or canopy openings, ericaceous shrubs and other heath vegetation were dominant. These species included, but were not limited to, Labrador tea (*Ledum groenlandicum*), leatherleaf (*Chamaedaphne calyculata*), bog rosemary (*Andromeda glaucophylla*), small cranberry (*Vaccinium oxycoccus*), and bog laurel (*Kalmia polifoila*). Other shrub species observed included speckled alder and bog birch (*Betula pumila*). The herbaceous layer was often comprised of cotton grass (*Eriophorum* sp.), woolgrass, wiregrass sedge, mud sedge (*Carex limosa*), three-seeded bog sedge (*C. trisperma*), northern pitcher plant (*Sarracenia purpurea*), northern manna grass (*Glyceria boreali*), horsetail, Canada blue-joint grass, and northern bog orchid (*Platanthera hyperborea*) all growing in deep Sphagnum moss (*Sphagnum* sp.) peats. Sphagnum moss, Labrador tea, leatherleaf and small cranberry were often the most dominant species found in this diverse herbaceous layer.

In areas closest to the adjacent upland where groundwater influence would be higher, floating Sphagnum mats were encountered and wetland vegetation trended toward more deciduous shrubs, sedges, and grasses. In the areas upslope from the wetland edge, the Sphagnum soils were dense and with less influence from the shallow surficial groundwater, where vegetation trended toward ericaceous shrubs, cottongrass, and conifers. This difference in habitat conditions demonstrates the boundary between true bog habitat with little groundwater influence and fen habitat in the lagg area with groundwater influence from the surrounding upland.

The Type 8 bogs were comprised of deep histosols that were saturated at ground surface and contained Sphagnum moss. The organic soils varied in decomposition with undecomposed fibric material at the ground surface, to moderately decomposed hemic peat from 1 to 2 feet below the surface, to well decomposed sapric peat several feet below the surface.

3.7.5.2 Surface Water Crossings

Several streams and one waterway crossing are located within the utility corridor alternatives for the West Range Site. Section 404 of the CWA regulates these resources. These streams and surface waters are discussed in Section 3.5.1.1. Table 3.7-4 describes the surface water crossings and wetland types adjacent to those waters within the HVTL, gas pipeline, and water process line alternative corridors. The specific surface waters that may be impacted by utility and transportation corridor crossings for the West Range Site are discussed in Sections 4.5.3 and 4.7.3.

Table 3.7-4. Utility and Corridor Crossings of Surface Waters (West Range Site)

Utility Corridor	Number of Crossings	Total Length of Crossings (linear feet)	Adjacent Wetland Types
HVTL Alternative 1	2	123	Types 3, 6
HVTL Alternative 1A	6	533	Types 3,6
HVTL Phase II	5	283	Types 2, 3, 5, & 6[1]
Natural Gas Pipeline Alternative 1	4	133	Types 1, 2, 6, & 3
Natural Gas Pipeline Alternative 2	4	313	Types 6, 3[1]
Natural Gas Pipeline Alternative 3	4	236	Types 3, 6, 8
Process Water Blowdown Pipeline 1	2	6	Types 3, 6[1]

Note: [1]Some wetland areas adjacent to these crossings do not have identified wetland types due to limitations in NWI information and site access for field identification.
Source: Excelsior, 2006b

3.7.6 Wetlands within the East Range Site Buffer Land and Utility and Transportation Corridors

Wetland types were delineated at the East Range Site and its associated corridors (where access was granted) during October 2004 and August 2005. Wetlands in the vicinity of the East Range Site are shown in Figure 3.7-2 and listed on Table 3.7-5. The results of the wetland delineation efforts describe the water resources and wetland habitats encountered during the field investigations. A description of specific wetlands that may be impacted by proposed project features in the East Range Site and associated corridors is included in Section 4.7.4.

Table 3.7-5. Wetland Types (East Range Site and Associated Corridors)

Wetland Type	Total Area (acres)
Type 2	0.15
Type 6	21.18
Type 7	5.53

Table 3.7-5. Wetland Types (East Range Site and Associated Corridors)

Wetland Type	Total Area (acres)
Type 7/8	21.34
Type 3/7/8	18.79
Type 2/3/4/6/7/8	565.13
Total	**632.12**

Note: Wetland types with multiple characterizations describe certain wetlands that exhibited the characteristics of multiple wetland types in different locations within the wetland complex.
Source: Excelsior, 2006b

The dominant wetland types at the East Range Site include Type 6 shrub swamps, Type 7 wooded swamps, and Type 8 bogs. Type 2 wet meadows were also observed. Type 3 shallow marshes and Type 4 deep marshes were less common but were observed in areas where wildlife (i.e., beaver activity) has modified wetland hydrology. No Type 1, seasonally saturated wetlands, or Type 5, open water wetlands were identified at the East Range Site and its associated utility and transportation corridors during the 2004 and 2005 field investigations.

3.7.6.1 Descriptions of Wetland Types for the East Range Site

The sections provided below discuss the typical wetland plant communities that could be encountered within the East Range Site. Although not all of the utility and transportation corridors have been field-verified for the presence of wetlands, the following descriptions provide a summary of the types of wetland habitats that could be encountered within the proposed utility and transportation corridors based on NWI mapping.

Type 2 Wet Meadow

Type 2 wet meadows primarily occurred as small isolated wetlands, although small amounts of Type 2 wetlands also existed in the fringes of the larger wetland complexes. Canada blue-joint grass and woolgrass were the dominant vegetation in the wet meadow habitats. Red top (*Agrostis alba*), fowl manna grass, and several species of sedges were also common. Scattered black ash trees were also observed occasionally.

Type 2 wetland soils typically consisted of mineral surface horizons of sandy and loamy clays underlain by bedrock. Hydric soil indicators present included a depleted matrix in subsurface mineral soils, low chroma colors, and occasionally iron and manganese concretions. The primary hydrology indicators in the Type 2 wet meadows were soils that were saturated in the upper 12 inches.

Type 3 Shallow Marsh

Type 3 shallow marshes only occurred in association with larger wetland complexes at the East Range Site and were typically vegetated by Canada blue-joint grass, broad-leaf cattail, pickerelweed (*Pontederia cordata*), spotted joe-pye weed (*Eupatorium maculatum*), wire grass sedge, and other species of sedges.

Texture of soils typically consisted of organic muck or peat and had a black chroma matrix in the Munsell color chart. In areas hydrologically modified by wildlife (i.e., beaver activity), the soil texture consisted of silt and muck and possessed a black chroma matrix. Wetland hydrology throughout the Type 3 shallow marsh areas ranged from saturated soils to two feet of inundation in open water areas.

Type 4 Deep Marsh

Type 4 deep marshes occurred in association with larger wetland complexes in the East Range Site, specifically where hydrology has been altered by beaver activity. Type 4 deep marshes were dominated by broad-leaf cattail and pickerelweed in the fringe areas bordering open water.

Texture of soils in Type 4 deep marshes typically consisted of organic muck and peat. A mixture of silts and mucky soils were observed in areas that had recently been modified by wildlife (beaver activity). Wetland hydrology indicators noted included visual observations of standing water possessing a water column ranging from two to six feet of water, drift lines, and water marks.

Type 6 Shrub Swamp

Type 6 wetlands were common throughout the East Range Site. Type 6 scrub-shrub swamps occurred as isolated depressions and in association with larger wetland complexes. Type 6 wetlands were characterized as transitional zones between Type 3 shallow marshes, Type 7 wooded swamps and Type 8 bogs. Speckled alder typically dominated the scrub-shrub swamps while red-osier dogwood, black ash, and black spruce were also often observed in the shrub layer. Canada blue-joint grass and wire grass sedge dominated the herbaceous layer, while scattered broad-leaf cattail and red top were also observed.

Soils in the Type 6 scrub-shrub swamps typically consisted of a sandy clay surface horizon underlain by a clay horizon. Soils consisting of deep organic muck or peat were observed in the large wetland complexes. One wetland had a soil texture containing a mixture of rock and gravel. Hydric soil indicators observed included a depleted matrix in subsurface mineral soils, iron and manganese concretions, and low chroma colors in mineral soils. Type 6 wetlands typically had soils that were saturated to the surface or inundated with up to six inches of water.

Type 7 Wooded Swamp

Type 7 wooded wetlands were common throughout the East Range Site. These habitats were typically associated with Type 8 bogs and were typically vegetated by white cedar (*Thuja occidentalis*), black ash, or speckled alder with lesser amounts of black spruce, and tamarack (*Larix laricina*). Speckled alder, black spruce, tamarack, and quaking aspen formed the dominant plant community in the shrub layer while the herbaceous layer was mostly comprised of Canada blue-joint grass, wiregrass sedge, and Sphagnum moss.

Soil texture in Type 7 wooded swamps were typically comprised of deep organic black muck or peat. In some situations, a thick layer of mineral soils underlay layers of relatively shallow peat. For the most part soils in the Type 7 wetlands were saturated at the surface or were inundated with two to three inches of standing water.

Type 8 Bogs

Type 8 bogs were common throughout the East Range Site. The majority of bog habitat is vegetated by conifers such as black spruce, white cedar, and tamarack. The understory was characterized by a thick Sphagnum moss mat along with leatherleaf (*Chamaedaphne calyculata*). Soils in the Type 8 bogs typically consisted of black, deep organic peat soils. Texture of peaty soils varied from undecomposed fibric peat (O_f) at the surface, to moderately decomposed hemic peat (O_h) from 1 to 2 feet below the surface, to well decomposed sapric peat (O_s) several feet below the surface. The soils in the Type 8 wetlands were saturated at the surface.

3.7.6.2 Surface Water Crossings

Construction of utility and transportation corridors associated with the East Range Site would require crossing streams or rivers as well as crossing other bodies of water, including wetlands. The water crossings are associated with the HVTL alternatives, gas pipeline alternatives, three process water supply pipelines, the potable water and sewer pipelines, and the rail alternatives. There are no “other water”

crossings associated with the location, placement, or construction of the Mesaba Generating Station and access roads. Table 3.7-6 describes the surface water crossings within the HVTL, gas pipeline, process water supply pipeline, and rail line alternative corridors. The specific surface waters that may be impacted by utility and transportation corridor crossings for the East Range Site are discussed in Sections 4.5.4 and 4.7.4.

Table 3.7-6. Utility and Transportation Corridor Crossings of Surface Waters (East Range Site)

Utility Corridor	Number of Crossings	Total Length of Crossings (linear feet)	Adjacent Wetland Types
HVTL Alternative 1	21	1194	Types 2, 5, 6[1]
HVTL Alternative 2	20	1760	Types 2, 5, 6, 7, & 8[1]
Natural Gas Pipeline Alternative 1	19	792	Types 2, 6, 7, & 8[1]
Process Water Supply Pipeline – Area 6 and Stephens Mine to Area 2WX	2	33	Type 6
Process Water Supply Pipeline – Area 9 South to Area 6	1	3	N/A[1]
Process Water Supply Pipeline – Area 9 North (Donora Mine) to Area 6	1	3	N/A[1]
Potable Water and Sewer Pipelines	1	460	N/A[1]
Rail Line Alternative 1	2	6	Types 2, 3, 4, 6, 7, & 8
Rail Line Alternative 2	2	6	Types 2, 3, 4, 6, 7, & 8

Note: [1]Some wetland areas adjacent to these crossings do not have identified wetland types due to limitations in NWI information and site access for field identification.
Source: Excelsior, 2006b

INTENTIONALLY LEFT BLANK

3.8 BIOLOGICAL RESOURCES

Projects receiving Federal funds are subject to the Fish and Wildlife Coordination Act, requiring that Federal agencies consider the effects on fish and wildlife and their habitats prior to implementation of an action. Fish and game species are protected through the hunting, fishing, and trapping regulations enforced by the MNDNR and the U.S. Fish and Wildlife Service (USFWS). Birds and their nests, including any songbirds or raptors that may inhabit the sites, are protected under the Federal Migratory Bird Treaty Act.

The following sections describe the ecological conditions and biological communities that are present on the West Range and East Range Sites and their associated utility and transportation corridors. Section 3.8.1 describes the types of terrestrial floral (vegetative) and faunal (animal) communities present at the West Range Site, the East Range Site, and the associated corridors. Section 3.8.2 describes the aquatic biota associated with each of the alternative project site locations. State and Federally listed rare, special concern, threatened, or endangered species and associated habitats located within the vicinities of the potential project locations are discussed in Section 3.8.3.

Flora and fauna and associated habitats were assessed in conjunction with the field reconnaissance for wetland habitat. Specific locations of potential protected habitats and/or species occurrences located within or near the project areas were targeted during the reconnaissance and identified prior by conducting a review of MNDNR Natural Heritage Information System (NHIS) data.

3.8.1 Terrestrial Communities

Loss of habitat and habitat degradation have contributed to the population decline of some types of wildlife in Minnesota. Consequently, the MNDNR and the USFS have developed an Ecological Classification System (ECS) in Minnesota for mapping and classifying landscape features based on the ecological functions that these features provide. Ecological land classifications are used to identify, describe, and map progressively smaller areas of land with increasingly uniform ecological features. The system utilizes associations of biotic and environmental factors, which include climate, geology, topography, soils, hydrology, and vegetation (MNDNR, 2007).

Based on the ECS, the West Range Site lies within the Nashwauk Uplands Subsection, and the East Range Site lies within the Laurentian Uplands Subsection. Subsections are ECS units that are defined using glacial deposition processes, surface bedrock formations, local climate, topographic relief, and the distribution of vegetation, particularly tree species (MNDNR, 2007).

The Nashwauk Uplands Subsection is bounded by Giant's Ridge to the north and the Mesabi Range to the south. Before settlement by people of European descent, forests in this region consisted of red and white pine, balsam fir, white spruce, and aspen-birch. Vegetation in wetlands consisted of evergreen conifer trees and shrubs. Forestry and mining activities are the most common types of land use in this subsection. Animal species of note that are known or expected to occur in this subsection include bald eagles, Canada lynx, spruce grouse, American bitterns, bobolinks, Connecticut warblers, gray jays, northern goshawks, ospreys, trumpeter swans, and northern brook lampreys (MNDNR, 2006b).

The Laurentian Uplands Subsection is bounded by the North Shore Highlands and Border Lakes Subsections. The high elevations in this subsection are the source of many rivers, including the St. Louis, Cloquet, and Whitefish. Lakes and wetlands are numerous in this area. Before settlement by people of European descent, major upland forest types consisted of aspen-birch, jack, and red and white pine. Lowland areas contained conifer swamps and bogs. At present, forestry is the most important land use, and quaking aspen has become the dominant tree species. The size and shape of areas affected by forestry practices influences the types of wildlife species utilizing large, contiguous blocks of land. Animal species of note that are known or predicted to occur in this subsection include bald eagles, gray wolves, Canada lynx, spruce grouse, black-throated warblers, common loons, gray jays, and heather voles (MNDNR, 2006c).

3.8.1.1 West Range Site

Habitats were first identified for the West Range Site using offsite methods primarily consisting of aerial and satellite imagery review. Assessments of vegetation cover type were completed through the use of LandSat-Based Land Use-Land Cover data, which is Raster-based land cover data derived from 30-meter resolution Thematic Mapper satellite imagery (MNDNR, 2006d). The review was followed by field reconnaissance completed during June 2005. The terrestrial (upland) habitats described below are based on observations collected during the June 2005 field reconnaissance. Supplemental information describing terrestrial habitats was obtained during wetland surveys performed in the summer of 2005.

In some areas, biological communities could not be determined for segments of the proposed HVTL and gas pipelines. Permission to access existing or proposed corridors was not granted by the various landowners and/or easement holders at the time of the field surveys. For areas where access was not permitted, assessments of vegetation cover type were completed through aerial imagery only. Although the source of imagery ranges from June 1995 to June 1996, the overall land use in this area of the state has not changed dramatically. Therefore, the dataset from 1995 to 1996 was considered appropriate for providing land cover information.

Physiography

The onsite geology of the West Range Site is comprised of Pleistocene glacial till over Precambrian bedrock. The glacial till is within the Nashwauk Moraine Association of the Rainy Lobe glacial advance. Deposits of peat and bedrock outcrops are embedded within the till. The site topography is varied with gently sloping hills located in the western half of the West Range Site and a more rugged series of north-south trending ridges located in the eastern half. Flat areas consist of peat deposits (wetlands), which are described in Section 3.7, Wetlands.

Flora (Vegetation)

Timber harvesting has historically been the primary land use in the area, which has influenced the composition and dynamics of the forest cover on the site, creating stands of differing age and species composition. Both clear-cutting and selective harvesting of timber are evident along defined tracts of land within the site resulting in a patchwork of recently cut areas as well as stands of forest cover of varying ages and compositions.

Results of the field studies identified several ecologically successive stages of terrestrial communities possessing a variety of trees, shrubs, and herbs. The following descriptions of the floral communities found on the West Range Site are derived from the *Field Guide to the Native Plant Communities of Minnesota: The Laurentian Mixed Forest Province* (MNDNR, 2003), a vegetation classification system for north-central and northeastern Minnesota. The wetland communities on the site are discussed in Section 3.7. State and Federally protected flora species are addressed in Section 3.8.3.

The most common forested terrestrial habitat onsite is characterized as the northern mesic hardwood forest, and further classified as the plant community type red oak-sugar maple-basswood-(bluebead lily) forest (MNDNR Code MHn35b). This hardwood forest typically occurs on well-drained to moderately well-drained loamy soils, most often on stagnation moraines and till plains and less frequently on bedrock hills. This plant community association is dominated by sugar maple (*Acer saccharum*), basswood (*Tilia americana*), and northern red oak (*Quercus rubra*). The presence of paper birch (*Betula papyrifera*), red maple (*A. rubra*), and occasionally yellow birch (*B. allegheniensis*) and quaking aspen (*Populus tremuloides*) indicate the plant community type MNDNR Code MHn35b. Subcanopy species in the northern mesic hardwood forest commonly include sugar maple and ironwood (eastern hop hornbeam, *Ostrya virginiana*). Sugar maple is the dominant species in the shrub layer, but other frequent shrub species include beaked hazel (*Corylus cornuta*), chokecherry (*Prunus virginiana*), pogoda dogwood (*Cornus alternifolia*), fly honeysuckle (*Lonicera canadensis*), and balsam fir (*Abies balsamea*). Common understory species include wild sarsaparilla (*Aralia nudicaulis*), large-leaved aster (*Aster macrophyllus*),

mountain rice grass (*Oryzopsis asperifolia*), and rose twistedstalk (*Streptopus roseus*). Common herbaceous species include Pennsylvania sedge (*Carex pennsylvanica*), sweet-scented bedstraw (*Galium triflorum*), large-flowered bellwort (*Uvularia grandiflora*), and bluebead lily (*Clintonia borealis*).

Field investigations identified northern mesic hardwood forest as one of the more mature forest stands, which was dominated by sugar maple and yellow birch. Trees in this forest stand had approximate diameters at breast height (DBHs) that ranged between 8 to 18 inches. Based upon visual observations, it was estimated that timber-harvesting activities of northern mesic hardwood forest had not occurred within the past 30 to 60 years. Sugar maple and yellow birch were the largest tree species, with many yellow birches averaging a DBH of 8 to 12 inches and sugar maples averaging DBHs of 12 to 14 inches. The subcanopy and shrub-layer were sparsely vegetated, but contained a few small maples, oaks, ironwood, hazel, honeysuckle, and serviceberries. Forbs and herbaceous plants were commonly represented by bluebead lily, Pennsylvania sedge, maple seedlings, wild sarsaparilla, and large-leaved aster. Stands of sugar maple saplings dominated areas where sunlight penetrated the forest canopy.

The second most common terrestrial habitat at the West Range Site consists of the northern wet-mesic boreal hardwood-conifer forest, and further classified as the aspen-birch-red maple forest (MNDNR Code MHn44a). This hardwood forest association is most commonly encountered on level, clayey sites with a seasonally shallow local water table on glacial lake deposits, stagnation moraines, and till plains. Species composition is variable, and the canopy is often dominated by quaking aspen, paper birch, and balsam fir. Less common associates include red maple, white spruce (*Picea alba*), and black ash (*Fraxinus nigra*). Trees that formed the forest canopy also formed the subcanopy. The most prevalent species in the shrub layer was beaked hazel, but other common species included chokecherry, juneberries (*Amelanchier* spp.), bush honeysuckle (*Diervilla lonicera*), and mountain maple (*Acer spicatum*). Common understory forbs included Canada mayflower (*Maianthemum canadensis*), wild sarsaparilla, sweet-scented bedstraw, dwarf raspberry (*Rubus pubescens*), and large-leaved aster, which is most common.

The northern wet-mesic boreal hardwood-conifer forest at the West Range Site was characterized as a less mature forest than the northern mesic hardwood forest, and was mostly dominated by paper birch interspersed less frequently with balsam fir. Other less common species included white pine (occasional), American elm (*Ulmus americana*), sugar maple, and green ash (*Fraxinus pennsylvanica*). Understory species consisted mostly of beaked hazel and serviceberries. Immature red maple, basswood, quaking aspen, and big-toothed aspen (*Populus grandidentata*) were also observed at the shrub and sub-canopy layer. Common understory forbs included, but were not limited to, large-leaved aster, bracken fern (*Pteridium aquilinum*), bluebead lily, species of clubmoss, Canada mayflower, and sweet coltsfoot (*Petasites frigidus*).

The remaining terrestrial forested cover types within the West Range Site were identified as second growth aspen forest, which was characterized as early successive, near monotypic, even-aged stands emerging after logging activities. This community had a tree canopy dominated by quaking aspen and balsam poplar (*Populus balsamifera*). Generally, vegetation in these areas ranged from 10 to 20 years in age and was defined by even-aged canopy trees, many of which were relatively young with small stems. Herbaceous species consisted mainly of big-leaf aster, bracken fern, and goldenrods (*Solidago* sp.). The early successional aspen forest community is recognized in the MNDNR's Mesic Hardwood Forest System as being approximately 0 to 35 years in age, but it has not been assigned a plant community classification code (MNDNR, 2005a). Consequently, these clear-cut areas are referred to as aspen forest.

There were no old-growth or mature conifer forests observed during the field reconnaissance. White pines were observed infrequently and red pine (*Pinus resinosa*) was not observed at the site. All of the terrestrial communities identified have been impacted by silvicultural (forest management) practices and other land use activities at some point in time. The eastern half of the West Range Site had recently been harvested for timber (2005) and portions of the western half of the West Range Site exhibited evidence of logging activities within the past 10 to 20 years, as evidenced by dense stands of quaking aspen sprouts. Evidence of beaver activity was also observed, particularly in the eastern half of the site.

Invasive species observed on the West Range Site consisted of reed canary grass (*Phalaris arundinacea*) and smooth brome (*Bromus inermis*), which were identified in maintained utility ROWs. Other invasive species not observed onsite, but are known to occur within the Arrowhead Region include plant species such as: purple loosestrife (*Lythrum salicaria*), typically located within disturbed emergent wetlands; buckthorn (*Rhamnus cathartica* and *R. frangula*), honeysuckle (*Lonicera tatarica*), and black locust (*Robinia pseudoacacia*), typically located within disturbed forests and along forest edges; and, garlic mustard (*Alliara petiolata*) and crown vetch (*Coronilla varia*), located in herbaceous layers (MNDNR, 1999).

The linear maintained utility ROWs transecting portions of the West Range Site were dominated by a variety of persistent and non-persistent herbaceous plants and occasional shrubs. Wetlands within these linear features typically occupied the lower elevations of the ROWs. Uplands in the ROWs were dominated with old field vegetation, which were comprised of Timothy grass (*Phleum pratense*), Canada blue-joint grass (*Calamagrostis canadensis*), goldenrods (*Solidago sp.),* smooth brome (*Bromus inermis*), reed canary grass (*Phalaris arundinacea*), big-leaf aster, bracken fern, wild sarsaparilla, and other pioneer vegetation typical of disturbed areas. Reed canary grass is an invasive species in Minnesota that is a major threat to wetlands and often produces large, single-species stands in which native vegetation are unable to compete for necessary resources. Smooth brome is also an invasive species in Minnesota that is somewhat less noxious than reed canary grass and spreads into disturbed areas as well as moist wooded areas (MNDNR, 2006e). Old field areas that were disturbed or maintained were not assigned specific classification in the MNDNR system for the Laurentian Mixed Forest Province.

LandSat Vegetative Cover Types

For utility and transportation corridors that were not accessible during the 2005 field surveys, GIS-based LandSat-Based Land Use-Land Cover (Raster) data were used to characterize vegetative coverage. The data originated from the Manitoba Remote Sensing Centre, and are downloadable from the MNDNR on-line Data Deli (MNDNR, 2006d). Table 3.8-1 describes the Land Cover Types from the LandSat-Based Land Use-Land Cover data and Table 3.8-2 summarizes the Terrestrial Land Cover Types encountered within each utility or transportation ROW during field reconnaissance.

Table 3.8-1. Terrestrial Land Cover Types from LandSat-Based Land Use-Land Cover

Land Cover	Definition
Coniferous Forest	Includes areas with at least two thirds or more of the total canopy composed of predominantly woody coniferous species. It may contain deciduous species but is dominated by coniferous species. It includes woodlots, shelter belts, and plantations.
Deciduous Forest	Includes areas with at least two-thirds or more of the total canopy cover composed of predominantly woody deciduous species. It may contain coniferous species but is dominated by deciduous species. It includes woodlots, shelter belts, and plantations.
Grassland	Includes areas covered by grasslands and herbaceous plants. May contain up to one third shrubs and/or tree cover. Areas may be small to extensive and range from regular to irregular in shape. These areas are often found between agricultural land and more heavily wooded areas, along ROWs and drains. Some areas may be used as pastures and be mowed or grazed, and may range in appearance from very smooth to quite mottled. Included are fields which show evidence of past tillage but now appear to be abandoned and grown to native vegetation or planted to a cover crop.
Mixed-Wood Forest	Areas of forest where the canopy is composed of approximately equal amounts of deciduous and coniferous species.

Table 3.8-1. Terrestrial Land Cover Types from LandSat-Based Land Use-Land Cover

Regeneration/Young Forest	Areas where commercial timber has been completely or partially removed by logging; management activities whose goal is to enhance timber productivity and/or wildlife habitat and to provide age class and species diversity; and catastrophic events, primarily fire and wind damage. These activities have taken place in the last 15 years. Almost all of these areas have been replanted or naturally regenerated into young trees.
Shrubby Grassland	This class includes a combination of grass, shrubs, and trees in which deciduous and/or coniferous treed cover comprises from one third to two thirds of the area, and/or the shrub cover comprises more than one third of the area. This complex is often found adjacent to grassland or forested areas, but may be found alone. These areas are often irregular in shape and vary greatly in size.

Source: MNDNR, 2006d

The NWI (Cowardin et al., 1979) and USFWS Circular 39 (Shaw and Fredine, 1956) classifications were used to characterize land cover types within the utility and transportation corridors that were not field surveyed.

Table 3.8-2. Terrestrial Land Cover Types within Utility and Transportation Corridor ROWs (West Range Site)

Utility or Transportation Corridor	Land Cover Types from LandSat-Based Land Use-Land Cover					
	Coniferous Forest	Deciduous Forest	Grassland	Mixed-Wood Forest	Regeneration/Young Forest	Shrubby Grassland
HVTLs	X	X	X	X	X	X
Gas Pipelines	X	X	X	X	X	X
Process Water Pipelines	X	X		X	X	
Process Water Blowdown Pipelines	X	X	X	X	X	
Potable Water and Sewer Pipelines	X	X	X	X	X	
Rail Lines	X	X	X	X	X	
Access Roads	X	X	X	X	X	

Source: MNDNR, 2006d

Fauna (Wildlife)

Wildlife at the West Range Site included species typical to northern Minnesota. The following discussion describes the wildlife habitats as related to wetland communities (described in Section 3.7) and terrestrial vegetative communities described above, and faunal assemblages that would be expected to occur within each of those communities. Fauna that were observed during the field investigations are also addressed. State and Federally protected fauna are addressed in Section 3.8.3.

The quality of the wildlife habitat varies throughout the site, and the majority of the site could be characterized as medium habitat quality based upon the plant species composition, wildlife habitat

structure, vegetation interspersion, and habitat complexity. Wetlands qualify as the highest quality habitats on site and the bog wetlands would rank as high quality due to their uniqueness and lack of disturbance, when compared to the condition and spatial distribution of terrestrial habitats at the West Range Site. Areas experiencing recent timbering and areas with monoculture stands of aspen with little or no forest structure diversity would be considered low value habitat. However, these areas are distinguished from other disturbed areas such as mined areas within utility or road ROWs because these areas, when viewed over a long period of time, would succeed from one successive stage to another.

A combination of timbering, mining, and development (utilities, roads, and buildings) has created areas of fragmented habitat. Habitat fragmentation is prevalent southwest of the site boundary because of the types of land management that has historically occurred. The existing roads and high voltage transmission corridors in and around the project area have resulted in permanent habitat fragmentation for some species. Land uses and types of habitats are similar in areas surrounding the West Range Site.

The quality of habitat often dictates the abundance and diversity of both plant and animal species found within the ecosystem. For instance, trees with a DBH of greater than 10 inches could be utilized as dens for cavity-dwelling birds. Also, habitat structure becomes increasingly complex along a vertical axis from the forest floor to the top of the canopy, which also correlates positively with the potential use of these habitats by avifauna (birds) (Bartoldus et al., 1994) and mammals. Animal communities within each of these habitat types are discussed below.

Mammals

Mammals that commonly utilize northern mesic hardwood forest include predators such as fox, lynx, and raccoons, or large ungulates such as moose and deer. Many deer were observed at the West Range Site and deer browse lines were evident. A moose skeleton was also observed on the site. Beaver activity was prevalent, especially within the eastern half of the site. During the June 2005 field reconnaissance a gray wolf (*Canis lupus* – recently delisted in Minnesota at the Federal level; had been listed as threatened) was observed preying on a deer fawn.

The northern wet-mesic boreal hardwood-conifer forest is patchy and discontinuous at the West Range Site due to the presence of other habitat types (wetlands), and forestry management activities. The wildlife using this habitat type is anticipated to be common to second growth forests and the varying upland habitats found in northern Minnesota. The northern wet-mesic boreal hardwood-conifer forest provides similar wildlife habitat as the northern mesic hardwood forest community. The well-defined shrub layer and older tree canopy present at the site increases the available wildlife habitat.

Wildlife diversity within the aspen forest cover type is expected to be less than the northern mesic hardwood forests because of a simpler wildlife habitat structure and a decrease in plant diversity. This may be especially applicable to the younger stands of aspen. However, aspen communities can provide habitat for specialty species that are not found in other habitats and have preferences exclusive to aspen forests. Quaking aspens are often considered keystone species for which other forms of plants and animals are dependent on for food, shelter, or reproduction. Aspens are an important part of the northern woods food web for many levels of life ranging from microscopic insects to beaver and moose. A significant portion of the forest area consists of monotypic communities of poplar and aspen trees, and has limited cover type diversity. Trees in the area have den cavities, and thus provide shelter and nesting habitat for a variety of birds and wildlife.

Many of the wetland areas present at the site can be characterized as vernal pools and provide wildlife with a source of drinking water during early spring and summer.

Numerous mammal species often take advantage of the open grassy corridors found within utility ROWs and other forest edge habitats. Predator and scavenger mammal species utilize this habitat to locate and capture food. Deer and other mammals also use this habitat for food.

Birds

As birds are oftentimes more transient than mammals, they can be observed in a variety of habitats; however, often nest in a particular habitat type. Wooded, shrub-swamp, marsh, and bog wetlands provide nesting and forging habitat for songbirds, raptors, wading birds, rails, and waterfowl. Avifauna generally partition habitat by occupying different vertical layers within a habitat. For example, the limbs and branches in the upper part of the forest canopy provide song and roosting perches and support for nests, while overhanging vegetation can provide concealment from predators (Bartoldus et al., 1994). Field investigations at the West Range Site indicate that the project area has wetlands with a light to moderately dense shrub layer. Consequently, the structure and habitat complexity of wetlands and uplands varies throughout the project area, qualifying the project area as moderate wildlife habitat.

Several migratory bird species use wetlands, including peatlands, during the spring and summer as part of their life cycles. Typical migratory birds using peatlands include species such as the alder flycatcher (*Empidanox alnorum*), swamp sparrow (*Melospiza georgiana*), common yellowthroat (*Geothlypis trichas*), and LeConte's sparrow (*Ammodramus leconteii*). Table 3.8-3 summarizes the migratory bird species that may be found in peatlands (MNDNR, 2006f).

The West Range Site contains breeding bird habitat in uplands as well as wetlands, as evidenced by songbirds engaged in territorial behaviors and calls during the June and July 2005 field surveys. These activities were assumed to be from nesting birds. Raptor nesting was assumed to occur throughout the site as well, although no raptor nesting was observed. Two adult unidentifiable Accipiters (forest dwelling hawks) and a barred owl (*Strix varia*) were observed. Of the three potential Accipiters found utilizing forested areas, the northern goshawk (*Accipiter gentiles*) is the only Accipiter considered rare and is a designated sensitive species in Minnesota by the USFS. Goshawks tend to prefer mature, undisturbed conifer forests, which are present throughout the region, including the West Range Site and IGCC facility footprint area. The MNDNR is currently upgrading the status of this species to special concern. There is no Federal designation as threatened or endangered for this species under the Endangered Species Act of 1973. The MNDNR may ultimately request or require surveys for the northern goshawk. Ruffed grouse (*Bonasa umbellus*) were commonly observed especially in the second growth aspen forest.

Table 3.8-3. Avifauna Potentially Utilizing Wetland Habitat (West Range Site)

Scientific Name	Common Name
Dendroica petechia	yellow warbler
Passerculus sandwichensis	Savannah sparrow
Dolichonix orzivorous	bobolink
Empidanox alnorum	alder flycatcher
Melospiza georgiana	swamp sparrow
Geothlypis trichas	common yellowthroat
Ammodramus leconteii	LeConte's sparrow
Oporornis agilis	Connecticut warbler
Dendroica coronata	yellow-rumped warbler
Vermivora ruficapilla	Nashville warbler
Dendroica palmarum	palm warbler
Catharus guttatus	hermit thrush
Empidonax flaviventris	yellow-bellied flycatcher

Table 3.8-3. Avifauna Potentially Utilizing Wetland Habitat (West Range Site)

Scientific Name	Common Name
Junco hyemalis	dark-eyed junco
Spizella passerina	chipping sparrow

Source: MNDNR, 2006f

Certain avian species take advantage of the open grassy forest edge areas created by roadways and utilities. Predatory birds such as hawks and eagles utilize these corridors for increased line of site of prey species. Grasslands in Minnesota can provide habitat for a variety of bird species, which include, but are not limited to grasshopper sparrows (*Ammodramus savannarum*), Henslow's sparrows (*A. Henslowii*), Baird's sparrows (*A. bairdii*), chestnut-collared longspurs (*Calcarius ornatus*), and Sprague's pipit (*Anthus spragueii*). Grasslands can also provide habitat for numerous species of mammals such as Plain's pocket mice (*Pergonathus flavescens*), prairie voles (*Microtus ochrogaster*), and Richardson's ground squirrels (*Spermophilus richardsonii*), and herptile species such as western hognose snakes (*Heterodon nasicus*) (MNDNR, 2006g).

No colonial migratory birds were observed within the West Range Site at the time of the field investigation; however, no specific survey targeting migratory birds was conducted. It is assumed that colonial migratory birds utilize habitats on site during the songbird nesting season, which occurs from approximately April 15 through August 15. Colonial migratory birds include species such as nesting swallow colonies, heron and egret nests, or other colonial nesting species.

The MNDNR NHIS database lists no bald eagle nesting areas within the West Range Site, nor within a 2-mile radius of the project area or the transportation and utility corridors.

Reptiles and Amphibians

Wetlands provide habitat for a variety of wildlife species common throughout the West Range Site. Bog habitat is the most unique onsite habitat, which is generally considered potential habitat for rare species of herpetofauna (reptiles and amphibians) (MNDNR, 2006f). Isolated wetlands (wetlands not hydrologically connected to interstate waters via a surface connection, such as a channel) function as reproductive habitat for herpetofauna. Adult anurans (frogs) were observed during the field reconnaissance and included American toad (*Bufo americanus*), gray treefrog (*Hyla versicolor*), northern leopard frog (*Rana pipiens*), and wood frog (*Rana sylvatica*). Potential habitats were also observed for the spring peeper (*Psuedacris crucifer*), western chorus frog (*Psuedacris triserata*), green frog (*Rana clamitans*), and mink frog (*Rana septentrionalis*), all species common to the area. The mink frog is common to lakes and lake-fringe wetlands and could occur at the site. Onsite wetlands also provide potential habitat for the eastern newt (*Notopthalmus viredescens*) and the blue-spotted salamander (*Ambystoma laterale*), which are common to northern Minnesota.

Wildlife Protected Areas

No designated Federal Wildlife Refuges, Waterfowl Production Areas, or National Preserves are within or immediately adjacent to the West Range Site boundary. No MNDNR Wildlife Management Areas (WMAs), Wildlife Refuges, State Natural Areas (SNAs), designated Game Lakes, or Designated Trout Streams occur within or immediately adjacent to the West Range Site or any of the associated utility or transportation corridors. An unnamed designated trout stream, which drains into Swan Lake (east of Pengilly), is located 2,500 feet east of one of the HVTL corridors proposed for the West Range Site.

3.8.1.2 East Range Site

Habitats for the East Range Site were first identified through a review of aerial and satellite imagery. Vegetation cover types were characterized through the use of LandSat-Based Land Use-Land Cover data, which is Raster-based land cover data derived from 30-meter resolution Thematic Mapper satellite imagery (MNDNR, 2006d). The terrestrial (upland) habitats described below are based on field surveys conducted during October 2004, and wetland surveys performed in September through October 2005. Observations of specific flora and fauna during field surveys are also discussed.

Floral and faunal communities could not be determined for some segments of the utility corridors during the field surveys because permission to access these corridors was not granted by the various landowners and/or easement holders. For these utility corridors, vegetation cover types were characterized through the use of aerial imagery. Although the source imagery dates range from June 1995 to June 1996, overall land use in this area has not dramatically changed; therefore, the dataset was considered appropriate for evaluation.

Physiography

The geology is comprised of a thin mantle of Pleistocene glacial till over Precambrian bedrock amidst areas that are exposed bedrock. The glacial till (surface geology) is a ground moraine within the Nashwauk Moraine Association of the Rainy Lobe glacial advance. Deposits of peat and bedrock outcrops occur within the till. The site topography is comprised of flat areas within the larger wetland basins and gently undulating hills elsewhere. The large ridges associated with the Iron Range occur approximately one mile to the north of the site. Large spoil and overburden piles surround the northern and western sides of the site. Flat areas are often peat deposits (wetlands), which are described in Section 3.7, Wetlands.

Flora (Vegetation)

Timber harvesting is the primary land use for the site. A portion of the uplands within the East Range Site were recently clear-cut (within the previous five years). Timber harvesting has influenced the composition and dynamics of the forest cover on the site. Large areas are virtually devoid of tree cover due to recent clear-cutting.

The following descriptions of the vegetative communities found on the East Range Site were derived from the *Field Guide to the Native Plant Communities of Minnesota: The Laurentian Mixed Forest Province* (MNDNR, 2003), a vegetation classification system for north central and northeastern Minnesota. The wetland communities on the site are discussed in Section 3.7. State and Federally protected flora and fauna species are addressed in Section 3.8.3.

The forested terrestrial (upland) habitats at the East Range Site consist of northern mesic mixed forest, further classified as the native plant community type aspen-birch forest (balsam fir subtype) (MNDNR Code FDn43b1). This mixed forest is typically on loamy soils over bedrock in scoured bedrock uplands or on loamy, rocky, or sandy soils on glacial moraines, till plains, and outwash plains. This plant community association is dominated in the ground layer by wild sarsaparilla, large-leaved aster, bluebead lily, and bunchberry (*Cornus canadensis*). The shrub layer consists of beaked hazel, fly honeysuckle, and mountain maple. Canopy composition is mixed and includes paper birch, quaking aspen, white pine (*Pinus strobus*), balsam fir, white spruce (*Picea glauca*), red pine, and white cedar (*Thuja occidentalis*). The presence of balsam fir in either the shrub layer or the subcanopy is an indicator of the northern mesic mixed forest.

The northern mesic mixed forest habitat at the East Range Site contained a wide range of trees. From field observations, it was obvious that timber logging had occurred historically and in recent years. The entire site has undergone several iterations of clear-cuts based upon tree age and plant community dominance. Quaking aspen stands were perpetuated through clear-cutting activities, as evidenced by the

stands of evenly aged aspens observed on the site. The most mature trees in many areas were in an early- to mid-successional stage with ages of less than 50 years. The landscape setting for this area was mostly scoured bedrock terrain. The soils in this natural community consisted of shallow parent material, mostly sands and loams, over bedrock.

Invasive species observed on the East Range Site consist of reed canary grass (*Phalaris arundinacea*) and smooth brome (*Bromus inermis*), which were identified in maintained utility ROWs. Other invasive species not observed onsite, but are known to occur within the Arrowhead Region include plant species such as: purple loosestrife (*Lythrum salicaria*), typically located within disturbed emergent wetlands; buckthorn (*Rhamnus cathartica* and *R. frangula*), honeysuckle (*Lonicera tatarica*), and black locust (*Robinia pseudoacacia*), typically located within disturbed forests and along forest edges; and garlic mustard (*Alliara petiolata*) and crown vetch (*Coronilla varia*), located in herbaceous layers (MNDNR, 1999).

LandSat Vegetative Cover Types

For utility and transportation corridors that were not accessible during the 2004 or 2005 surveys, use of the LandSat-Based Land Use-Land Cover (Raster) data were used to characterize vegetative coverage along these corridors (MNDNR, 2006d). A summary of each terrestrial vegetative land cover encountered within utility and transportation corridors is provided in Table 3.8-4 (refer to Table 3.8-1 for descriptions of the land cover types). The National Wetlands Inventory (Cowardin et al., 1979) and USFWS Circular 39 (Shaw and Fredine, 1956) classifications were used to characterize wetland or aquatic habitats within the utility and transportation corridors that were not field surveyed.

Fauna (Wildlife)

Fauna present at the East Range Site would include species typical to northern Minnesota. The following discussion describes the wildlife habitats as related to the wetland habitats (described in Section 3.7) and the terrestrial vegetative communities described above, and faunal assemblages that are expected to occur within each community. Fauna observed during the field investigations are also addressed. State and Federally protected fauna are addressed in Section 3.8.3.

The quality of the wildlife habitat varies throughout the site. The majority of the site could be characterized as having medium quality habitat based upon the plant species composition, wildlife habitat structure, vegetation interspersion and wildlife utilization. Wetlands were the highest quality habitat on site and the bog wetlands would rank as high quality due to their uniqueness and lack of disturbance. Emergent wetlands also occur in areas where organic material forms the dominant substrate. There appears to be a high degree of vegetative cover type interspersion and an irregular shoreline in areas where emergent wetlands exist. The occurrence of emergent vegetation along shorelines creates favorable habitat for fisheries. Disturbed habitat from recent clear-cutting was widespread, and was the primary reason for the diminished quality in wildlife habitat.

Table 3.8-4. Terrestrial Land Cover Types Encountered within the Utility and Transportation Corridor ROWs (East Range Site)

Utility or Transportation Corridor	Land Cover Types from LandSat-Based Land Use-Land Cover					
	Coniferous Forest	Deciduous Forest	Grassland	Mixed-Wood Forest	Regeneration/Young Forest	Shrubby Grassland
HVTLs Alternative 1	X	X	X	X	X	X
Gas Pipeline Alternatives	X	X	X	X	X	X

Table 3.8-4. Terrestrial Land Cover Types Encountered within the Utility and Transportation Corridor ROWs (East Range Site)

Utility or Transportation Corridor	Land Cover Types from LandSat-Based Land Use-Land Cover					
	Coniferous Forest	Deciduous Forest	Grassland	Mixed-Wood Forest	Regeneration/Young Forest	Shrubby Grassland
Process Water Pipelines		X	X	X	X	X
Railroad Alternatives	X			X	X	X
Potable Water and Sewer Lines		X	X	X	X	
Access Roads	X	X		X	X	X

Source: MNDNR, 2006d

The East Range Site upland habitats have been widely impacted by recent clear-cutting. All of the uplands are classified as northern mesic mixed forest, aspen birch forest (balsam fir subtype) (MNDNR Code FDn43B1). Most of the un-harvested stands of this habitat are located in the eastern third of the site. Clear-cuts dominate elsewhere and wildlife habitat has been modified and qualitatively reduced in these areas. Avifauna diversity is highest within the un-harvested stands compared to the clear-cut areas. This includes nesting and foraging habitats for songbirds and raptors. The same also applies to suitable habitats for reptiles, amphibians, and mammals where clear-cutting has diminished habitat quality and complexity for these faunal groups.

Wetland habitats for fauna are relatively diverse and common on the East Range Site. Bog habitat is the most unique habitat and is potential habitat for rare species of fauna, primarily birds and small mammals, but is not the most common or abundant wetland type within the East Range Site.

Mammals

The list of mammals that potentially utilize this site is comprehensive and includes predators, such as bears, and large ungulates, such as moose and deer. A moose calf was observed during the wetland assessments in 2004 and evidence of moose was widespread throughout the East Range Site. Gray wolf tracks and scat were also observed occasionally throughout the site. Deer were observed frequently, and a family of otters was observed on the eastern side of the project site. Evidence of beaver foraging for food was widespread. Many of the wetlands within the project area contained beaver lodges and dams. Habitat for fisher (*Martes pennanti*) and pine martin (*M. americana*) was confined to the forested wetlands where clear-cutting has not occurred. Snowshoe hare habitat is also mostly confined to the forested wetlands for the same reason. This species is the primary prey item for the Federally threatened Canada lynx (*Lynx canadensis*) (discussed in Section 3.8.3). Lastly, the American black bear (*Ursus americana*) is relatively common in the area and could be expected to utilize the habitat resources in the area.

Numerous mammal species often take advantage of the open grassy corridors found within utility ROWs and other forest edge habitats. Predator and scavenger mammal species utilize this habitat to locate and capture food. Deer and other mammals also use this habitat for food.

Birds

No raptor nests were observed during the 2004 and 2005 habitat characterizations and wetland surveys. An adult merlin (*Falco columbaris*) was observed in flight exhibiting territorial behaviors. A

great horned owl (*Bubo virginianus*) was observed as well. Habitat for the red-shouldered hawk (*Buteo jamaicensis*) and northern goshawk was absent within the East Range Site, which is probably attributable to forest management activities. Probable habitats and improved habitat quality for these two rare species increases east and south of the project area, especially when entering the USFS property. No breeding concentrations of colonial migratory birds (i.e., nesting swallow colonies, waterbird colonies, heron and egret nests, or other colonial nesting species) were observed within the East Range Site. Table 3.8-3 summarizes typical migratory birds that may be found near the East Range Site.

No bald eagle nests were observed within or immediately adjacent to the project site and the MNDNR NHIS database shows no nesting areas within the East Range Site or within a 2-mile radius of the East Range Site project area. The NHIS has documented five bald eagle nesting areas within a one-mile radius of the various proposed and existing utility and transportation corridors.

Wooded and shrub wetlands also provide nesting and foraging habitat for songbirds and raptors. Marsh wetlands provide foraging habitats for wading birds, rails, and waterfowl.

Grasslands in Minnesota can provide habitat for a variety of bird species, which include, but are not limited to grasshopper sparrows (*Ammodramus savannarum*), Henslow's sparrows (*A. Henslowii*), Baird's sparrows (*A. bairdii*), chestnut-collared longspurs (*Calcarius ornatus*), and Sprague's pipit (*Anthus spragueii*). Grasslands can also provide habitat for numerous species of mammals such as Plain's pocket mice (*Pergonathus flavescens*), prairie voles (*Microtus ochrogaster*), and Richardson's ground squirrels (*Spermophilus richardsonii*); as well as herptile species such as western hognose snakes (*Heterodon nasicus*) (MNDNR, 2006g).

Reptiles and Amphibians

Many of the wetlands on the East Range Site appear to be isolated and provide habitat for herpetofauna. Herpetofauna observed utilizing isolated wetlands include adult anurans and included species such as the American toad, gray treefrog, northern leopard frog, and wood frog. Potential habitats were also observed for the spring peeper, western chorus frog, and green frog all species common to the area. These wetlands also provide potential habitat for the eastern newt and the blue-spotted salamander. Several of these species require upland habitats for some portion of their life. In some cases, timber harvesting may have provided upland habitats for herpetofaunal species that require open upland habitats on sandy soils. For other herpetofaunal species, clear-cutting may instead reduce favorable habitat.

Wildlife Protected Areas

No designated Federal Wildlife Refuges, Waterfowl Production Areas, nor National Preserves are within or immediately adjacent to the East Range Site boundary. No MNDNR WMAs, Wildlife Refuges, SNAs, designated Game Lakes, nor Designated Trout Streams occur within or immediately adjacent to the East Range Site or any of the associated utility or transportation corridors.

3.8.2 Aquatic Communities

The following sections provide information regarding aquatic habitats and associated fisheries located on or adjacent to the West Range Site, East Range Site, and associated utility and transportation corridors.

3.8.2.1 West Range Site

There are no bodies of water within the West Range Site. There are several streams and rivers, and one body of water, Oxhide Lake, located along the utility corridors associated with the West Range Site. These surface waters can generally be broken down into three basic categories: small ephemeral/perennial streams, rivers, and lakes. These three basic classifications all have somewhat unique fisheries components, and will be discussed in general terms. In addition, many former iron mine pits have filled with water via groundwater infiltration and surface water runoff following the cessation of mining

operations. Where pits are hydrologically connected to streams and rivers, as in the case of the Lind Mine Pit and Prairie River, aquatic communities have populated the pits.

There are no waterways designated as trout streams within the area of the West Range Site or proposed utility and transportation corridors, although it is possible that trout are occasionally present in some of the area waterways not designated. None of the waterways or water bodies in the area is considered to be cold water due to the lack of naturally reproducing trout populations and significant groundwater source hydrology.

Small streams are typically less than three feet across, tend to be very shallow, have low discharge, are often vegetated with emergent marsh species, and tend to function as conveyance systems between the multiple wetlands and water bodies located in the project vicinity. These small waterways are also highly prone to hydrologic alteration due to the abundance of beaver and associated beaver dams. The fisheries habitat in these small streams is limited due to the lack of space and cover and drawdown during dry periods. While beaver dams can obstruct fish passage, they can also create small ponds that benefit some species. These smaller streams can be important for allowing fish to move between more permanent suitable habitats, but are generally not primary fisheries resources. If fish species are present in these small stream systems, they would likely be dominated by small non-game species such as Cyprinids (minnows, dace, and creek chub) and Percids (darters).

The rivers, primarily the Swan River, Prairie River, and their tributaries, support more fish populations than the smaller streams. Both of these river systems discharge into the Mississippi River and serve to connect many of the lakes in the region including Trout Lake, Holman Lake, Twin Lake, and Swan Lake. An unnamed designated trout stream flows into Swan Lake in the vicinity of the HVTL ROW at the West Range Site. Because of the interconnectedness of these rivers and lakes, the fish assemblages are likely to be similar in most of these rivers. The rivers would support prime game fish species such as northern pike (*Esox lucius*), largemouth bass (*Micropterus salmoides*), bluegill sunfish (*Lepomis* spp.), and possibly walleye (*Sander vitreus*). Non-game species likely include bowfin (*Amia calva*), many minnows and shiners (Cyprinidae), white sucker (*Catostomus commersoni*), redhorse (*Moxostoma* spp.), bullhead (*Ameiurus* spp.), and darters (Percidae). Ox Hide Lake, like many of the lakes in the region, supports northern pike, largemouth bass, panfish, and yellow perch (*Perca flavescens*).

In past years the Canisteo Pit was stocked with lake trout, and the population has become self-sustaining. Lake trout is a swift, torpedo-shaped game fish of deep, cold waters, which is eagerly sought by commercial, sport, and subsistence fishermen. Young lake trout generally feed on plankton, insects, freshwater shrimp, and other aquatic invertebrates; whereas lager trout tend to prey on smaller fish. It spawns over large cobble and boulder substrates (BWCAW, 2007).

Rainbow smelt (*Osmerus mordax*) is a small, slender, cylindrical-shaped fish with a large mouth and lower protruding jaw with teeth on both mandibles. Found naturally in coastal inshore areas between Newfoundland and Virginia, the species has been introduced into freshwater systems throughout the northeastern and central U.S., including the Canisteo Mine Pit, where it now has a self-sustaining population. This introduced species poses a potential threat to the fishes of northern lakes, as it is a voracious feeder on the young of native fish, including walleye and lake trout (BWCAW, 2007).

3.8.2.2 East Range Site

Several small streams and one lake are located in the vicinity of the East Range Site and the proposed utility or transportation corridors. Onsite fish habitats are restricted to an unnamed creek and deeper wetlands that occur within the central portion of the site. Small fish (Notropids) were observed in these open water habitats. Based on the field observations, small fish are most likely the only fish assemblages present. There are no lakes or larger water bodies that could support game fish habitat at the East Range Site. Beaver dams are widespread in the area and could function as barriers restricting the migration of

larger fish, such as spring spawning migrations of northern pike into the upstream segments of surface waters. The emergent vegetation bordering open waters provides shelter and reproductive habitat for non-game fish species. The wetland fringe bordering open water, along with floating vascular emergents, provides habitat for macroinvertebrates, which in turn acts as a food source for waterfowl, herpetofauna, and other water-dependent avifauna. Wetlands characterized by deep water marshes or border open water systems (e.g., type 5 wetlands) frequently tend to have a diverse littoral plant community, which attracts different invertebrates, thereby diversifying the nutritional requirements for a variety of species (Bartoldus et al., 1994).

The small streams that are proposed to be crossed by the utility or transportation corridors are typically less than three feet across, tend to be very shallow, have low discharge, are often associated with wetlands, and tend to act as conveyance systems between the multiple wetlands and water bodies located in the project vicinity. These small waterways are highly prone to hydrologic alteration due to the abundance of beavers and associated beaver dams. The fisheries habitat in these small streams is limited due to the lack of space and cover and occasional lack of water during dry periods. Beaver dams can block fish passage, but can also create small ponds suitable for some species to thrive. These smaller streams can be important for allowing fish to move between more permanent suitable habitats, but are generally not primary fisheries resources. If fish species are present in these small stream systems, they would likely tend to be dominated by small non-game species such as Cyprinids and Percids.

Colby Lake, a 539-acre lake that has inlets from the Partridge River, Wyman Creek, and Whitewater Lake is located just south of the proposed footprint of the Mesaba Generating Station. A fish survey completed in 2000 identified Colby Lake as being generally below average in terms of fish abundance as compared to other lakes in the region. Fish populations in 2000 were dominated by bluegill sunfish (*Lepomis* spp.) followed by northern pike, yellow perch, and white sucker. Other species were present in low numbers, including walleye, black crappie (*Pomoxis nigromaculatus*), yellow bullhead (*Ameiurus natalis*), and rock bass (*Ambloplites rupestris*) (MNDNR, 2006h).

Mine pits in the East Range vicinity are all located on CE property that is not open to the public. Since these pits have been associated with more recent mining activities, and they are located on private property, information about aquatic communities in these pits is not available.

3.8.3 Protected Species and Habitats

3.8.3.1 Federally Protected Species

The Federal Endangered Species Act is regulated by the USFWS, and both the West Range Site and the East Range Site (including the associated utility and transportation corridors) are within USFWS Region 3. Currently, population studies are being conducted for the Canada lynx (threatened Federal status) in conjunction with a formal consultation that has been initiated for other projects in the area (i.e., the proposed PolyMet mine expansion, the Minnesota Steel Industry facility, and the IPSAT Mine Expansion). In a telephone conversation with the USFWS Region 3 Endangered Species Biologist (October 10, 2005), the USFWS invited Excelsior to participate in this comprehensive formal consultation process and expand these surveys to include the West Range Site and the East Range Site, which are both in close proximity to the other projects that are currently under consultation (USFWS, 2005).

Two Federally listed species in northern Minnesota have recently been delisted: the gray wolf and the bald eagle (*Haliaeetus leucocephalus*). Consultation with the USFWS is not required for delisted species. Therefore, Canada lynx is the only Federally protected species of interest in the areas of the alternative sites.

Preliminary discussions between DOE and USFWS on listed species began in September 2005, and subsequent discussions have been held. DOE initiated formal consultation with USFWS in accordance with Section 7 of the Federal Endangered Species Act in a letter dated December 18, 2006 (Appendix E),

which requested a biological opinion regarding potential impacts and mitigation for listed species on both sites. In a letter dated March 6, 2007 (Appendix E), the USFWS agreed to consult with DOE on the West Range Site and, although consultation is no longer required for this species, concurred with DOE's determination that the Proposed Action would not likely adversely affect the bald eagle. USFWS also concurred with DOE's determination that the Proposed Action may affect the Canada lynx and expressed concerns that the vulnerability of lynx to vehicle collisions when crossing roads would be the most pressing challenge. USFWS stated that activities resulting in new roads, new road alignments, widened ROWs, or increased vehicle speeds in habitat occupied by the Canada lynx may affect this species. In response to Section 7 formal consultation, USFWS will prepare a biological opinion to document project impacts on the listed species, provide a determination as to whether the project would jeopardize the continued existence of the listed species, and may also provide conservation recommendations and an incidental take statement. The biological opinion will be available for inclusion in the Final EIS.

West Range Site

The USFWS Region 3 list of Federally protected species describes Itasca County, Minnesota as occurring within the range of the Canada lynx (threatened). There are no Federally protected plant species identified by the USFWS as occurring within the West Range Site or any of the proposed utility or transportation corridors.

According to the MNDNR data (MNDNR, 2005b), there have been both "verified without evidence of breeding" and "unverified" sightings of Canada lynx within Itasca County during 2005. Potential Canada lynx habitat and prey species were observed on and around the West Range Site during the field reconnaissance. However, in a letter concerning impacts to Federally protected species resulting from the development of the proposed Minnesota Steel Industries project in Nashwauk, USFWS determined that the project would be located near the southwestern edge of the Canada lynx's range. USFWS determined that the proposed mine may affect lynx moving through the area, but it was unlikely to result in reduced survival or reproduction of any lynx, partly because the site would be located far from areas of high lynx densities, and an intensive survey did not find any indications of lynx present in the area of the potential mine site (Sullins, 2007). The West Range Site is approximately nine miles west of the proposed Minnesota Steel Industries mine; therefore, it is even further toward the edge of the lynx's range.

East Range Site

The USFWS Region 3 list of Federally protected species describes St. Louis County, Minnesota as occurring within the breeding range of the peregrine falcon (*F. peregrinus* – threatened Federal status) and within the range of the Canada lynx.

Suitable snowshoe hare habitat (the primary prey item for Canada lynx) was present, but was relatively poor or marginal due to the extensive and recent timber harvesting. According to the MNDNR data (MNDNR, 2005a), there have been "verified with evidence of breeding," "verified without evidence of breeding," and "unverified" sightings of Canada lynx within St. Louis County through 2005. Many more verified records of Canada lynx have been recorded in the general area of the East Range Site since 2000 as compared to the West Range Site (Sullins, 2007).

There are no NHIS occurrences for the peregrine falcon within or adjacent to the East Range Site.

3.8.3.2 Minnesota Protected Species

Minnesota's Endangered Species Statute authorizes the MNDNR to adopt rules designating species meeting the statutory definition of endangered, threatened, or species of special concern. Minnesota Rules Chapter 6134 provides the "List of Endangered, Threatened, and Special Concern Species." The Endangered Species Statute authorizes the MNDNR to adopt rules to regulate the treatment of species designated as endangered and threatened, which are codified as Minnesota Rules 6212.1800 to

6212.2300. As such, species of special concern or non-status (tracked) species are not protected by Minnesota's Endangered Species Statute or the associated Rules.

Species designated as endangered, threatened, or species of special concern are defined as follows:

- Endangered – the species is threatened with extinction throughout all or a significant portion of its range within Minnesota.
- Threatened – the species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range within Minnesota.
- Species of Special Concern – 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 the category along with those species that were once threatened or endangered but now have increasing or stable, protected populations.

A non-status (or tracked) species is one that has been identified by the MNDNR as a rare species that has not received a legal status, but needs further monitoring to determine its status.

The MNDNR NHIS database contains documented occurrences of non-status (tracked), special concern, threatened, and endangered species; sensitive ecological and natural resources; and results of the Minnesota County Biological Survey (MCBS). State-listed threatened or endangered species are protected under the Minnesota Endangered Species Statute (Minnesota Statutes § 84.0895). The MNDNR was contacted to request a review of the NHIS for occurrences within the East Range Site boundaries and associated utility and transportation corridors. At the request of the MNDNR, the specific locations of these occurrences are not provided in this report to protect the integrity of rare or protected species.

West Range Site

Mesaba Generating Station

According to the MNDNR NHIS, a total of 8 plant species (17 occurrences) have been recorded in the general vicinity of the Nashwauk, Taconite, and Bovey areas. However, none of these 17 occurrences are recorded within the West Range Site boundaries. A list of the species that were identified by the MNDNR NHIS is provided in Table 3.8-5.

There are three records of moonworts (*Botrychium campestre*, *B. matricariifolium*, and *B. simplex*) listed in the MNDNR NHIS database and within one mile of the project site. The three records of moonworts (*Botrychium* spp.) listed in the MNDNR NHIS database are associated with mine spoil areas or disturbed soils. *B. campestre* and *B. simplex* are listed as species of special concern. *B. matricariifolium* has no formal protection status in Minnesota, but has been identified as a species that may be monitored due to its potential rarity or other factors that may affect this species or its habitat in the state.

Table 3.8-5. MNDNR NHIS Plant Species Occurrences in the Vicinity of the West Range Site

Scientific Name	Common Name	Protection Status	Records in Area	Associated Habitat Near Project Area
Botrychium campestre	Prairie moonwort	Special Concern	2	High iron content and gravel soils
Botrychium simplex	Least moonwort	Special Concern	6	Mine tailings basin, disturbed utility ROW
Botrychium matricariifolium	Matricary grapefern	Non-status	2	Grassy opening, near mine area

Table 3.8-5. MNDNR NHIS Plant Species Occurrences in the Vicinity of the West Range Site

Scientific Name	Common Name	Protection Status	Records in Area	Associated Habitat Near Project Area
Liparis lilifolia	Lilia-leaved twayblade	Non-status	2	Tailings basin
Myriophyllum tenellum	Leafless water milfoil	Non-status	1	Lake shoreline
Platanthera flava var. *herbiola*	Tubercled rein-orchid	Endangered	2	Tailings basin
Spiranthes casei	Case's ladies'-tresses	Non-status	1	Tailings basin
Torreyochloa pallida	Torrey's manna grass	Special Concern	1	Shallow marsh in mixed hardwood forest

Source: Excelsior, 2006b

Since the West Range Site may not have been surveyed by the MNDNR, potential habitats for flora listed by NHIS were investigated during the June 2005 field reconnaissance and the summer 2005 wetland surveys. Preliminary investigations for potential habitats for *Botrychium* spp. were performed during field investigations in 2005. No disturbed soil or mine spoil conditions are found within the West Range Site. However, habitat for these species or other *Botrychium* spp. may occur within the northern mesic hardwood forest. During the field reconnaissance in June 2005, a plant species that closely resembled *B. minganense*, a state-listed species of special concern, was observed in the northern mesic hardwood forest. Only one individual was observed, and no voucher specimens were collected.

Most of the other plant species occurrences recorded by the MNDNR NHIS are associated with mine spoil, tailings, or disturbed soil conditions. No mine areas are found within the West Range Site. If recruitment of these rare or otherwise protected species appears to be associated with mine spoil or disturbed soil conditions from mining activities, it is unlikely that the West Range Site would provide this type of habitat.

Two plant species records from the NHIS database that are of interest for the project area are *Myriophyllum tenellum* and *Torreyochloa pallida*. *M. tenellum*, a non-status species, is associated with aquatic environments along shorelines. Dunning Lake, located along the eastern edge of the site, is the only likely habitat that may be suitable for this species. *T. pallida*, a species of special concern, is associated with shallow marsh habitats in mixed hardwood forests. This type of habitat is abundant throughout the West Range Site, although this species was not observed during the field reconnaissance for habitat or during the wetland surveys.

Transportation and Utility Corridors

Since access was not available for nearly all of the transportation and utility corridors during the field surveys, potential occurrences of habitat for state-listed species could only be assessed through a review of species locations within approximately 1 mile of the corridors.

No NHIS occurrences occur within one mile of the transportation or utility corridors. Since access to the transportation and utility corridors was not available during the 2005 field season, it is possible that some areas would be suitable habitat for state-listed species. At the request of the MNDNR, the element occurrence identification numbers for known records of state-listed or otherwise rare natural features are not provided graphically to protect the integrity of the species, populations, or respective habitats.

In addition to the NHIS occurrences provided in the original data request from MNDNR, the MNDNR provided a supplemental report completed in November 2005 by Critical Connections

Ecological Services, Inc.(CCES) (CCESR, 2005), that described six populations of previously undocumented occurrences of state-listed or tracked plant species (*B. pallidum*, *B. campestre*, *B. simplex*, and *B. matricariifolium*).

According to the 2005 CCES report, the six populations of *Botrychium* spp. were observed "within mine tailings along the Canisteo Pit to Prairie River outflow route." This outflow route appears to include the Lind Pit and West Hill Pit, which are located between the Prairie River and the west end of the Canisteo Pit. The Lind Pit and Canisteo Pit are both identified as a potential source for process water to serve the Mesaba Generating Station at the West Range Site. In addition, the Canisteo Pit is identified as a source for the discharge of process water from the Mesaba Generating Station at the West Range Site. The maps that accompany the CCES report identify these six populations of *Botrychium* spp. as occurring within the immediate vicinity of the Lind Pit and the West Hill Pit.

A summary of potential habitats for state-listed species that could be within the project area for the West Range Site utility and transportation corridors is provided in Table 3.8-6. Species with "yes" marked in the far-right column of Table 3.8-6 may require further investigation if the West Range Site is chosen as the preferred location. Portions of the area have not been surveyed through the County Biological Survey program; therefore, there is a potential that other state- or Federally listed species not identified in the MNDNR NHIS database exist within the area.

Table 3.8-6. MNDNR NHIS Species Occurrences within 1 Mile of Transportation or Utility Corridors (West Range Site)

Common Name	Scientific name	State Protection Status	Field Investigation for Potential Habitats Recommended? (yes/no)
West Range HVTL Alternative Corridors			
Tubercled-rein orchid	*Platanthera flava* var. *herbiola*	Endangered	Yes; occurs in fringe wetland habitats. Site records also within mine spoil areas.
Case's ladies'-tresses	*Spiranthes casei*	Non-status	Yes; occurs in fringe wetland habitats. Site records also within mine spoil areas.
Least moonwort	*Botrychium simplex*	Special Concern	No; site record is within mine spoil areas.
Matricary grapefern	*Botrychium matricariifolium*	Non-status	No; site record is within mine spoil areas.
Species of moonwort	*Botrychium michiganense*	Non-status	No; site record is within mine spoil areas.
Pale moonwort	*Botrychium pallidum*	Special Concern	No; site record is within mine spoil areas.
Prairie moonwort	*Botrychium campestre*	Special Concern	No; site record is within mine spoil areas.
Lilia-leaved twayblade	*Liparis lilifolia*	Special Concern	Yes; occurs in fringe wetland habitats. Site records also within mine spoil areas.
Northern goshawk	*Accipiter gentiles*	No-status	Yes; review habitats if new alignments are proposed within mature conifer forest habitat.

Table 3.8-6. MNDNR NHIS Species Occurrences within 1 Mile of Transportation or Utility Corridors (West Range Site)

Common Name	Scientific name	State Protection Status	Field Investigation for Potential Habitats Recommended? (yes/no)
Lapland buttercup	*Ranunculus laponnicus*	Special Concern	Yes; species is found in wetland habitats.
West Range Gas Pipeline Alternative Corridors			
Leafless water milfoil	*Myriophyllum tenellum*	Non-status	No; species is found in lakes.
American bittern	*Botaurus lentiginosus*	Non-status	No; secretive species with low population density. Nests are difficult to survey.
Tubercled-rein orchid	*Platanthera flava* var. *herbiola*	Endangered	Yes; occurs in fringe wetland habitats. Site records also within mine spoil areas.
Case's ladies'-tresses	*Spiranthes casei*	Non-status	Yes; occurs in fringe wetland habitats. Site records also within mine spoil areas.

Table 3.8-7. MNDNR NHIS Species Occurrences within 1 Mile of Transportation or Utility Corridors (West Range Site)

Common Name	Scientific name	State Protection Status	Field Investigation for Potential Habitats Recommended? (yes/no)
Least moonwort	*Botrychium simplex*	Special Concern	No; site record is within mine spoil areas.
Matricary grapefern	*Botrychium matricariifolium*	Non-status	No; site record is within mine spoil areas.
Species of moonwort	*Botrychium michiganense*	Non-status	No; site record is within mine spoil areas.
West Range Process Water Supply Pipelines			
Prairie moonwort	*Botrychium campestre*	Special Concern	Yes; observed in mine tailings near Lind Pit and West Hill Pit.
Matricary grapefern	*Botrychium matricariifolium*	Non-status	Yes; observed in mine tailings near Lind Pit and West Hill Pit.
Pale moonwart	*Botrychium pallidum*	Endangered	Yes; observed in mine tailings near Lind Pit and West Hill Pit.
Least moonwart	*Botrychium simplex*	Special Concern	Yes; observed in mine tailings near Lind Pit and West Hill Pit.
St. Lawrence grapefern	*Botrychium rugulosum*	Threatened	Yes; site record within mine tailings basin among aspen.

Source: Excelsior, 2006b

East Range Site

Mesaba Generating Station

According to the MNDNR NHIS, there are no known occurrences of state-listed protected, rare, or otherwise unique natural features within the immediate vicinity of the East Range Site. The closest recorded occurrence of a NHIS feature is 2.5 miles or greater distance from the East Range Site. Although the MNDNR NHIS is the most comprehensive database for known occurrences of rare natural features in the state, it does not preclude the discovery of undocumented occurrences within the East Range Site.

Transportation and Utility Corridors

Because access was not available for nearly all the transportation and utility corridors during the 2004 and 2005 field surveys, the potential for state-listed species to occur was assessed through a review of MNDNR information on species locations within approximately one mile of the proposed corridors.

According to the MNDNR NHIS, a total of 9 listed species (27 occurrences) have been recorded in the general vicinity of Aurora, Biwabik, Eveleth, and Virginia, within one mile of a proposed transportation or utility corridor (Table 3.8-7). The closest occurrence would be for the wood turtle (*Clemmys insculpta*), located more than 2 miles from any of the corridors. At the request of the MNDNR, these locations of occurrences are not provided graphically to protect these rare species.

Table 3.8-8. MNDNR NHIS Species Occurrences within 1 Mile of Transportation or Utility Corridors Associated (East Range Site)

Scientific Name	Common Name	Protection Status[1]	NHIS Records in Area	Associated Habitat near Project Area
Arethusa bulbosa	Dragon's mouth	Non-status	1	Creek shoreline
Caltha natans	Floating marsh-marigold	Endangered	1	Pond outlet
Poa sylvenstris	Woodland bluegrass	Non-status	1	Mixed hardwood forest
Waldsteinia fragarioides	Barren strawberry	Special Concern	3	Jack pine forest
Botrychium matricariifolium	Matricary grapefern	Non-status	1	Mine tailings
Botrychium simplex	Least moonwart	Special Concern	2	Mine tailings
Clemmys insculpta	Wood turtle	Threatened	13	Partridge and St. Louis Rivers
Haliaeetus leucocephalus	Bald eagle	Special Concern	4	Various nesting areas, some in management areas
Ligumia recta	Black sandshell mussel	Special Concern	1	Lake shoreline

Source Excelsior, 2006b

3.9 CULTURAL RESOURCES

3.9.1 Regional Setting

National Historic Preservation Act Sections 106 and 110 (16 USC 470 *et seq*.) and NEPA regulations require all construction receiving Federal funding to identify the potential prehistoric, historic, and Native American cultural resources in an area. The regulations also state the need to determine what potential negative impacts could occur if the Proposed Action or its alternatives were completed. Compliance with Section 106 is guided by 36 CFR Part 800. Compliance requires consultation with the Minnesota State Historic Preservation Office (SHPO), associated Federal agencies, and Federally recognized Native American tribal groups.

The affected environment for cultural resources is identified through determination of the area of potential effect (APE). The APE is defined as the geographic region that may be impacted as a result of the construction and operation of the Proposed Action or alternatives. For the purposes of this EIS, the APE is considered to be equal to the region of influence. This includes all areas impacted from the construction and operation of the facility site itself, as well as its associated transportation systems, HVTL, natural gas pipelines, and other associated upgraded utilities. The APE surrounding the HVTL corridor includes the area affected by construction, which is represented as a 0.5-mile wide corridor centered on the transmission lines.

3.9.1.1 Methodology

Cultural resource assessments were performed on the West Range Site and its associated corridors in July 2005, and on the East Range Site and its associated corridors in September 2005. These assessment reports identified previous archaeological sites and cultural assessment surveys within one mile of the facilities and corridors. In addition, an archaeological site model was developed for each location to identify the potential for unknown cultural resources. All known cultural resources within a 10-mile radius around the site locations were used to refine the results. The results of the model present the areas with the highest potential for undiscovered cultural affiliations, archaeological artifacts, and architectural sites. The model guidelines are further described in the impacts section for Section 4.9, Cultural Resources.

3.9.1.2 Historical Setting

Precontact (12,000 years before present [B.P.] to Circa 1700 A.D.)

Habitation in northeastern Minnesota began 12,000 years ago, after the retreat of the glaciers, when small nomadic groups followed big game animals into Minnesota and Canada. Minnesotan precontact cultural traditions have been categorized into general stages by their material culture (e.g., tools and ceramics), subsistence adaptations (e.g., hunting, gathering, and horticulture), and to a lesser extent, other sources, such as oral traditions or language evolution. These traditions are analyzed and categorized into stages, which generate a sequential picture of North American cultural history before European contact. Each stage, Paleoindian, Archaic, Woodland, and Ceramic/Mound, is based on one or more particular developmental themes, and encompasses a variety of subgroups. More information on these stages is available in the cultural resource assessments and statewide cultural source documents (106 Group, 2005; Dobbs, 1989).

Post Contact (Circa 1700 A.D. to present)

The Santee Dakota historically occupied eastern Minnesota when the European traders first made contact. The loosely confederated tribes lived in semi-permanent and permanent villages, and possessed an economy based on game animals, fish, wild rice gathering, and some agricultural production. Several Dakota village and cemetery sites have been found along the Minnesota and Mississippi river systems.

The French fur traders made initial contact in the area, but were replaced by the British in the late 1700s. The British traders transported furs from Canada and northern Minnesota to the Great Lakes by traveling through the border lakes. The United States established sovereignty on lands from the Atlantic to the Rockies in 1803, and formally denied trading licenses to British Traders in 1812.

The initial United States presence consisted of traders and military mapping expeditions. As the beaver fur trade collapsed, settlers and an increased military presence began to encroach on the Native American land, which eventually was abandoned by the local tribes. Treaties signed at Traverse des Sioux and Mendota in 1851 set aside a 10-mile-wide reservation on both sides of the Minnesota River from Lake Traverse to Little Rock Creek in western Nicollet County. Leech Lake Reservation was established by treaties on February 22, 1855, and is currently located in the Chippewa National Forest.

In the mid-1800s, as additional settlers moved into the area for the flourishing logging and mining industries, homesteads and farmsteads were built. Small communities and towns grew up around the ore deposits and logging centers. There are a limited number of residential structures from this time period, and little architectural information about the earliest mining groups in the area is available. Archaeological properties would include logging camps and transportation routes, rather than historically cleared areas.

3.9.2 Archaeological Resources

3.9.2.1 West Range Site and Corridors

Archaeological artifacts are common around water sources in northern Minnesota. The 2005 cultural resources report identified 71 archaeological sites located within a 10-mile radius of the West Range Site. Of these sites, 54 have been confirmed, and 17 have been reported but not field checked. Seven of the 17 unconfirmed sites lack sufficient evidence and archaeological integrity to be considered further. Of the 64 remaining sites, all are located within proximity to water (106 Group, 2005).

There are no archaeological sites recorded on the West Range Site or its corridors. Within the surrounding area, three archaeological surveys have been conducted. In 1981, Vernon Helmen conducted a Phase I archaeological survey south of Nashwauk, prior to the construction of a proposed wastewater lagoon. Fieldwork included both surface inspection and sub-surface shovel testing. The fieldwork most likely occurred during the spring, because the report described "water-logged land surface with an extremely high water table, even on the higher elevations." Although shovel testing was concentrated along all rises, all of the tests had significant seepage and standing water throughout excavation. No signs of any occupation were located within the survey area (Helmen, 1980).

In 1985, as part of the Minnesota Trunk Highway (TH) Archaeological Reconnaissance Survey, a preliminary archaeological assessment was performed along the proposed TH 169 (US 169) alternative corridors. The survey studied an 18-mile section of US 169 between Grand Rapids and Pengilly, which crosses south of the proposed West Range Site and alongside the proposed Natural Gas Pipeline Alternative 3. The field review consisted of drive-over reconnaissance with pedestrian reconnaissance of the most undisturbed segments at approximately 100-foot intervals. The study found that only 40 percent of the surveyed area was in its natural state, as mining operations (30 percent) and road construction (30 percent) had previously disturbed the topsoil. No significant archaeological sites were located by the preliminary surface reconnaissance or historical record search (Peterson, 1985).

In 1998, the Minnesota Historical Society (MHS) conducted an archaeological assessment prior to the installation of a proposed floating fishing pier in Holman Lake, located south of the current proposed plant site. The survey was located on the northeastern shoreline of the lake, approximately 2 miles south of the power plant, and within 0.25 miles of Blowdown Pipeline Alternative 1. The assessment determined the nature of the soils within a 10-foot-wide by 100-foot-long development corridor located on a small segment of shoreline. Pedestrian examination of the area confirmed that the area had been cleared and denuded of all organic surface soils. Cores were used to confirm the distinctly truncated

nature of the surface sediments exposed within the sparsely vegetated parcel. Given the findings, intensive archaeological field survey was not recommended (Skaar, 1998).

3.9.2.2 East Range Site and Corridors

The September 2005 study identified 85 archaeological sites within a 10-mile radius of the East Range Site and corridors, 21 of which are confirmed. The remaining 64 sites have been reported, however they lack sufficient evidence of archaeological integrity to be included in the analysis. Nineteen of the 21 confirmed sites are within proximity to water; the two remaining sites are located on topographically prominent areas that command a wide view of the surrounding landscape (106 Group, 2005).

In the preliminary cultural resources report performed by the 106 Group, four confirmed archaeological sites were identified within the construction buffer zone around the East Range Site and potential corridors (Table 3.9-1). Site 21SL0843 is located approximately 0.5 miles directly west of the 38L corridor. The archaeological Site 21SL0836 is located along the 34L HVTL Route, which was removed from consideration as an alternative in this project. There are no unconfirmed sites located around the site or its corridors.

Table 3.9-1. Archaeological Sites Previously Identified Within the Study Area

Site No.	Description
21SL0009	Mounds
21SL0390	Mound
21SL0836	Historic Depressions and Artifact Scatter
21SL0843	Lithic Scatter

Source: 106 Group, 2005

Both sites 21SL0009 and 21SL0390 consist of mounds found on the southern shore of Eshquaguma Lake. The SHPO documentation for the mound groupings in the area is incomplete, with vague locations and descriptions of the mounds. A series of mounds resembling the site descriptions are located in a sandy plain surrounded by trees, and may be partially disturbed by the construction of the Eshquaguma golf course (106 Group, 2005). The St. Louis County Historical Society has marked site 21SL0009 with an archaeological interpretation sign. The Site 21SL0390 is located 3,500 feet east of Site 21SL0009, and has similar characteristics.

In April 1999, a group from the University of Minnesota at Duluth conducted a Phase I archaeological reconnaissance survey on a parcel near the Syl Laskin Energy Center in Hoyt Lakes. The East Range HVTL corridors would cross between the Syl Laskin plant and Colby Lake. The surveyed parcel was designed to be the site of a proposed containment pond for ash residue from the energy center approximately 33 acres in size. The survey consisted of both pedestrian survey and shovel testing in areas with poor ground visibility. Most of the parcel was disturbed prior to the survey; however, a relatively undisturbed portion in the northwestern corner was surveyed using shovel tests. Lithic scatter was recovered from five shovel tests, resulting in Site 21SL0843. Minnesota Power engineers modified the engineering designs to exclude the site area from construction disturbance. No other cultural resources were recorded in the remainder of the project area (Mulholland et al., 1999).

In 1976, the MHS conducted a reconnaissance survey prior to the construction of the Pike Mountain access road in Superior National Forest. The access road is approximately 5.3 miles northeast of Virginia and approximately 2 miles north of the HVTL 37L/39L alternative corridor. The only culturally-related material found in the course of the Pike Mountain survey consisted of an abandoned mineshaft. The mine age was tentatively dated to between 1915 and 1929.

In 1996, a Phase I archaeological reconnaissance survey was conducted on a 7.8-mile segment of County State Aide Highway (CSAH) 4 south of Biwabik. CSAH 4 crosses the 38L and 37L/39L HVTL corridors as well as the proposed natural gas pipeline ROW. A visual walking survey and shovel testing were performed on approximately 190 acres along both sides of CSAH 4. The investigation did not find any new archaeological materials in the impact corridor, but did identify the remains of a twentieth-century railroad grade, assigned number SL-BIT-003 (Thompson et al., 1996).

3.9.3 Historic Resources

3.9.3.1 West Range Site and Corridors

Many of the documented architectural history resources within the vicinity of the West Range Site and corridors were recorded during the countywide survey in 1980. This survey focused on buildings within the communities of Coleraine, Taconite, Marble, Calumet and Nashwauk. As a result of this work, several properties were listed on or determined to be eligible for the National Register of Historic Places (NRHP). Later studies looked beyond the standing structures found within the village limits and included the Hill Annex Mine, located just north of Calumet and listed on the NRHP in 1986.

Table 3.9-2 lists 11 architectural history properties within the recommended APE that have been previously recorded in SHPO records. Two properties, the Great Northern Railway Nashwauk-Gunn Line, and the Duluth, Missabe, and Northern Railway Alborn Branch have been determined eligible for listing on the NRHP. Two previously recorded properties are no longer extant.

Table 3.9-2. Historic Properties Within the West Range Site APE

Property Name	Inventory No.	Location	NRHP Status	Description
Great Northern Railway Nashwauk-Gunn Line	IC-IRT-009	Iron Range Twp.	Eligible	Abandoned 1909 rail line that provided service to the western end of Mesabi Iron Range.
Duluth, Missabe & Northern Railway Alborn Branch	IC-IRT-010	Iron Range Twp.	Eligible	1906 rail line serving the western Mesabi Iron Range from Alborn to Pengilly, and on to the Canisteo District near Coleraine
Rhude Media Plant	IC-IRT-016	US 169	Not Eligible	Ca. 1955 industrial complex used for iron ore separation concentration; not extant
House	IC-IRT-017	6670 US 169	Not Eligible	Ca. 1930 front-gabled house
House	IC-IRT-018	6708 US 169	Not Eligible	Ca. 1930 front-gabled house
Bridge L3811	IC-TCC-005	BN Railroad over CSAH 7	Not Eligible	1916 steel beam span railroad bridge
Log Cabin and barn	IC-TLT-004	Off Co. Hwy. 70, Trout Lake Twp.	Not Evaluated	Abandoned farmstead
Jacob Edward Johnson Farmstead	IC-TLT-005	Off Co. Hwy. 70, Trout Lake Twp.	Not Evaluated	Ca. 1910 group of Finnish log farm structures

Table 3.9-2. Historic Properties Within the West Range Site APE

Property Name	Inventory No.	Location	NRHP Status	Description
Finnish Log Barn and Building	IC-TLT-009	Off Co. Hwy. 10, Trout Lake Twp.	Not Evaluated	Finish log barn and other log building; Not extant
Trout Lake Apostolic Lutheran Church	IC-TLT-010	24062 North Road	Not Evaluated	N/A
School and Teacherage	IC-TLT-011	24032 North Road	Not Evaluated	N/A

N/A = Not Available
Source: 106 Group, 2005

The 1985 cultural resources study for TH 169 summarized in *The Minnesota Trunk Highway Archaeological Reconnaissance Survey Annual Report – 1985* (Peterson, 1985) identified no known historic or archaeological sites within the study corridors that would affect the selection of a preferred alignment. An updated study, *The Minnesota Trunk Highway Archaeological Reconnaissance Study Annual Report – 1993* (Peterson et al., 1993) identified and evaluated several architectural history properties in Nashwauk as part of a resurfacing, gutter, curb and sidewalks project for TH 65. The properties were either previously destroyed, declared ineligible, or located outside of the reconnaissance study's APE.

A cultural resources survey was performed along US 169 from Coleraine to 0.3 miles east of CR 7 for the Minnesota Department of Transportation (Mn/DOT) (Bradley et al., 2003). The survey recorded 142 properties in the study area, including buildings, railroad-related resources, and mine dumps. Two railroad properties that pass through portions of TH 169 project area, the Great Northern Railway line from Nashwauk to Gunn and the Duluth, Missabe, and Northern Railway's Alborn Branch Line, were determined eligible for listing on the NRHP. Based on this report, Mn/DOT determined that the individual components of the project area should be viewed as components of a large mining district inclusive of a mining landscape, associated towns, and railroad related properties organized in a multiple property format. The name of this multiple property is Historic and Architectural Resources of the Western Mesabi Iron Range, Itasca County, Minnesota. The multiple property listing is further broken into four contexts, one being the Mesabi Iron Range Early Mining Landscape District of the Coleraine, Bovey, Taconite, and Holman communities. This district also includes a large area that encompasses mines and mine dumps which is located immediately west of the West Range APE.

The *Mesabi Iron Range Historic Contexts, Itasca and St. Louis Counties, Minnesota: Phase III Mitigation Study for the TH 169 Project in Bovey, Minnesota*, commissioned by the Minnesota Department of Transportation, is currently underway, but has not been reviewed at this time. The final report will consist of historical contexts for the entire Mesabi Iron Range, with brief histories of each community and a chronology of each mine. The document will also provide registration considerations and suggestions for resources and landscapes on the Mesabi Iron Range. Communities from Grand Rapids through Hoyt Lakes would be considered, which would include the West and East Range site and corridors.

3.9.3.2 East Range Site and Corridors

Many of the documented architectural history resources within the vicinity of the East Range Site and corridors were recorded during the countywide survey in 1987 (Roberts and Roberts, 1987). This survey focused on buildings within the towns, including the communities of Virginia, Eveleth, Aurora, and Biwabik, which are located within or near the APE. As a result of this work, several properties were listed on, or determined eligible for, the NRHP, including a number of civic and community buildings

such as churches, schools, recreation halls, and hotels. Since that time, very few architectural history studies have been conducted in the project area.

In 2000, a Phase II study of the Duluth, Winnipeg, and Pacific Railway and of Bridge 5195, located several miles north of Virginia, was completed for the Minnesota Department of Transportation (Henning, 2000). This report provides historical contexts for the development of the lumbering industry around Virginia, the role of logging railroads, railroad construction, and the State's trunk highway system. Henning concluded that the Duluth, Winnipeg, and Pacific Railway was eligible for listing on the NRHP, although Bridge 5195 did not contribute to the railroad's significance. When completed, the ongoing *Mesabi Iron Range Historic Contexts, Itasca and St. Louis Counties, Minnesota, Phase III Mitigation Study for the US 169 Project in Bovey, Minnesota*, commissioned by the Mn/DOT, will also provide historical context for the entire Mesabi Iron Range, including Hoyt Lakes and Eveleth.

Table 3.9-3 shows 20 previously recorded architectural history properties, most of which are in Eveleth, located within the recommended APE. Although most of these inventoried properties have not been formally evaluated for NRHP eligibility, four have been listed on, or determined to be eligible for, the NRHP.

The Eveleth City Hall (SL-EVC-008) was determined to meet the criteria for NRHP eligibility by the SHPO in 2002, although the SHPO does not specify how the property meets the criteria. Little historical information on the building is provided in the SHPO files on this property, except that the building bears a 1908 date block. The building is still used as the city hall.

The Eveleth Recreation Building (SL-EVC-021) was listed on the NRHP in 1980. Funded by the significant tax revenues afforded to local governments by the mining industry, the 1918 building was constructed during the Progressive Era to provide a recreational facility for working-class citizens to improve their physical development. In the 1930s, the city made the building available for a shirt manufacturing facility in order to provide employment opportunities for women.

The E. J. Longyear First Diamond Drill site is a NRHP-listed site located to the east of CR 666. The site includes a 0.25-mile wilderness trail from the road to the location of the 1890 drill site. The historic site is generally underdeveloped, and little documentation about the site is available.

Table 3.9-3. Historic Properties Within the East Range Site APE

Property Name	Inventory No.	Location	NRHP Status	Description
Biwabik Township				
Railroad grade	SL-BIT-003	Off County Highway 4	Not eligible	Remnants of an abandoned railroad grade of an unidentified rail line
Eveleth				
Commercial building	SL-EVC-005	SE corner of Grant Avenue and Monroe Street	Not evaluated	Circa-1920 two-story
Commercial building	SL-EVC-006	Grant Avenue	Not evaluated	1923 two-story commercial building
Commercial buildings	SL-EVC-007	Grant Avenue	Not evaluated	Series of early twentieth century commercial buildings
Eveleth City Hall	SL-EVC-008	413 Pierce Street	Eligible	1906 City Hall with Classical detailing

Table 3.9-3. Historic Properties Within the East Range Site APE

Property Name	Inventory No.	Location	NRHP Status	Description
Commercial buildings	SL-EVC-009	Grant Avenue	Not evaluated	Series of early twentieth century commercial buildings
Commercial buildings	SL-EVC-010	Grant Avenue	Not evaluated	Series of early twentieth century commercial buildings
Miners National Bank	SL-EVC-011	NE corner Grant Ave. and Jones Street	Not evaluated	Circa-1920 bank building
Commercial buildings	SL-EVC-012	Grant Avenue	Not evaluated	Series of early twentieth century commercial buildings
Eveleth Post Office	SL-EVC-014	421 Jones Street	Not eligible	1936 post office in the "Starved Classicism" style
Auditorium	SL-EVC-015	015 419-423 Jackson Street	Not evaluated	Circa-1930 municipal auditorium
Eveleth Recreation Building	SL-EVC-021	Garfield Street and Adams Avenue	Listed	1918 public facility for the physical development of workers
Slovenian Meeting Hall	SL-EVC-024	420 Grant Street	Not eligible	Circa-1905 saloon
Uranian Hall	SL-EVC-025	520 Grant Street	Not eligible	Site of union organizing and social gathering place in a circa-1900 building; substantially altered
Eveleth Hippodrome	SL-EVC-026	SW corner Hayes Street and Douglas Avenue	Not eligible	WPA building and home to Eveleth hockey teams
Bridge L08537	SL-EVC-027	Adams Avenue over a small stream	Not eligible	Single-span, concrete-slab highway bridge constructed in 1921
Hoyt Lakes				
E. J. Longyear First Diamond Drill Site	Not assigned	Off County Road 666	Listed	Site of 1890 drilling exploration for ore deposits on the Mesabi Iron Range
McDavitt Township				
Evangelical Church	SL-MCD-012	Off Minnesota Highway 16	Not evaluated	Circa-1900 church, clad with metal siding (as of 1987)
Unorganized Township				
Bridge 7674	SL-UOG-078	CSAH 20 over Embarrass River	Not eligible	Steel deck girder highway bridge built in 1934
Multiple Townships				
Duluth, Winnipeg & Pacific Railway Company	Not assigned	From Duluth to Virginia, to the Canadian border	Eligible	Railroad providing a pivotal link to the lumbering industry in Virginia (1901-1912)

Source: 106 Group, 2005

The fourth NRHP property in the APE is the Duluth, Winnipeg, and Pacific Railway, which began construction in 1901 as the Duluth, Virginia, and Rainy Lake Railway as a permanent line between Duluth and Canada, by way of Virginia, Minnesota. A line from Virginia to Cook was completed by 1903, and later met the Canadian border and Fort Frances, Ontario. Around 1912, the line was extended southward to Duluth; was renamed the Duluth, Winnipeg, and Pacific Railway Company; and became associated with the Canadian rail system. The completed line connected Duluth with Canada and made Virginia an important hub. The line was pivotal in supporting the region's lumber industry, and later went on to provide transportation of freight and passengers along its route following the demise of lumbering in northern Minnesota (Henning, 2000). The proposed HVTL corridor appears to cross the Duluth, Winnipeg, and Pacific Railway in multiple locations.

3.9.4 Native American Resources

In August 2005, DOE-NETL contacted representatives of local Native American tribes and reservations to inform them about the project and initiate formal consultation. Table 3.9-4 presents the tribes and reservations that are, or may historically have been, located in the vicinity of the proposed project. DOE-NETL also contacted the Minnesota Indian Affairs Council to inform the council about the project and elicit any support that it might provide in facilitating consultation with tribal organizations. The closest tribal land to the West Range Site is the Leech Lake Reservation, located approximately 20 miles to the West of the West Range Site. The closest tribal land to the East Range Site is the Fond du Lac Reservation, located approximately 55 miles to the south of the East Range Site.

Table 3.9-4. List of Contacted Native American Tribes and Reservations

Leech Lake Band of Ojibwe	Keweenaw Bay Indian Community
Mille Lacs Band of Ojibwe	Lac Courte Oreilles Band of Lake Superior Chippewa Indians of Wisconsin
White Earth Reservation	Lac Vieux Desert Band of Lake Superior Chippewa Indians
Minnesota Chippewa Tribe	Lac du Flambeau Band of Lake Superior Chippewa Indians of Wisconsin
Grand Portage Reservation	Red Cliff Band of Lake Superior Chippewa Indians
Bois Forte Reservation	Sisseton-Wahpeton Oyate of the Lake Traverse Reservation
Fond du Lac Reservation	Sokaogon Chippewa (Mole Lake) Community of Wisconsin
Red Lake Band of Chippewa	Spirit Lake Tribal Council
Lower Sioux Community	St. Croix Chippewa Indians of Wisconsin
Upper Sioux Community	Turtle Mountain Band of Chippewa
Prairie Island Indian Community	Flandreau Santee Sioux
Shakopee Mdewakanton Dakota Community	Santee Sioux Nation
Bad River Band of Lake Superior Chippewa	

All Federally recognized tribes with historic or current affiliation to Minnesota and the project area have been invited to participate in the consultation process. Initial consultation letters were sent in September 2005 from DOE to all Federally recognized tribes who have expressed a cultural and historical interest in Minnesota. Follow-up consultation letters were sent to these tribes in May 2006 inviting them again to submit any concerns they might have that have not as yet been submitted. DOE received responses from the Tribal Historic Preservation Offices (THPOs) of the Keweenaw Bay Indian Community, Flandreau Santee Sioux Tribe, the Lac Vieux Desert Band of Lake Superior Chippewa Indians, the Mille Lacs Band of the Ojibwe Indians, and the Leech Lake Band of Ojibwe Indians. Copies of the responses from the

tribes are included in Appendix E. Also included in Appendix E are copies of responses from the 1854 Authority, which is an intra-tribal natural resource management organization, and correspondence from James Merhar, representing the Iron Range Council for Native Americans. DOE then had discussions with representatives of the following tribes by telephone: Grand Portage Reservation; Red Lake Band of Chippewa; Fond du Lac Reservation; Lower Sioux Community; Bois Forte Reservation; Leech Lake Band of Ojibwe; Mille Lacs Band of Ojibwe; and the White Earth Reservation. In the telephone calls, DOE offered to meet with the tribes personally for consultation. Efforts to arrange for such meetings are continuing. DOE also invited these tribes to consider participation in any agreements reached with the Minnesota State Historic Preservation Office regarding additional cultural resource surveys to be conducted for the alternative utility corridors at both the West and East Range Sites (see Sections 4.9.3.1 and 4.9.4.1). The following tribes requested that they be included as signatories to any such agreement: Bois Forte Band of Chippewa; Grand Portage Band of Chippewa; and Leech Lake Band of Ojibwe. The other tribes have expressed interest but have not made a final decision on participation as signatories.

INTENTIONALLY LEFT BLANK

3.10 LAND USE

This section describes land uses that may be affected by the Proposed Action and alternatives.

3.10.1 Existing Land Use

Existing land uses in the Iron Range were characterized based on the land use categories and definitions provided by the 1996 Land Use/Land Cover Map completed by the Manitoba Remote Sensing Centre and obtained through the MNDNR Data Deli (MNDNR, 2006b). Similar categories were combined to arrive at the following land use groupings:

- Forest Land – Includes land covers defined as coniferous, deciduous, and mixed wood forests, as well as regeneration/young forests where commercial timber has been removed.
- Grassland – Includes areas covered by grasslands and herbaceous plants that are often found between agricultural land and more heavily wooded areas, along ROWs and streams.
- Wetland – Includes bogs, marshes, and fens characterized by high water table, standing or slow-moving water, and hydrophytic vegetation.
- Open Water – Includes permanent water bodies such as lakes, rivers, reservoirs, stock ponds, ditches, and permanent and intermittently exposed palustrine open water areas. Note: May not include mine pits that have filled with water subsequent to 1996.
- Cultivated Land – Includes those areas under intensive cropping or rotation, including fallow fields and fields seeded to forage or cover crops.
- Mined Land – Includes areas stripped of top soil revealing exposed substrate, mine pits and tailings piles, gravel quarry operations, borrow pits, rock quarries, and rock outcrops. Note: Mine pits may have filled with water since 1996.
- Developed Land – Includes urban areas (defined as "cities") as well as rural developments, including farmsteads, rural commercial and industrial facilities, cultural and recreational facilities, and other structures and developed uses.

3.10.1.1 Regional Conditions

The Iron Range is characterized by land uses traditionally associated with mineral mining (mainly iron ore), timber harvesting, hunting and fishing, and outdoor recreation. Commercial, industrial, and residential uses are scattered in the small cities and communities along the principal thoroughfares and rail lines that link Grand Rapids with Hibbing and Virginia from west to east across the Iron Range. The land cover on and adjacent to the project sites and ROW corridors consists mainly of forest land and mined land. There are also areas of open water, wetlands, and scattered areas of grassland.

3.10.1.2 West Range Site and Corridors

Figure 3.10-1 shows the land use/land cover within and adjacent to the West Range Site. Figure 3.10-2 shows the land use/land cover in the wider vicinity of the West Range Site and potential utility corridors. There are no residential, commercial, or industrial buildings within the West Range Site boundary; the site consists of forest land, wetland, and grassland.

Residential Areas

The locations of residential properties in the vicinity of the West Range Site and corridors are illustrated in Figures 3.2-6 and 3.2-7 in Section 3.2, Aesthetics, and the distances from the station footprint and centerlines of corridors are based on recent aerial photography (Excelsior, 2006b). The residential neighborhoods in the City of Taconite, which is the closest community, are located more than 1.5 miles south of the proposed West Range Site boundary (Figure 3.10-1). The nearest residential properties to the West Range Site are located along CR 7 west of the site boundary and along the north shore of Big Diamond Lake and southeast shore of Dunning Lake to the south of the site as illustrated previously in Figure 3.2-7. These properties consist of year-round residences and farmsteads, mainly along CR 7, and seasonal residences, mainly along the lake shores. Fewer than a dozen of these residences are located within 1,000 feet of the West Range Site boundary based on aerial photography completed in 2003. The closest residence to the proposed Mesaba Generating Station footprint is located about 0.7 mile to the southwest. The closest residences to the southeast, east, and northwest are located approximately 0.7 to 0.8 mile away. In total, approximately 50 residences would be located within one mile of the proposed power station footprint.

As many as 16 residences are located within 0.5 mile of a potential new rail alignment for the West Range Site. The nearest residences to potential rail alignments are located on the north shore of Big Diamond Lake and the southeast shore of Dunning Lake. Depending upon the alignment taken, the nearest residence would be 400 feet from the centerline of the track, and nine other residences could be located between 800 feet and 0.25 mile away. Approximately 10 residences are located within 0.25 mile of the potential new access road alignments for the West Range Site, the closest of which would be between 100 and 300 feet away.

Potential process water pipelines for the West Range Site could be located within 0.5 mile of 104 residential properties. However, only seven residences are located within 500 feet, and none is within 100 feet of the potential alignments. Potential process water discharge pipelines could be located within 0.5 mile of 14 residences; two residences would be 100 to 500 feet away.

Potential potable water and sanitary wastewater pipelines could be located within 0.5 mile of 114 residential properties. The closest would be at least 50 feet away, and three others would be between 100 and 300 feet away.

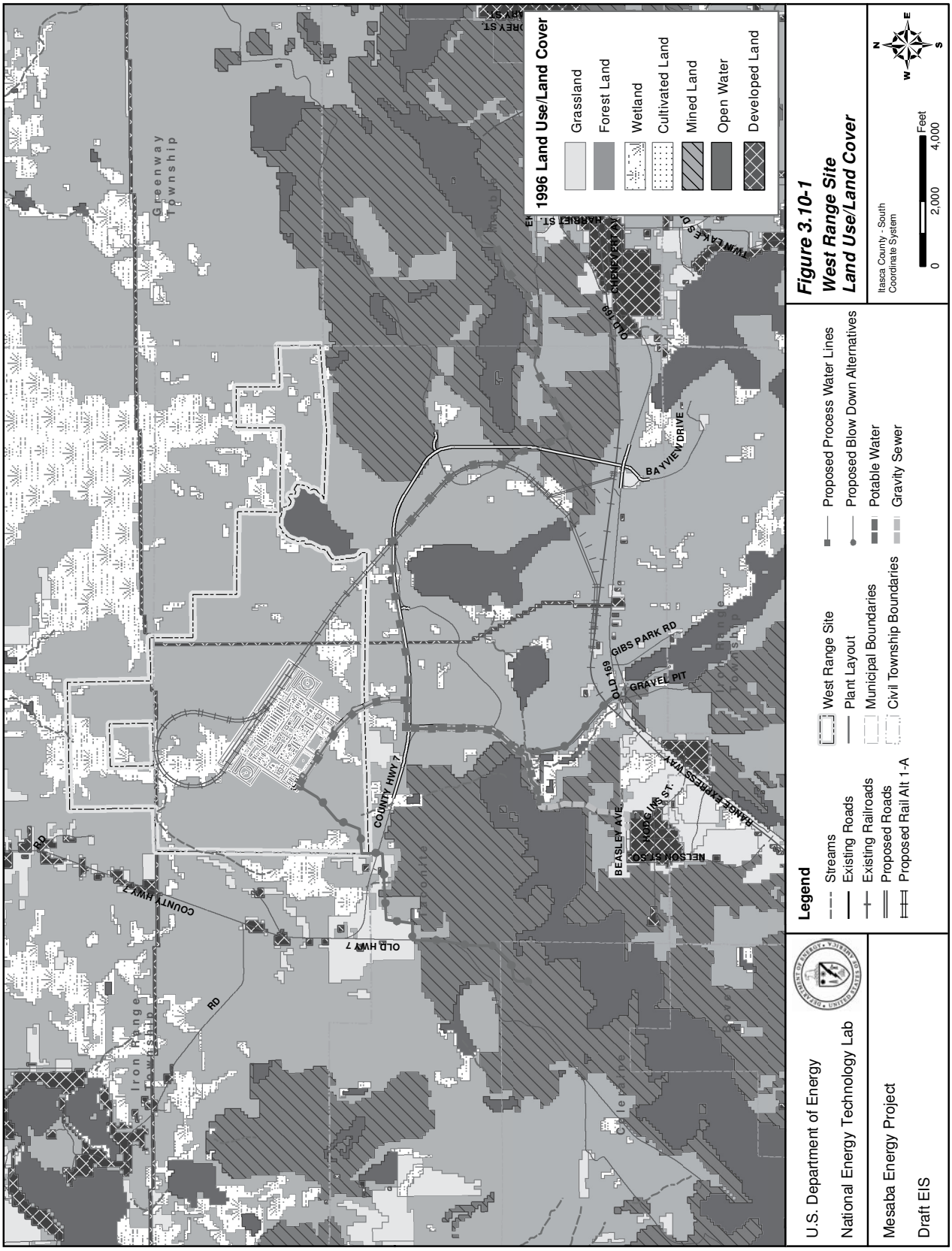
Depending upon the alignment selected, a natural gas pipeline could pass within 0.5 mile of 935 residences. As many as five residences could be located within 50 feet of the alignment and 24 others may be within 300 feet.

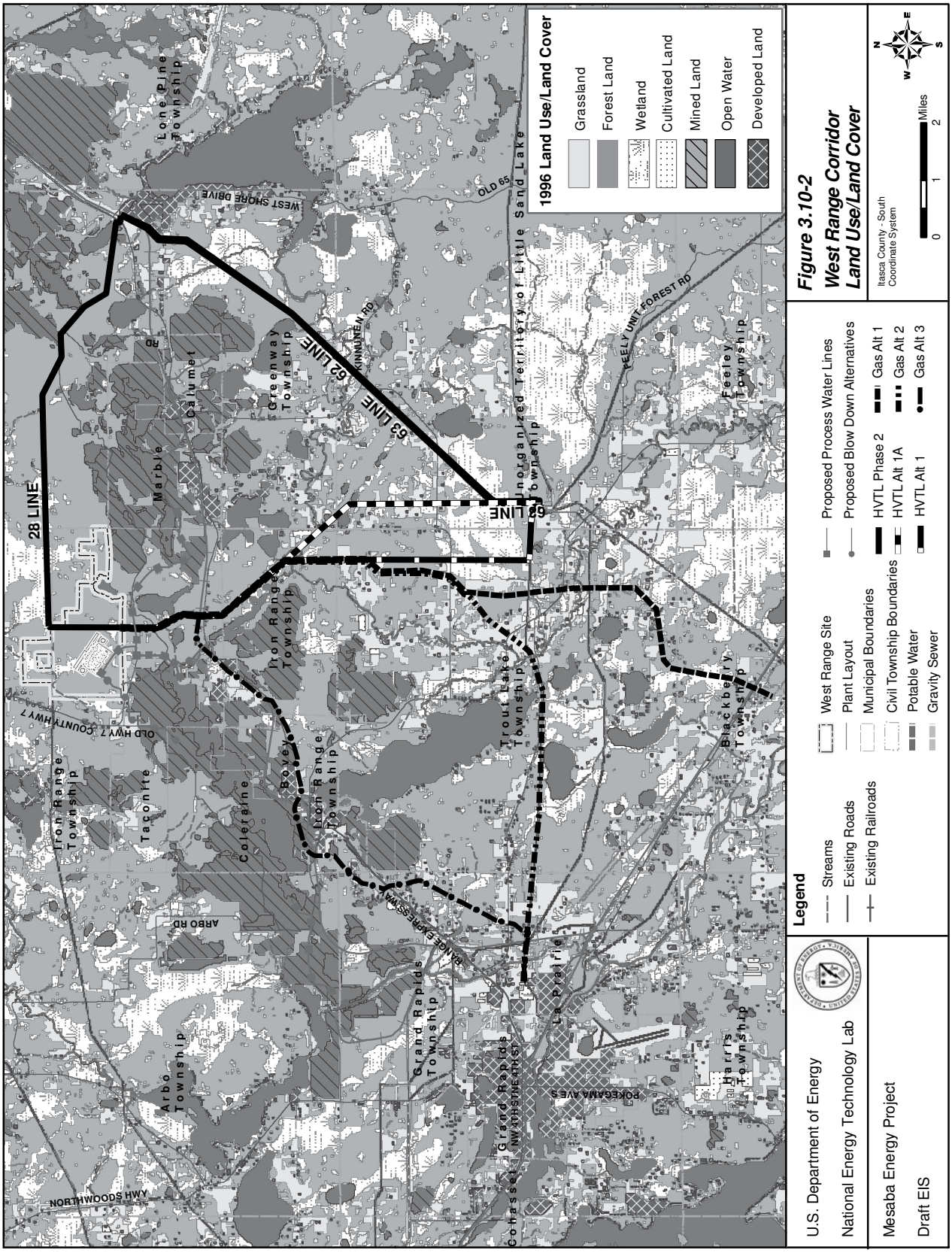
Potential HVTL corridors could be located within 0.5 mile of 280 residences. None would be closer than 100 feet from the centerline of the corridor, and as many as 10 would be between 100 and 300 feet from the centerline.

Industrial Areas

Existing and planned industries in the vicinity of the West Range Site and corridors include (Excelsior, 2006b):

- Solid Waste Transfer Station (and closed landfill) adjoining the southern boundary of the site;
- Mineral extraction operations on the west side of Holman Lake 2 miles south of the site;
- Mineral extraction operations near Loon Lake approximately 4.5 miles southeast of the site; and
- Proposed Minnesota Steel Industries plant to be located approximately two to three miles east of the West Range Site.


1996 Land Use/Land Cover
Grassland
Forest Land
Wetland
Cultivated Land
Mined Land
Open Water
Developed Land
Greenway Township
Iron Range Township
COUNTY HWY 7
OLD HWY 7
GIBS PARK RD
GRAVEL PIT
BAYVIEW DRIVE
OLD 169
RANGE EXPRESS WAY
BEASLEY AVE.
NELSON ST SO
Legend
Streams
Existing Roads
Existing Railroads
Proposed Roads
Proposed Rail Alt 1-A
West Range Site
Plant Layout
Municipal Boundaries
Civil Township Boundaries
Proposed Process Water Lines
Proposed Blow Down Alternatives
Potable Water
Gravity Sewer
U.S. Department of Energy
National Energy Technology Lab
Mesaba Energy Project
Draft EIS
Figure 3.10-1
West Range Site
Land Use/Land Cover
Itasca County - South
Coordinate System
0
2,000
4,000
Feet
N
E
S
W


1996 Land Use/Land Cover
Grassland
Forest Land
Wetland
Cultivated Land
Mined Land
Open Water
Developed Land
28 LINE
62 LINE
63 LINE
62 LINE
Lone Pine Township
Marble
Calumet
Greenway Township
Iron Range Township
Taconite
Coleraine
Bovey
Iron Range Township
Trout Lake Township
Unorganized Territory of Little Sand Lake
Feeley Township
Blackberry Township
Arbo Township
Grand Rapids Township
Cohasset
Grand Rapids
La Prairie
Harris Township
WEST SHORE DRIVE
OLD 65
KINNUNEN RD
FEELY UNIT FOREST RD
OLD HWY 7
COUNTY HWY 7
ARBO RD
RANGE LINE
POKEGAMA AVE S
NORTHWOODS HWY
Legend
Streams
Existing Roads
Existing Railroads
West Range Site
Plant Layout
Municipal Boundaries
Civil Township Boundaries
Potable Water
Gravity Sewer
Proposed Process Water Lines
Proposed Blow Down Alternatives
HVTL Phase 2
HVTL Alt 1A
HVTL Alt 1
Gas Alt 1
Gas Alt 2
Gas Alt 3
U.S. Department of Energy
National Energy Technology Lab
Mesaba Energy Project
Draft EIS
Figure 3.10-2
West Range Corridor
Land Use/Land Cover
Itasca County - South
Coordinate System
Miles
0
1
2
N
E
S
W

Publicly Owned Lands

No publicly owned lands are located within the West Range Site boundary; however, parcels of publicly owned lands are located in the vicinity of the West Range Site and proposed corridors. Itasca County owns several parcels of land adjacent to the West Range Site. The largest parcel is located southeast of the site boundary, east of Dunning Lake and Big Diamond Lake, and consists primarily of old mine pits, forest land, and shrubby grassland. This area would be traversed by the potential rail alignment, a process water pipeline, and the relocated CR 7 alignment providing site access. A smaller parcel of county land is located directly south of the West Range Site, which would be traversed by potential utility alignments. Parcels of state-owned land located farther from the site also could be traversed by potential utility corridors. Excelsior has estimated that approximately 169 acres of publicly owned land could be traversed by potential corridors associated with the West Range Site, 60 percent of which would be Itasca County land and 34 percent of which would be state land (Excelsior, 2006b).

Farmland

None of the land within the West Range Site is actively cultivated as farmland. Although timber has been harvested from this area historically, the land that would be taken out of service to construct the power plant is not uniquely suited for such use. However, the site has soils that classify some of the land as prime farmland or prime farmland if drained (see Section 3.4). Several residents living along CR 7 own horses and grow hay for feed. At least one resident, located about 1.6 miles north-northeast of the West Range Site, raises beef cattle and feeds them from crops grown on the property. No crops are currently known to be cultivated on properties that would be crossed by the proposed access road, rail line, process water supply pipeline, or process water discharge pipeline easements associated with the West Range Site. HVTL and natural gas pipeline ROW corridors would cross open lands that may be used for farming purposes. The Land Cover Map indicates the presence of cultivated lands about two miles to the north-northwest and south of the Mesaba power plant footprint.

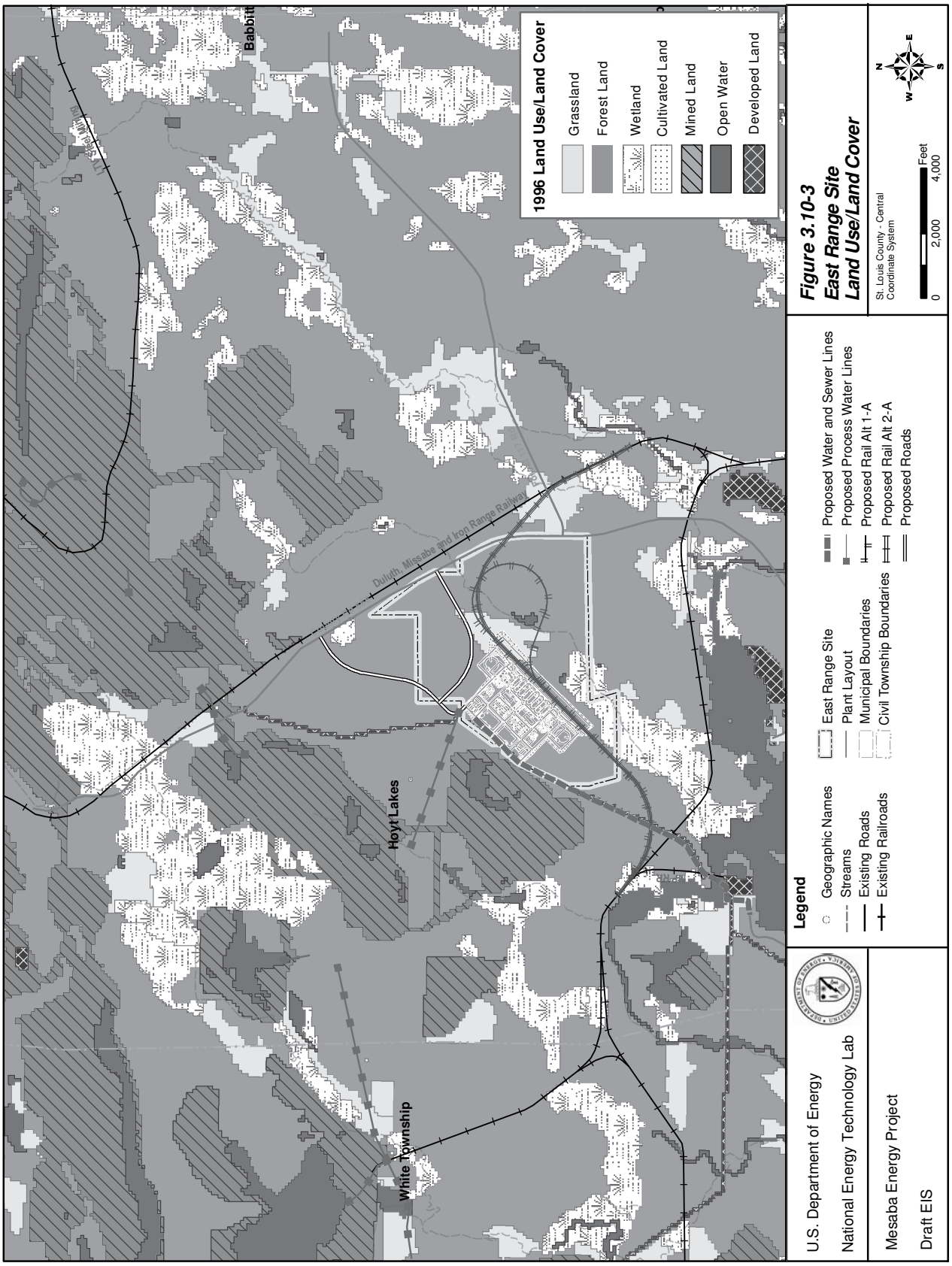
3.10.1.3 East Range Site and Corridors

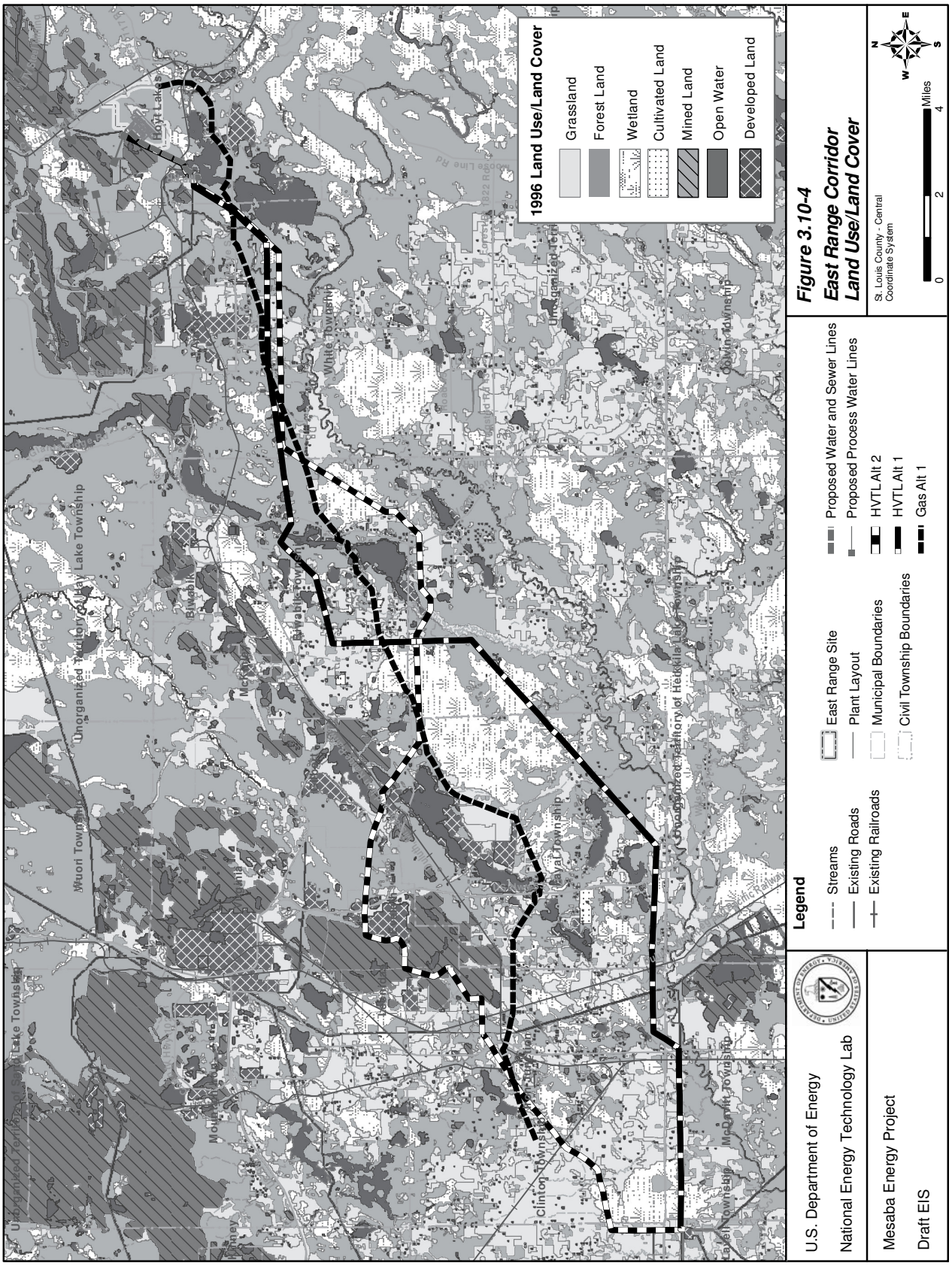
Figure 3.10-3 shows the land use/land cover within and adjacent to the East Range Site. Figure 3.10-4 shows the land use/land cover within the wider vicinity of the East Range Site and potential utility corridors. There are no residential, commercial, or industrial buildings within the East Range Site boundary; the site consists of forest land, wetland, and grassland.

Residential Areas

The locations of residential properties in the vicinity of the East Range Site and corridors are illustrated in Figures 3.2-9 and 3.2-10 in Section 3.2, Aesthetics, and the distances from the station footprint and centerlines of corridors are based on recent aerial photography (Excelsior, 2006b). The residential neighborhoods in the City of Hoyt Lakes are located more than a mile south of the East Range Site. The nearest residential properties to the East Range Site are located along the southeastern shore of Colby Lake directly south of the site (Figure 3.10-3). These properties consist mainly of year-round residences. No residences are located within 1,000 feet of the East Range Site boundary based on the aerial photography, and the closest residence to the proposed Mesaba Generating Station footprint is located about 1.2 miles to the south. Many residences in Hoyt Lakes are located within two miles of the proposed power plant footprint.

No residences are located within 0.5 mile of a potential new rail alignment for the East Range Site. The nearest residences to potential rail alignments are located on the southeastern shore of Colby Lake approximately 0.7 mile away. No residential properties are located within 1.5 miles of the potential new access road alignments for the East Range Site.


1996 Land Use/Land Cover
Grassland
Forest Land
Wetland
Cultivated Land
Mined Land
Open Water
Developed Land
Babbitt
Hoyt Lakes
White Township
Duluth, Missabe and Iron Range Railway Co.
Legend
Geographic Names
Streams
Existing Roads
Existing Railroads
East Range Site
Plant Layout
Municipal Boundaries
Civil Township Boundaries
Proposed Water and Sewer Lines
Proposed Process Water Lines
Proposed Rail Alt 1-A
Proposed Rail Alt 2-A
Proposed Roads
U.S. Department of Energy
National Energy Technology Lab
Mesaba Energy Project
Draft EIS
Figure 3.10-3
East Range Site
Land Use/Land Cover
St. Louis County - Central
Coordinate System
Feet
0
2,000
4,000
N
E
S
W


1996 Land Use/Land Cover
Grassland
Forest Land
Wetland
Cultivated Land
Mined Land
Open Water
Developed Land
Legend
Streams
Existing Roads
Existing Railroads
East Range Site
Plant Layout
Municipal Boundaries
Civil Township Boundaries
Proposed Water and Sewer Lines
Proposed Process Water Lines
HVTL Alt 2
HVTL Alt 1
Gas Alt 1
U.S. Department of Energy
National Energy Technology Lab
Mesaba Energy Project
Draft EIS
Figure 3.10-4
East Range Corridor
Land Use/Land Cover
St. Louis County - Central
Coordinate System
Miles
0
2
4
Hoyt Lakes
Unorganized Territory of Hay Lake Township
Mtuori Township
Biwabik
White Township
Unorganized Territory of Hellicla Lake Township
Clinton Township
Laval Township
McDavitt Township
Colvin Township

No residences are located within 0.5 mile of potential process water pipelines, potable water pipelines, or sanitary sewers for the East Range Site.

The potential natural gas pipeline could pass within 0.5 mile of 856 residences. As many as two residences could be located within 50 feet of the alignment and 44 others may be within 300 feet.

Potential HVTL corridors could be located within 0.5 mile of 1,233 residences. No residences would be closer than 50 feet from the centerline of the corridor, although three could be located within 100 feet. As many as 24 other residences would be between 100 and 300 feet from the centerline.

Industrial Areas

The entire land area north and west of the East Range Site was part of a large mining complex now owned by CE, which currently operates a mineral extraction and sales business (decorative and other specialty rock) on the property. Existing and planned industries in the vicinity of the East Range Site and corridors include:

- Minnesota Power's Syl Laskin Energy Center, which is a coal-fired, steam turbine electric generating plant located approximately one mile southwest of the East Range Site;
- Laskin Energy Park located approximately two miles southwest of the East Range Site;
- Mesabi Nugget, a planned taconite processing facility permitted for development on CE property approximately 3 miles northwest of the East Range Site; and
- PolyMet Mining Corporation, a precious metals mining operation planned for development on the CE property approximately 3 miles north of the East Range Site.

Publicly Owned Lands

Publicly owned lands in the vicinity of the East Range Site include Superior National Forest land, MNDNR lands, St. Louis County tax forfeit lands, and municipal property in the City of Hoyt Lakes.

Farmland

None of the land designated for the East Range Site is actively cultivated as farmland. As in the case of the West Range Site, timber has been harvested historically from the East Range Site. No crops are currently known to be cultivated on properties where the process water supply pipeline corridor, potable water and sewer pipeline corridor, rail alignments, or access road corridor easements would be required. Land is known to be cultivated for crops south of Aurora, and HVTL and natural gas pipeline infrastructure are proposed to traverse this area. Section 3.4 addresses the status of prime farmland determinations in the vicinity of the East Range Site.

3.10.2 Zoning Ordinances

3.10.2.1 West Range Site and Corridors

The West Range Site is located entirely within an area zoned for industrial use (I district) by Itasca County. The purpose of the I district is to separate heavy industrial uses that may conflict with uses in other zoning districts (Itasca County, 2005).

3.10.2.2 East Range Site and Corridors

The East Range Site is located entirely within an area zoned as a MD by the City of Hoyt Lakes. The purpose of the MD district is to identify areas of existing and potential mineral mining, processing, storage and loading, tailings and waste disposal, and accessory and support activities required for proper operation of mining activities, and to ensure the compatibility of these uses with other uses within the City of Hoyt Lakes (Excelsior, 2006b).

3.10.3 Land Use Planning

3.10.3.1 West Range Site and Corridors

Among the stated goals and objectives of the Comprehensive Land Use Plan for Itasca County that are most relevant to the Mesaba Energy Project are the following (Biko Associates and BRW, Inc., 2000):

- Natural resources goal to promote land and water uses that result in the sustainable use of natural resources, including objectives to maintain or improve air quality and to maintain high water quality in the county's abundant lakes, wetlands, and waterways and to develop mitigation efforts for lakes and waterways at risk of degradation. The plan also recommends the use of tax incentives to encourage private lakeshore owners not to develop, subdivide, or plat undeveloped lakeshore or environmentally sensitive areas.
- Commercial/industrial goal to encourage a sound and diverse economy that meets the needs of Itasca County residents and visitors for employment and services, including an objective to support the continuation and expansion of the mining industry and another to target economic development efforts toward the development of value-added industries. The plan also recommends contingencies for increased housing and commercial development related to a substantial resurgence of mining activity in the Western Mesabi Range.
- Transportation goal to maintain and enhance a system that meets the local and regional access needs of Itasca County residents, industries, and visitors, including an objective to improve transportation access to regional commercial and industrial markets for businesses.

3.10.3.2 East Range Site and Corridors

Although not included in a comprehensive planning area of the St. Louis County Planning Commission, the City of Hoyt Lakes is located in the vicinity of the East Range Planning Area of the county. Among the stated goals and policies of the East Range Plan most relevant to the Mesaba Energy Project are the following (St. Louis County, 1981):

- Encourage a variety of industrial activities at the most appropriate sites so as to establish a diversified economic base, including policies to expand existing industrial activities and encourage industry to locate in the county.
- Allow for development of the copper-nickel mining industry in a manner which safeguards private property rights and the public's health, safety, and general welfare, including a policy to buffer mining activities from conflicting uses.
- Restrict residential growth in the East Range planning area but not by using large lot sizes as the planning tool to accomplish this restriction; encouraging high density residential development near existing cities.
- Support development of recreational facilities that meet the needs of local residents, including policies to support development of community recreational facilities and to encourage development of tourist-oriented recreation by private industry.

Due to the limited extent of its jurisdiction, the City of Hoyt Lakes uses the zoning ordinance as its principal land use planning tool.

INTENTIONALLY LEFT BLANK

3.11 SOCIOECONOMICS

The region evaluated for the Mesaba Energy Project includes Aitkin, Carlton, Cook, Itasca, Koochiching, Lake, and St. Louis Counties. This region is defined by the Minnesota Department of Employment and Economic Development (DEED, 2006a) as the Northeast or Arrowhead Region (Economic Development Region 3) (Figure 3.11-1). The Taconite Tax Relief Area, as defined in Minnesota Statutes § 216B.1694, is a subset of this region that excludes the City of Duluth; all of Aitkin and Carlton Counties; and portions of Koochiching, Itasca, and St. Louis Counties (see Figure 2.1-1).

Figure 3.11-1. Arrowhead Region

Locally, socioeconomic conditions were evaluated for the West Range Site based on data for Census Tract 9810, which includes Iron Range Township, the City of Taconite, and several other jurisdictions in Itasca County. The socioeconomic conditions for the East Range Site were based on data for the City of Hoyt Lakes (Census Tract 140) in St. Louis County. These are the areas in which social and economic activities may be affected more directly by the Proposed Action and alternatives. Baseline socioeconomic conditions for selected communities located in Itasca and St. Louis counties are presented in this section.

3.11.1 Demographics

3.11.1.1 Regional Conditions

After gaining population in the 1970s, the Arrowhead Region experienced a decade-long population decline during the 1980s, in part due to a downturn in the national steel industry affecting the local taconite industry. The regional population declined by about 9 percent between 1980 and 1990. St. Louis and Lake Counties, in the heart of the Arrowhead, suffered the largest drop (11 percent and 20 percent, respectively). Beginning in 1991, the population began to gradually increase, and by 2000, the population had recovered to nearly the level recorded in 1970. In comparison, over the same 30 years, the population of the State of Minnesota increased by 29 percent to 4.9 million. Based on the 2000 census, there were 322,073 people living in 132,152 housing units in the Arrowhead Region with a population density of 18 persons per square mile (MDOA, 2006).

Table 3.11-1 presents the regional population trends by county. On a percentage basis, Cook County is the fastest growing in the region, but it has the smallest population and lowest density. Itasca County (West Range Site) has a population slightly greater than it had in 1980, and the population of St. Louis County (East Range Site) has declined by 10 percent since 1980.

Table 3.11-1. Population Trends by County for Arrowhead Region

				% Change	
County	**1980**	**1990**	**2000**	**1980–2000**	**1990–2000**
Aitkin	13,404	12,425	15,301	14.2	23.1
Carlton	29,936	29,259	31,671	5.8	8.2
Cook	4,092	3,868	5,168	26.3	33.6
Itasca	43,069	40,863	43,992	2.1	7.7
Koochiching	17,571	16,299	14,355	-18.3	-11.9
Lake	13,043	10,415	11,058	-15.2	6.2
St. Louis	222,229	198,213	200,528	-9.8	1.2
Arrowhead Region	343,344	311,342	322,073	-6.2	3.4

Source: MDOA, 2006

The populations of the 10 largest municipal districts in the Arrowhead Region are provided in Table 3.11-2. There are 278 cities and townships in the Arrowhead region. As shown in Table 3.11-2, approximately one-quarter of the regional population lives in the City of Duluth.

Table 3.11-2. The 10 Largest Municipalities in Northeast Minnesota (2002)

City	2002 Population
Duluth	86,044
Hibbing	16,968
Cloquet	11,378
Virginia	9,108
Hermantown	8,178
Grand Rapids	7,829
International Falls	6,554
Chisholm	4,872
Thomson Township (Carlton County)	4,361
Rice Lake Township (St. Louis Township)	4,190

Source: MDOA, 2006

The Minnesota State Demographic Center predicts that the Arrowhead Region will increase in population by 15 percent between 2000 and 2030. The Center expects the population of St. Louis County to increase by about 9 percent and that of Itasca County to increase by about 22 percent between 2000 and 2030 (MSDC, 2002).

3.11.1.2 West Range Site and Corridors

The West Range Site is located within the city limits of Taconite in Census Tract 9810 of Itasca County. Itasca County is the third largest county in Minnesota occupying approximately 3,000 square miles (7,770 square kilometers). The county has a population of approximately 44,000, and the county seat is located in Grand Rapids.

Census Tract 9810 (Figure 3.11-2) includes Taconite and Iron Range Township, as well as several other small communities along US 169 between the eastern outskirts of Grand Rapids and Nashwauk. As

indicated in Table 3.11-3, the population of Iron Range Township grew at a higher rate during the 1990s than the larger census units. However, the population in the City of Taconite has remained relatively constant since 1980, as indicated in Table 3.11-4. The smallest census unit in which the West Range Site is located (Block Group 3, Block 3083) had a population of 86 in the last census.

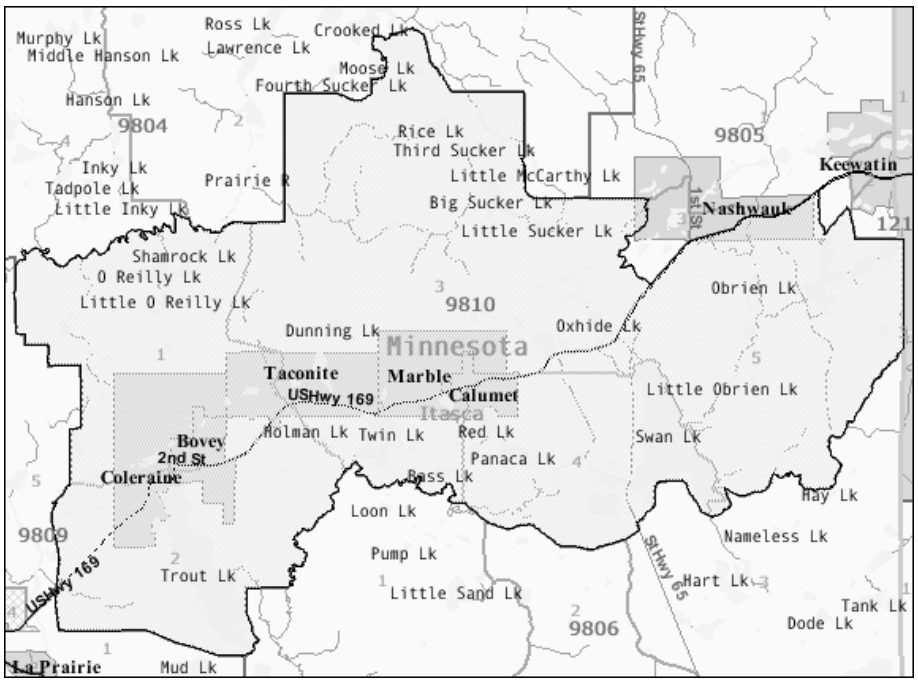


Figure 3.11-2. Census Tract 9810 in Itasca County

The area near Taconite experiences a seasonal increase in population primarily consisting of visitors to lake cabins, resorts and campgrounds during the summer. These seasonal increases are not reflected in census data but should be considered when evaluating housing availability, transportation, and the capacity of local government services to meet local needs.

Table 3.11-3. Local Population Change, West Range (1990 to 2000)

Unit	1990	2000	% Change
Taconite	310	315	1.6
Iron Range Township	590	651	10.3
Census Tract 9810, Block Group 3	1,324	1,448	9.4
Census Tract 9810	5,597	5,938	6.1

Source: U.S. Census Bureau, 2006

Table 3.11-4. Population Trend in Taconite (1980 to 2004)

Municipality	1980	1990	2000	2004
Taconite	331	310	315	323

Source: MDOA, 2006

3.11.1.3 East Range Site and Corridors

The East Range Site is located in the City of Hoyt Lakes (Census Tract 140) in St. Louis County (Figure 3.11-3). St. Louis County is the largest county in Minnesota, occupying approximately 6,860 square miles (17,800 square kilometers). The county has a population of approximately 200,000 including the City of Duluth, which is the county seat and most populous city in the Arrowhead Region.

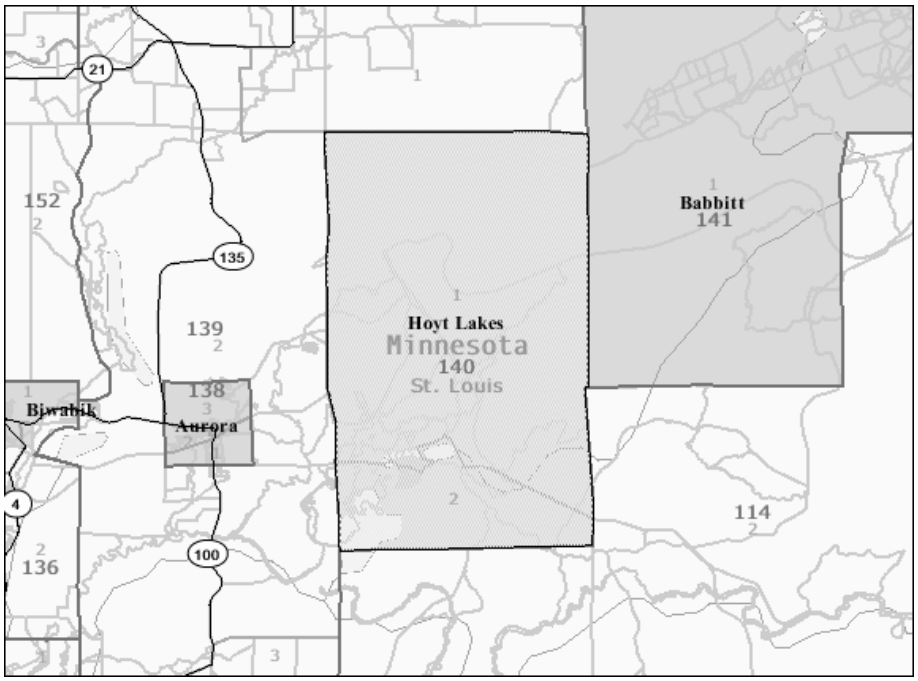


Figure 3.11-3. Hoyt Lakes (Census Tract 140) in St. Louis County

Table 3.11-5 illustrates the steady decline in population experienced by Hoyt Lakes since 1980. The smallest census unit in which the East Range Site is located (Census Tract 140, Block Group 1, Block 1008) had no recorded population in the last census.

Table 3.11-5. Population Trend in Hoyt Lakes (1980 to 2004)

Municipality	1980	1990	2000	2004
Hoyt Lakes	3,186	2,348	2,082	1,961

Source: MDOA, 2006

Hoyt Lakes, like much of the region, gets a large influx of temporary residents and visitors at lake cabins, resorts and campgrounds during the summer that impact the capacity of local government services to meet local needs. However, these temporary residents are not counted in these population statistics.

3.11.2 Housing

3.11.2.1 Regional Conditions

Based on 2000 census data, there were a total of about 35,300 vacant housing units in the Arrowhead Region. Over 27,600 (78 percent) of these were for seasonal, recreational, or occasional use, leaving approximately 7,700 year-round vacant housing units (U.S. Census Bureau, 2006).

3.11.2.2 West Range Site and Corridors

Table 3.11-6 presents housing characteristics in Itasca County. In the 2000 census, there were 24,528 housing units in Itasca County of which 27 percent were vacant, and most of the vacant units were considered seasonal units. Approximately 12 percent of all housing units were renter-occupied. The number of housing units countywide grew by 9 percent over the prior decade, and the vacancy rate declined, while the percentage of rental units remained relatively stable. The median value of owner-occupied housing in Itasca County ($81,700) remained substantially below the median values in Minnesota ($122,400) and the United States ($119,600) in 2000. However, the median home value in the county increased at a substantially higher rate (84 percent) during the decade compared to the rates of increase for the state (65 percent) and nation (51 percent).

As of the 2000 census, Iron Range Township, including the City of Taconite, had 314 housing units, of which 11 percent were renter-occupied and 18 percent were vacant during the last census. Taconite had approximately 150 housing units, of which 21 percent were renter-occupied and 9 percent were vacant. Census Block 3083, in which the West Range Site is located, had 33 housing units (including one renter-occupied and three vacant seasonal units). The township added 35 housing units (13 percent increase) during the prior decade; Taconite added 11 new units (8 percent increase). Both Iron Range Township and Taconite have generally older housing than the county and state. The median house values in Iron Range Township ($61,400) and Taconite ($40,400) were substantially lower than the median value in the county, but median values in both jurisdictions grew by much higher rates than the county during the decade (163 and 122 percent, respectively).

Table 3.11-6. Itasca County Housing Characteristics (2000)

General Housing Data	2000 Census	% of 2000 Total	1990 Census	% of 1990 Total	Change from 1990 to 2000
Total Housing Units	24,528		22,494		9.0%
Occupied	17,789	72.5%	15,461	68.7%	15.1%
Vacant	6,739	27.5%	7,033	31.3%	-4.2%
Vacant Seasonal	5,747	23.4%	5,302	23.6%	8.4%
Owner-Occupied	14,768	83.0%	12,855	83.1%	14.9%
Renter-Occupied	3,021	17.0%	2,606	16.9%	15.9%
Mobile Home	2,815	11.5%	2,739	12.2%	2.8%
Median Value of Owner-Occupied Units	$81,700		$44,300		84.4%
Median Gross Rent	$406		$297		36.7%

Source: U.S. Census Bureau, 2006

3.11.2.3 East Range Site and Corridors

Table 3.11-7 presents housing characteristics in St. Louis County. In the 2000 census, there were 95,800 housing units in St. Louis County of which 14 percent were vacant, and most of the vacant units were considered seasonal units. Approximately 22 percent of all housing units were renter-occupied. The number of housing units countywide remained relatively constant over the prior decade, and the vacancy rate declined, while the percentage of rental units remained relatively stable. The median value of owner-occupied housing in St. Louis County remained substantially below the median values in the state and nation in 2000. However, the median home value in the county increased at a noticeably higher rate (78 percent) during the decade compared to the rates of increase for Minnesota and the nation.

As of the 2000 census, Hoyt Lakes had approximately 995 housing units, of which 8 percent were renter-occupied and 8 percent were vacant. Hoyt Lakes added 33 new housing units (a 3 percent increase) during the prior decade, which was a small, but higher rate of increase than the county. Hoyt Lakes and St. Louis County in general have older housing stock than Minnesota as a whole, but new homes are currently being constructed in the Hoyt Lakes area on lakeshore property owned by Minnesota Power. The median house value in Hoyt Lakes ($39,100) was substantially lower than the median value in the county and grew at a slower rate (47 percent) than the county during the decade.

Table 3.11-7. St. Louis County Housing Characteristics (2000)

General Housing Data	2000 Census	% of 2000 Total	1990 Census	% of 1990 Total	Change from 1990 to 2000
Total Housing Units	95,800		95,403		0.4%
Occupied	82,619	86.2%	78,901	82.7%	4.7%
Vacant	13,181	13.7%	16,502	17.3%	-20.1%
Vacant Seasonal	8,896	9.3%	11,046	11.6%	-19.5%
Owner-Occupied	61,683	74.7%	58,541	74.2%	5.4%
Renter-Occupied	20,936	25.3%	20,360	25.8%	2.8%
Mobile Home	5,090	5.3%	5,052	5.3%	0.7%
Median Value of Owner-Occupied Units	$75,000		$42,200		77.7%
Median Gross Rent	415		291		42.6%

Source: U.S. Census Bureau, 2006

3.11.3 Employment and Income

3.11.3.1 Regional Conditions

Northeastern Minnesota has relied on the mining and forestry industries historically for well-paying jobs and economic base. However, between 2000 and 2003, jobs in mining declined by 36 percent, and mining and agriculture, forestry, fishing, and hunting now comprise 4 percent of the region's jobs. Increased foreign competition and improved technological efficiencies have resulted in the slow decline in employment. However, increasing global iron ore demand and the steady fall of the U.S. dollar have temporarily reduced stress in the industry. This has increased the value of many local products and has created a rebounding demand for skilled workers. Mining still provides 5 percent of wages in the region, which are paid at hourly rates significantly higher than most service-oriented jobs. In comparison, 39 percent of jobs in the region paid less than $10 per hour in 2002 (DEED, 2006b).

Employment in the service sector also is an increasingly large percentage of total employment in the Arrowhead Region, which reflects a nationwide trend. Three sectors – healthcare and social assistance, retail, and accommodation and food services – account for more than half of all regional employment. The health care industry is now the top employing industry in northeast Minnesota, representing 20.7 percent of the total private employment in the region, which is well above the 12.7 percent statewide and the 10.1 percent in the Twin Cities (Schoeppner, 2006). The regional occupations expected to increase the most through 2012 include Community and Social Services Occupations (35 percent), Healthcare Support Occupations (31 percent), and Computer and Mathematical Occupations (26 percent).

The median ages of the populations in Itasca County (41 years) and St. Louis County (39 years) were both considerably higher than the statewide median (35 years) in the 2000 census. Therefore, the aging of the regional workforce is a growing concern in the Arrowhead Region as the Baby Boom generation

begins to retire. DEED expects this trend to significantly slow the labor force growth over the next two decades (DEED, 2006b).

Unemployment is generally higher in most of the Arrowhead Region compared to Minnesota as a whole. The unemployment rate in the seven-county region averaged 5.2 percent for 2005, but dropped to 4.5 percent in May 2006 (DEED, 2006a). Unemployment in the region has gradually declined over the last several years, due to a slow recovery from the 2001 recession. As shown in Figure 3.11-4, the unemployment rate in the Arrowhead Region was consistently 2 percent or more higher than the state average through the 1980s and 1990s, and about 1 percent higher than the state average for the last four years.

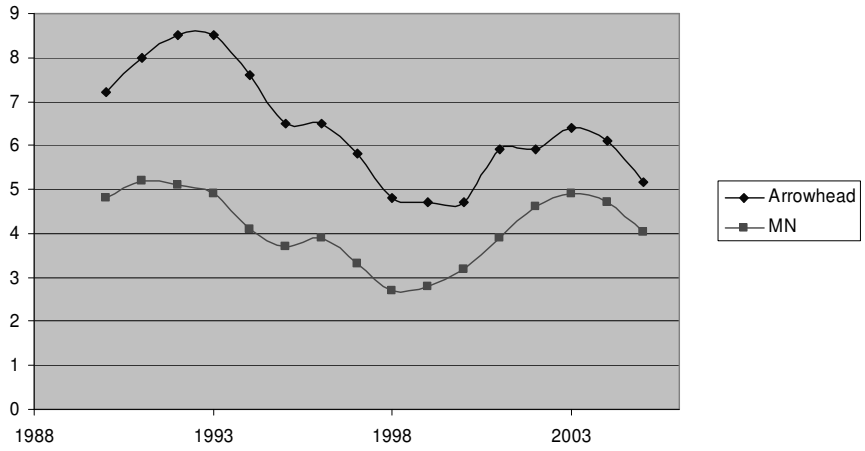


Figure 3.11-4. Annual Unemployment Rate (Percent), Arrowhead Region vs. Statewide Average

3.11.3.2 West Range Site and Corridors

In the 2000 census, the median incomes in Itasca County were $44,025 for a family, $36,234 for a household, and $17,717 per capita. Locally, the median incomes in Iron Range Township were $46,750 for a family, $35,000 for a household, and $16,384 per capita. In comparison, median incomes statewide ($56,874 family, $47,111 household, and $23,198 per capita) were substantially higher.

Many local residents travel long distances to work. Approximately 17 percent of workers in Iron Range Township, including Taconite, commuted at least 40 minutes to their places of employment in 2000, compared to 12 percent for both Itasca County and the state (U.S. Census Bureau, 2006). The use of public transport is negligible and more than 80 percent of local workers drive to work alone.

Unemployment in Itasca County has been comparable to the Arrowhead Region but higher than the state as a whole. The unemployment rate in May 2006 for Itasca County was 4.7 percent, and the annual unemployment rate has ranged between 4 and 6 percent since 1995, after having reached rates as high as 8 percent in the early 1990s (DEED, 2006a). The median age of the population in Iron Range Township (37 years) was lower than the county median in 2000 but slightly higher than the statewide median, pointing to potential workforce aging.

3.11.3.3 East Range Site and Corridors

The median incomes in St. Louis County in 2000 were $47,134 for a family, $36,306 for a household, and $18,982 per capita. Locally, the median incomes in Hoyt Lakes were $45,603 for a family, $39,493 for a household, and $18,882 per capita. These median incomes were substantially lower than those of the state as a whole.

Many local residents travel long distances to work. Approximately 15 percent of workers in Hoyt Lakes commuted at least 40 minutes to their places of employment in 2000, compared to 9 percent for the

county and 12 percent for the state (U.S. Census Bureau, 2006). The use of public transport is negligible and nearly 80 percent of local workers drive to work alone.

Unemployment in St. Louis County has been generally comparable to the Arrowhead Region but higher than the state as a whole. The unemployment rate in May 2006 for St. Louis County was 4.4 percent, and the annual unemployment rate has ranged between 4 and 6 percent since 1995 after having reached rates exceeding 8 percent in the early 1990s (DEED, 2006a). The median age of the population in Hoyt Lakes (over 45 years) was even higher than the county median in 2000, pointing to an aging local workforce.

3.11.4 Business and Economy

3.11.4.1 Regional Conditions

The Arrowhead Region, including the Iron Range, has relied on a natural resource-based economy for more than 100 years. Minnesota's economy has been driven by the development of its varied natural resources including iron ore, used in the making of steel through iron mining and ore processing; timber, used in papermaking and fiberboard; and, tourism. Of all these industries, the mining industry, which now accounts for a very small percentage of the annual gross state product in Minnesota, is viewed as the industry that drew many of the ancestors of current residents to settle in this region of Minnesota. However, global competition and increased production efficiency in the mining industry following the general economic crisis of the 1980s and earlier this decade, have forced the region to adopt economic diversification as a long-term strategy (Excelsior, 2006b).

The Arrowhead Region is evolving into a service- and commercial-oriented economy. Like the rest of rural Minnesota, the Arrowhead Region depends on smaller businesses. However, business development appears to be lagging in the Arrowhead Region. From 1998 to 2001, the state saw a 4.7 percent increase in the total number of establishments, while the Arrowhead Region saw only a 1 percent increase. Among the smallest businesses, those employing one to nine people, the Arrowhead Region saw no growth, staying virtually steady (0.6 percent) while the rest of rural Minnesota increased its number of establishments by 2.7 percent and the state as a whole grew by 4.2 percent.

Various state and regional organizations have been established with the objective of promoting economic stability and growth in the Arrowhead Region. Representative organizations include:

- Iron Range Resources (IRR) – Located in Eveleth, this state agency is responsible to help stabilize the economy and advance regional growth and diversity in the Taconite Assistance Area (the Taconite Tax Relief Area). The agency focuses its development efforts on four key industries: secondary wood products manufacturing, industrial machinery manufacturing, high-end customer service centers, and electronics manufacturing.
- Itasca Development Corporation – The Itasca Development Corporation, located in Grand Rapids, provides services including business development assistance and counseling, loan packaging, and site location assistance, and hosts a Minnesota Small Business Development Center.
- Arrowhead Regional Development Commission (ARDC) in Duluth.
- Northland Foundation in Duluth.
- The Northspan Group, Inc. in Duluth.

3.11.4.2 West Range Site and Corridors

Key businesses in Itasca County include the UPM Blandin Paper Mill in Grand Rapids, Ainsworth Grand Rapids OSB Plant, and Grand Itasca Clinic and Hospital, as well as numerous small and medium-sized businesses in Grand Rapids and other local communities. In the vicinity of the West Range Site,

smaller commercial businesses are located along US 169 and other local roads in Taconite, Bovey, Holman, Marble, Pengilly, and nearby communities.

3.11.4.3 East Range Site and Corridors

Key businesses in St. Louis County in the vicinity of the East Range Site include Cliffs-Erie, LLC, PolyMet Mining Corp., and Cliffs Natural Stone, as well as commercial businesses located along CR 110, CR 100 and other local roads in Hoyt Lakes, Aurora, Biwabik, and surrounding communities.

INTENTIONALLY LEFT BLANK

3.12 ENVIRONMENTAL JUSTICE

Environmental justice, in the context of this document, refers to the potential for minority and low-income populations to bear a disproportionate share of high and adverse environmental impacts from activities within the project area and the municipalities nearest to the two main sites under consideration: Taconite and Iron Range Township (West Range Site) and Hoyt Lakes (East Range Site). The general population for demographic analysis and comparison includes the counties of Aitkin, Carlton, Cook, Itasca, Koochiching, Lake, and St. Louis, which are defined by the Minnesota Department of Employment and Economic Development (DEED) as the Arrowhead Region.

3.12.1 Background and Definitions

Executive Order 12898 provides that "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations" (The White House, 1994).

The U.S. Department of Energy (2006a) defines "environmental justice" as:

> *The fair treatment and meaningful involvement of all people—regardless of race, ethnicity, and income or education level—in environmental decision making. Environmental Justice programs promote the protection of human health and the environment, empowerment via public participation, and the dissemination of relevant information to inform and educate affected communities. Department of Energy Environmental Justice programs are designed to build and sustain community capacity for meaningful participation for all stakeholders in Department of Energy host communities.*

In its guidance for the consideration of environmental justice under NEPA, the Council on Environmental Quality (CEQ) defines a "minority" as an individual who is American Indian or Alaskan Native, Black or African American, Asian, Native Hawaiian or Pacific Islander, Hispanic or Latino. CEQ characterizes a "minority population" as existing in an affected area where the percentage of defined minorities exceeds 50 percent of the population, or where the percentage of defined minorities in the affected area is meaningfully greater than the percentage of defined minorities in the general population or other appropriate unit of geographic analysis. The CEQ guidance further recommends that low-income populations in an affected area should be identified using data on income and poverty from the U.S. Census Bureau (CEQ, 1997).

3.12.2 Minority Populations

3.12.2.1 Regional Conditions

Table 3.12-1 compares the distributions of regional population with those of the state and nation. The 2000 Census revealed a more racially and ethnically diverse population in Minnesota compared to the 1990 Census. In 2000, 11.8 percent of Minnesotans (582,000 people) identified themselves as non-white, up from 6.3 percent (274,000 people) in 1990. However, the state population is far less diverse than that of the nation, and the population in the Arrowhead Region is even less diverse, with low distributions of minorities. The largest minority concentrations in the region are in central Duluth and on tribal reservations relatively distant from either the West Range or East Range Sites.

Table 3.12-1. National and Regional Population Distributions (2000)

Area	White	American Indian or Alaskan Native	Black or African American	Hispanic or Latino (all races)	Other Minorities	Total Population (Number)
Arrowhead Region	94.3%	2.5%	0.7%	0.7%	1.8%	322,073
State of Minnesota	88.2%	1.1%	3.4%	2.9%	4.4%	4,919,479
United States	69.1%	0.7%	12.1%	12.5%	5.6%	281,421,906

Source: U.S. Census Bureau, 2006

3.12.2.2 West Range Site and Corridors

Table 3.12-2 compares the minority compositions of the census units surrounding the West Range Site with larger areas based on the 2000 Census. The proposed West Range Site is located in Census Tract 9810, Block Group 3, Block 3083, for which no minority population was recorded in 2000. Iron Range Township, which includes the population of the City of Taconite, had a minority population of nearly 3 percent, and the percentage of minorities generally increases as the census units grow larger. The proportions of the non-minority (white) populations in these smaller census units are generally higher than in Itasca County and are substantially higher than the state and nation. Since the population in the area surrounding the proposed site is far more homogeneous racially and ethnically than the general population of the region, state, and country, a "minority population" as characterized by CEQ does not exist in the potentially affected area of the Mesaba Energy Project.

Table 3.12-2. Population Profiles (2000): Percentage of Minorities, West Range

Area	White	American Indian or Alaskan Native	Black or African American	Hispanic or Latino (all races)	Other Minorities	Total Population (Number)
Tract 9810, BG3, Block 3083	100.0	0.0	0.0	0.0	0.0	86
Iron Range Township	97.2	0.2	0.0	0.2	2.4	651
Tract 9810, BG3	96.1	1.5	0.0	1.0	1.4	1,448
Tract 9810	96.9	1.0	0.1	0.6	1.4	5,938
Grand Rapids	95.1	1.9	0.3	0.9	1.8	7,764
Itasca County	94.3	3.3	0.2	0.6	1.6	43,992

Source: U.S. Census Bureau, 2006

3.12.2.3 East Range Site and Corridors

Table 3.12-3 compares the minority compositions of the census units surrounding the East Range Site with larger areas based on the 2000 Census. The East Range Site is located in Census Tract 140, Block Group 1, Block 1008, which had no population in the 2000 Census. The nearest populated census block to the East Range Site (Block 1023) had no minority population recorded in the 2000 Census, and the larger Block Group 1 and City of Hoyt Lakes (Census Tract 140) each had a minority population of 1 percent. The proportions of the non-minority (white) population in these smaller census units are generally higher than in St. Louis County and are substantially higher than in the state and country. Since the population in the area surrounding the proposed site is far more homogeneous racially and ethnically than the general population of the region, state, and country, a "minority population" as characterized by CEQ does not exist in the potentially affected area of the Mesaba Energy Project.

Table 3.12-3. Population Profiles (2000): Percentage of Minorities, East Range

Area	White	American Indian or Alaskan Native	Black or African American	Hispanic or Latino (all races)	Other Minorities	Total Population (Number)
Tract 140, BG1, Block 1008	0.0	0.0	0.0	0.0	0.0	0
Tract 140, BG1, Block 1023	100.0	0.0	0.0	0.0	0.0	84
Tract 140, BG1	99.3	0.2	0.0	0.2	0.3	1,060
Hoyt Lakes	99.0	0.2	0.3	0.2	0.3	2,082
Virginia	94.6	2.2	0.5	0.8	1.9	9,157
St. Louis County	94.4	2.0	0.8	0.8	2.0	200,528

Source: U.S. Census Bureau, 2006

3.12.3 Low Income Populations

3.12.3.1 Regional Conditions

Table 3.12-4 compares regional poverty rates for the Arrowhead Region, Minnesota, and the United States for the 2000 Census. The data indicate that the Arrowhead Region has poverty rates for individuals, families, and households that are closer in line with national poverty rates than those of the state which are generally lower.

Table 3.12-4. Regional and National Poverty Rates

Percentage of Income in 1999 Below Poverty Level			
Area	**Families**	**Households**	**Individuals**
Arrowhead Region	7.2	11.6	11.2
State of Minnesota	5.1	7.9	7.9
United States	9.2	11.8	12.4

Source: U.S. Census Bureau, 2006

3.12.3.2 West Range Site and Corridors

Median incomes in the communities near the West Range Site as described in Section 3.11.3 are considerably lower than those of the state, but generally comparable to those in Itasca County. Table 3.12-5 compares the poverty rates for census units in the vicinity of the West Range Site with those in the larger community of Grand Rapids and in Itasca County from the 2000 Census. The table indicates that the county has a significantly higher percentage of families, households, and individuals with incomes below the poverty level than does the state as a whole but lower poverty rates than the nation.

The poverty rates in the smallest census unit encompassing the West Range Site (Census Tract 9810, Block Group 3), as well as in Taconite and Iron Range Township, are higher than the rates in the larger Census Tract 9810 and in the rest of the county. Poverty rate data are not available from the U.S. Census Bureau below the Block Group level, but the residential properties closest to the West Range Site include lakefront properties along Diamond Lake Road to the south and large-sized lots along CR 7 to the west. Therefore, it is reasonable to assume that the poverty rates in neighborhoods closest to the West Range Site are more comparable to those in Census Tract 9810 and the Arrowhead Region in general than to those in the City of Taconite.

Table 3.12-5. Population Profiles (2000): Local Poverty Rates, West Range

Percentage of Income in 1999 Below Poverty Level			
Area	**Families**	**Households**	**Individuals**
Taconite	14.9	13.1	17.1
Iron Range Township	9.7	10.9	15.0
Tract 9810, BG3	9.4	16.0	13.2
Tract 9810	7.9	11.7	11.3
Grand Rapids	7.9	10.2	10.5
Itasca County	7.7	10.6	10.6

Source: U.S. Census Bureau, 2006

3.12.3.3 East Range Site and Corridors

As described in Section 3.11.3, median incomes in the communities near the East Range Site are considerably lower than those of the state, but generally comparable to those in St. Louis County. Table 3.12-6 compares the poverty rates for census units in the vicinity of the East Range Site with those in the larger community of Virginia and in St. Louis County from the 2000 census. The table indicates that the county has a significantly higher percentage of families, households, and individuals with incomes below the poverty level than does the state as a whole but lower poverty rates than the nation.

Poverty rates in Hoyt Lakes are considerably lower than those in St. Louis County and the Arrowhead Region in general but more in line with those of Minnesota. Moreover, the poverty rates in the smallest census unit encompassing the East Range Site (Census Tract 140, Block Group 1), are substantially lower than those in Hoyt Lakes, the county and the state as a whole. Also, the residential properties closest to the East Range Site, consisting of lakefront and lake-view homes, are located about 1 mile south of the site. Therefore, it is reasonable to assume that the poverty rates in neighborhoods closest to the East Range Site are substantially lower than in the larger census units.

Table 3.12-6. Population Profiles (2000): Local Poverty Rates, East Range

Percentage of Income in 1999 Below Poverty Level			
Area	**Families**	**Households**	**Individuals**
Tract140, BG1	3.0	4.3	3.9
Hoyt Lakes	6.6	7.7	8.9
Virginia	10.6	17.3	15.9
St. Louis County	7.2	12.3	12.1

Source: U.S. Census Bureau, 2006

3.13 COMMUNITY SERVICES

This section describes the existing local government services for the Cities of Taconite (West Range Site) and Hoyt Lakes (East Range Site) that may be affected by the proposed project.

3.13.1 Law Enforcement

3.13.1.1 West Range Site and Corridors

The Itasca County Sheriff's Office provides law enforcement in Itasca County, including the City of Taconite and surrounding areas. The Sheriff's Office includes 64 employees working as deputies, jailers, dispatchers, and clerical support. The county has been divided into five patrol districts; deputies live and work within their assigned patrol districts to provide community policing. Taconite is in the East End patrol district. The office has employees with specialized training in D.A.R.E. (Drug Abuse Resistance Education), pre-employment background investigation, boat and water safety, snowmobile safety, drug task force, emergency response team, dive team, and special enforcement projects. Two supporting groups, the Itasca County Sheriff's Posse and the Itasca County Dive Team, are staffed by trained volunteers who contribute their time to search for lost persons, recover drowning victims, and provide time to community service work (Itasca County Sheriff, 2006).

3.13.1.2 East Range Site and Corridors

Hoyt Lakes Police Department serves the City of Hoyt Lakes with support from the St. Louis County Sheriff's Office, which has jurisdiction in surrounding areas. The Hoyt Lakes Police Department consists of five full-time and five part-time officers. The St. Louis County Sheriff's Office has 94 full-time and 23 part-time deputies on staff (Excelsior, 2006b). The patrol division is the largest division. In addition to their regular duty assignments, deputies also participate in activities such as background investigations of potential deputy sheriff candidates; field training officers for newly hired deputies; boat and water patrol; snowmobile patrol; Driving While Intoxicated (DWI) saturation patrol; illegal drug investigation; arson investigation; and membership on the Emergency Response Team (ERT).

The county is divided into three major regional sheriff's offices in Duluth, Hibbing, and Virginia. The Virginia office serves the East Range vicinity. The St. Louis County Sheriff's Office also provides law enforcement services for the community of Aurora. The Aurora Sheriff's Office consists of a sergeant and five deputies who patrol within a 4-mile radius of Aurora. Deputies also provide immediate response to any emergency outside of Aurora, which may extend into the neighboring City of Hoyt Lakes (St. Louis County Sheriff, 2006).

3.13.2 Emergency Response

3.13.2.1 West Range Site and Corridors

The City of Taconite has seven Emergency Medical Technician (EMT) volunteers and 14 fire department volunteers. Ambulance services are dispatched from Nashwauk or Grand Rapids, depending on the location of the 911 caller. The City of Taconite also has a mutual aid agreement with nearby Cohasset and Grand Rapids (Excelsior, 2006b). Itasca County provides additional emergency response as needed. The Itasca County Sheriff is also the Itasca County Director of Emergency Management for the Minnesota Department of Public Safety and for coordination with the U.S. Department of Homeland Security (MDPS, 2006).

Itasca County is served by three hospitals and 12 outpatient clinics (Excelsior, 2006b). The nearest hospitals to Taconite are the Grand Itasca Clinic and Hospital in Grand Rapids (13 miles) which has 64 beds, and University Medical Center-Mesabi in Hibbing (27 miles) which has 175 beds (MDH, 2006).

3.13.2.2 East Range Site and Corridors

Hoyt Lakes operates a volunteer emergency response and fire department cooperatively with the surrounding communities of Aurora, Biwabik, and White Township, which contribute funds to cover administrative expenses and build up reserves for capital purchases. The cooperative service has 25 EMTs and fire fighters who are paid by service run. Hoyt Lakes also has mutual aid agreements with nearby communities for police, fire, and ambulance services.

St. Louis County assists its municipalities when emergency response demands exceed their local capabilities. The St. Louis County Sheriff's Office Emergency Management Division coordinates emergency management plans and has jurisdiction throughout the county outside of cities that establish their own emergency management organizations (Excelsior, 2006b). The St. Louis County Sheriff is also the St. Louis County Director of Emergency Management for the Minnesota Department of Public Safety and for coordination with the U.S. Department of Homeland Security (DPS, 2006). In an extreme emergency or disaster situation within the county, the Chairman of the Board of Commissioners, the County Administrator, or the Sheriff activates the St. Louis County Emergency Operations Center (EOC). Response activities are coordinated through the EOC to assure effective response and recovery.

St. Louis County is served by eight hospitals and 56 outpatient clinics (Excelsior, 2006b). The nearest hospitals to Hoyt Lakes are the White Community Hospital in Aurora (4 miles) which has 16 beds, and the Virginia Regional Medical Center in Virginia (25 miles) which has 83 beds (MDH, 2006).

3.13.3 Parks and Recreation

3.13.3.1 West Range Site and Corridors

Itasca County is known for its trails, resorts, and campgrounds. Residents and visitors enjoy outdoor activities year-round, including fishing, hiking, hunting, snowmobiling, cross-country skiing, and golf. The Forest History Center in Grand Rapids is a state historical park and interpretive center demonstrating the history of forestry in northern Minnesota. The Edge of the Wilderness National Scenic Byway extends north from Grand Rapids through the Chippewa National Forest. The closest boundary of the Chippewa National Forest is located less than 10 miles northwest of the West Range Site, and the closest boundary of George Washington State Forest is located less than 15 miles north of the site. Scenic State Park is located approximately 25 miles to the northwest. The West Range Site is also located within 65 miles southwest of the Boundary Waters Canoe Area and within 75 miles south of Voyageurs National Park.

Recreational areas in the vicinity of the West Range Site include the Hill-Annex State Park and Gibbs Park. The Hill-Annex State Park, which exhibits the history of iron ore mining on the Mesabi Range, is within 4 miles east of the West Range Site. Gibbs Park is a day park that provides a fishing pier and swimming beach located on Holman Lake about 2 miles south of the West Range Site. Numerous lakes and woodlands in the area, including the West Range Site property, provide recreational opportunities for area residents. Activities such as hiking, swimming, boating, fishing, bird watching, and similar activities are prevalent. Former mine pits that have filled with water, such as the Canisteo Pit, also provide opportunities for recreational boating and fishing. MDNR has indicated that the CMP is used for recreational boating approximately 2,210 hours per year and for recreational fishing approximately 6,500 hours per year (Kavanaugh, 2007).

The Mesabi Trail is a multiuse trail (e.g., biking, hiking, snowmobiling, and wheelchair use) that will extend from Grand Rapids to Ely. When completed, the trail will traverse 132 miles and connect more than 25 communities. One segment of this trail is located about 1.5 miles south of the West Range Site along an abandoned rail grade situated parallel to and north of US 169.

3.13.3.2 East Range Site and Corridors

The East Range Site is located just west of the boundary of the Laurentian District of Superior National Forest, which provides opportunities for hiking, biking, hunting, bird watching and similar recreational activities. The City of Hoyt Lakes is located on the Superior National Forest Scenic Byway, approximately 1.5 miles south of the site, which extends from Aurora to Silver Bay on Lake Superior. The East Range Site is located within 25 miles southwest of the Boundary Waters Canoe Area and within 60 miles south of Voyageurs National Park.

Approximately 1 mile south of the East Range Site is Birch Cove Park, which includes a playground, beach, and boat launch on Colby Lake. Numerous lakes and woodlands in the area also provide recreational opportunities for area residents. Activities such as hiking, swimming, boating, fishing, snowmobiling, bird watching, and others are prevalent.

3.13.4 School Systems

3.13.4.1 West Range Site and Corridors

School districts in Itasca County include Deer River, Grand Rapids, Greenway, and Nashwauk-Keewatin. The county maintains five private schools and 20 public schools. The City of Taconite is located within the Greenway school district and, according to the Minnesota Department of Education, the Greenway district maintains four public schools (i.e., two elementary schools, one middle school, and one senior high school.) Table 3.13-1 provides a summary of the district's educational statistics.

Table 3.13-1. Educational Statistics for Greenway School District in Itasca County

Enrollment	
Elementary	710
Secondary	571
Spending per Student	
Total	$9,285
Instructional	$4,236
Student Teacher Ratio	
Elementary (1:1)	14.96
Secondary (1:1)	15.32
Private Elementary School Enrollment	
Number of Schools	0
Total Enrollment	N/A
Private Secondary School Enrollment	
Number of Schools	0
Total Enrollment	N/A

Source: MDE, 2006

3.13.4.2 East Range Site and Corridors

St. Louis County is divided into 16 school districts, including Mesabi east district, which serves the City of Hoyt Lakes. The Mesabi east district maintains two public schools, Mesabi East Elementary School and Mesabi East Secondary School. Table 3.13-2 provides a summary of the district's educational statistics.

Table 3.13-2. Educational Statistics for Mesabi East School District in St. Louis County

Enrollment	
Elementary	495
Secondary	417
Spending per Student	
Total	$10,260
Instructional	$4,796
Student Teacher Ratio	
Elementary (1:1)	12.04
Secondary (1:1)	21.06
Private Elementary School Enrollment	
Number of Schools	0
Total Enrollment	N/A
Private Secondary School Enrollment	
Number of Schools	0
Total Enrollment	N/A

Source: MDE, 2006

3.14 UTILITY SYSTEMS

3.14.1 Potable Water Supply

This section discusses the existing potable water supplies potentially utilized by the Mesaba Energy Project.

3.14.1.1 West Range Site

The nearest potable water supplier to the West Range Site is in the City of Taconite, located 2.5 miles south of the proposed Mesaba Generating Station footprint. Taconite is permitted to use 20 million gallons a year (about 55,000 gallons per day) based on their current groundwater allocation permit and is currently using an average of 8 million gallons a year (about 22,000 gallons per day). This system currently serves approximately 330 residents (Excelsior, 2006b).

3.14.1.2 East Range Site

The City of Hoyt Lakes' potable water is supplied from a 1.5 million-gallon per day surface water treatment plant located at the north end of the city near Colby Lake, approximately 1 mile southwest of the proposed plant site. The plant was constructed in 1954. Raw water is supplied to the plant from two intakes located in Colby Lake. The intakes are set at different depths and the quality of the water dictates which intake is used to supply water to the treatment plant. Treated water is pumped to a 1.7 million gallon standpipe located in the center of town and to a 150,000 gallon elevated tower located west of the City in the Laskin Energy Park. A pumping station is located at the standpipe that can pump water to the elevated tower at a maximum rate of 1,200 gallons per minute. The elevated tower supplies water to the Industrial Park site and MP through a 12-inch distribution main. The average water use for the City of Hoyt Lakes is 275,000 gallons per day with a maximum daily demand of 700,000 gallons per day (255.5 million gallons per year). The treatment plant currently serves approximately 2,400 residents.

3.14.2 Sanitary Wastewater

3.14.2.1 West Range Site

The City of Taconite has a wastewater collection system that conveys wastewater to the joint Coleraine-Bovey-Taconite WWTF located on CR 10 in Bovey. The WWTP is roughly 4 miles southwest of the West Range site, but the City of Taconite's collection system is only about 2 miles from the site. This facility is a conventional activated sludge treatment plant designed to treat typical domestic wastewater. The National Pollution Discharge Elimination System (NPDES) permit (permit # MN0053341) for this facility allows a discharge of 499,000 gallons per day of treated effluent to the Swan River. This permit will require renewal in March 2007. The facility currently treats an average of 334,000 gallons per day (EPA, 2006b). While the WWTF is currently in compliance with all permit requirements (EPA, 2006b), the collection system within the City of Taconite does experience bypass events. During high groundwater or rainfall, the main wastewater pump station in Taconite cannot handle the additional flows, creating a need to bypass untreated wastewater into a natural pond system.

3.14.2.2 East Range Site

The City of Hoyt Lakes has a wastewater collection system that conveys wastewater to the Hoyt Lakes WWTF located in the city. Access to the WWTP collection system is near the Syl Laskin Energy Center, about a mile southwest of the East Range site. This Hoyt Lakes WWTP is a trickling filter design to treat domestic wastewater. The NPDES permit (permit # MN0020206) for the Hoyt Lakes facility allows a discharge of 680,000 gallons per day of treated effluent to Whitewater Lake (EPA, 2006c). This permit will require renewal in January 2010. The facility currently treats an average of 300,000 gallons per day of wastewater effluent.

3.14.3 Electricity

3.14.3.1 State Electricity Infrastructure

There are thousands of miles of transmission lines in Minnesota. The transmission system in Minnesota connects more than 175 electric generating plants, sized from a few megawatts to more than 1100 MW; including fossil fuel-fired (coal, natural gas, and oil), nuclear, wind, hydro, and biomass plants, located both within and outside the state, to serve the state's more than five million residents. The system is also connected to utilities in other states and Canada in all directions, including over 6,500 miles of 69-kilovolt (kV) lines, nearly 3,500 miles of 115-kV lines, 820 miles of 161-kV lines, approximately 1,500 miles of 230-kV lines, 870 miles of 345-kV lines, and 340 miles of 500-kV lines. In addition, there are almost 300 miles of direct current (DC) lines in Minnesota. A map of transmission lines in Minnesota 69 kV and larger can be found on the Public Utility Commission's webpage at: http://server.admin.state.mn.us/maps/ElecTran03.pdf (PUC, 2005).

In the spring of 2004, six utility companies initiated a concerted effort to ensure that the transmission system in Minnesota was adequate to serve a growing demand for electricity and to plan for major capital expenditures that would be required to construct major new transmission infrastructure in the near future. The utilities are Great River Energy, MP, Missouri River Energy Services, Otter Tail Power Company, Southern Minnesota Municipal Power Agency, and Xcel Energy. These utilities initiated an effort, under the name CapX2020 (Capital Expansion by the year 2020), using the individual utility load growth figures from the Mid-Continent Area Power Pool (MAPP) *2004 Load and Capability Report* (CapX2020, 2004) to estimate the demand for electricity in the future. Based on their assessment, electricity demand could increase by roughly 6,300 MW by 2020 in the region, including Minnesota and portions of the Dakotas, Iowa, and Wisconsin.

3.14.3.2 Regional Electrical Infrastructure

Current electricity providers in the Iron Range region include: Arrowhead Electric Cooperative, Inc.; Bigfork Valley Electric Service Company, Inc.; Crow Wing Cooperative Power & Light Co.; Lake Country Power; Mille Lacs Power Cooperative; Minnesota Power; North Itasca Electric Cooperative, Inc.; North Star Electric Cooperative, Inc.; and The Cooperative Light & Power Association of Lake County (Iron Range Resources, 2006).

Minnesota is divided geographically into the following six Transmission Planning Zones: Northwest; Northeast; West Central; Twin Cities; Southwest; and Southeast. Both project alternative locations would be located within the Northeast Zone. The Northeast Planning Zone covers the area north of the Twin Cities suburban area to the Canadian border and from Lake Superior west to the Walker and Verndale areas. The zone includes the counties of Aitkin, Carlton, Cass, Cook, Crow Wing, Hubbard, Isanti, Itasca, Kanabec, Koochiching, Lake, Mille Lacs, Morrison, Pine, St. Louis, Todd, and Wadena counties. The primary population centers in the Northeast Planning Zone include the cities of Brainerd, Cambridge, Cloquet, Duluth, Ely, Grand Rapids, Hermantown, Hibbing, International Falls, Little Falls, Long Prairie, Milaca, Park Rapids, Pine City, Princeton, Verndale, Virginia, and Walker.

The following utility companies own transmission facilities in the Northeast Planning Zone:

- American Transmission Company, LLC
- Great River Energy
- Minnesota Power
- Xcel Energy

The transmission system in the Northeast Planning Zone consists mainly of 230-kV, 138-kV, and 115-kV lines that serve lower voltage systems comprised of 69 kV, 46 kV, 34.5 kV, 23 kV, and 14 kV. A 345-kV line extends between Duluth, Minnesota, and Wausau, Wisconsin, (the Arrowhead line is

currently under construction). The 345 kV and 230 kV system is used as an outlet for generation and to deliver power to the major load centers within the Northeast Planning Zone. From the regional load centers, 115-kV lines carry power to lower voltage substations where it is distributed to outlying areas. In a few instances, 230-kV lines serve this purpose. A ± 250-kV DC line runs from North Dakota to Duluth and serves as a generator outlet for lignite-fired generation located in North Dakota. In addition, a 500-kV line and a 230-kV line provide interconnections with Manitoba and a 115-kV line interconnects with Ontario at International Falls. The interconnections with Canada provide for generation resource sharing as well as seasonal and economic power interchanges between Minnesota and Canada (PUC, 2005).

Figure 3.14-1 shows the transmission lines in the Northeast Planning Zone.

3.14.3.3 West Range Site

There are a number of HVTLs and power substations in Itasca County. The point of intersection for the HVTLs and substations in the area is the Blackberry Substation, an existing 230/115-kV substation owned and operated by MP, that serves as the major HVTL hub in the area. The Blackberry Substation is located at the intersection of Itasca CR 10 and CR 434, approximately 8.5 miles south-southeast of the West Range Site (Figure 3.14-2).

3.14.3.4 East Range Site

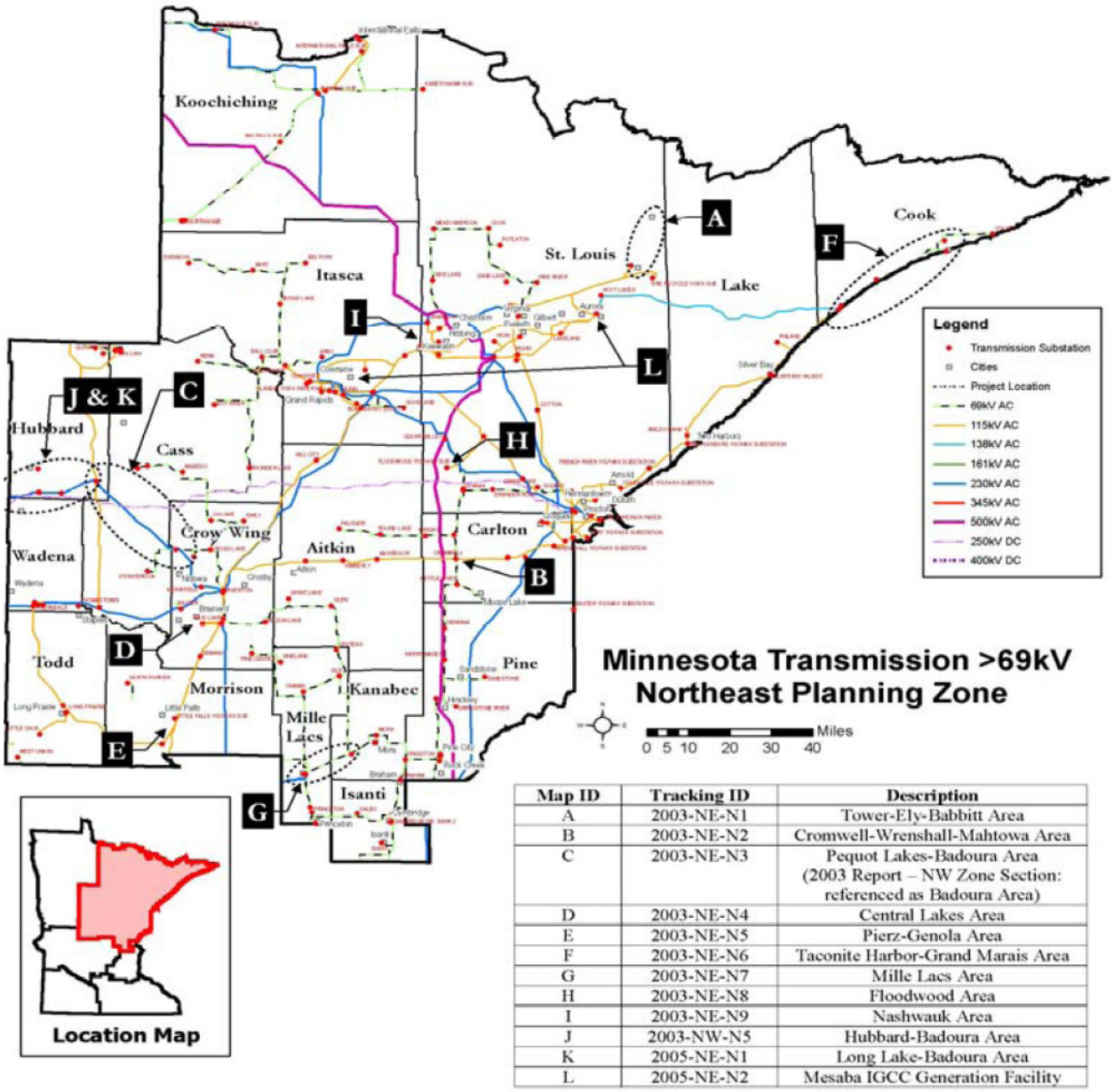
Current municipal utility providers in St. Louis County are: Hibbing Public Utilities; Northern Minnesota Utilities, Ltd.; Peoples Natural Gas Division; and Virginia Department of Public Utilities (Iron Range Resources, 2006).

The East Range Site is located approximately 3.5 miles south of a former taconite processing plant. Adjacent to this plant is an existing 138 kV substation that provides electric service to CE. Three 138-kV transmission lines traverse the CE property to deliver power to this substation, two of which occupy the same corridor and line as the CE Substation to the coal fueled power plant at Taconite Harbor. A third 138-kV HVTL runs between a substation serving MP's Syl Laskin Energy Center (the "Laskin Substation") and the CE Substation (Figure 3.14-3). These facilities are part of the Minnesota Power transmission network known as the "North Shore Loop," which extends from the east end of the Iron Range, along the North Shore of Lake Superior, and into Duluth. The 115/138-kV transmission facilities that make up this "loop" are heavily loaded and currently operate with several special protection schemes involving generation reduction and/or unit tripping to avoid overloading the remaining transmission facilities during critical equipment outages. HVTL route designations shown on Figures 3.14-2 and 3.14-3, such as 39 Line or 39L, are based on the identification numbers provided by their respective electric companies.

3.14.4 Natural Gas

This section describes the natural gas pipeline infrastructure located in the vicinities of the West and East Range Sites.

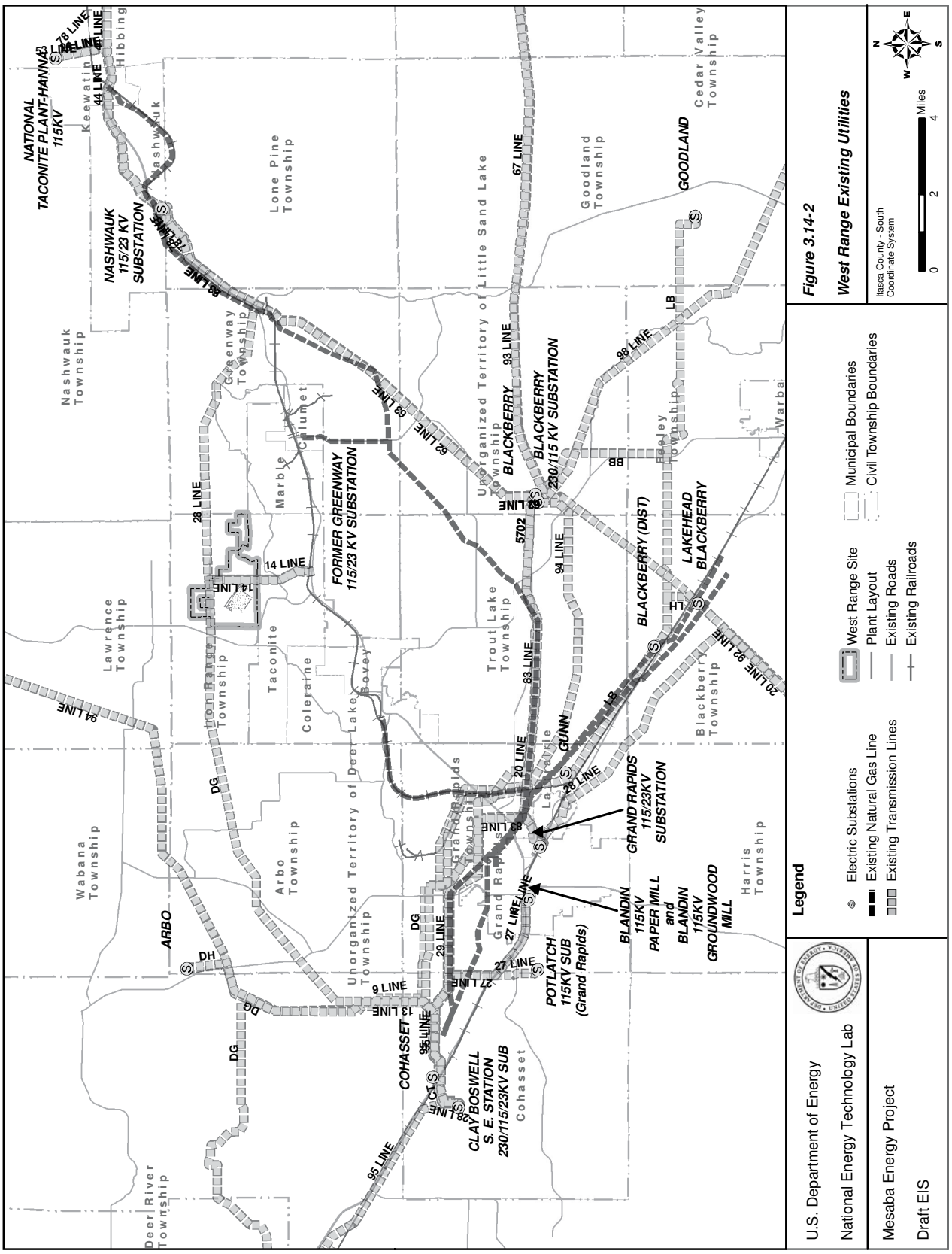
Minnesota's Iron Range is served by two major natural gas pipeline transmission companies: GLG and NNG. GLG has been providing energy services to the U.S. and Canada since 1967. They transport more than 2.2 billion cubic feet of natural gas per day through 2,100 miles of pipelines (GLG, 2006). NNG operates an interstate natural gas pipeline that extends from the Permian Basin located in Texas and New Mexico to the upper Midwest. Their system includes 16,500 miles of pipeline, which provides 4.5 billion cubic feet per day of market area peak capacity. NNG also has five natural gas storage facilities with a 59 billion cubic foot capacity, which includes four billion cubic feet of liquefied natural gas (NNG, 2006). The GLG natural gas pipeline transmission system interconnects with NNG's natural gas pipeline system near Carlton, Minnesota.

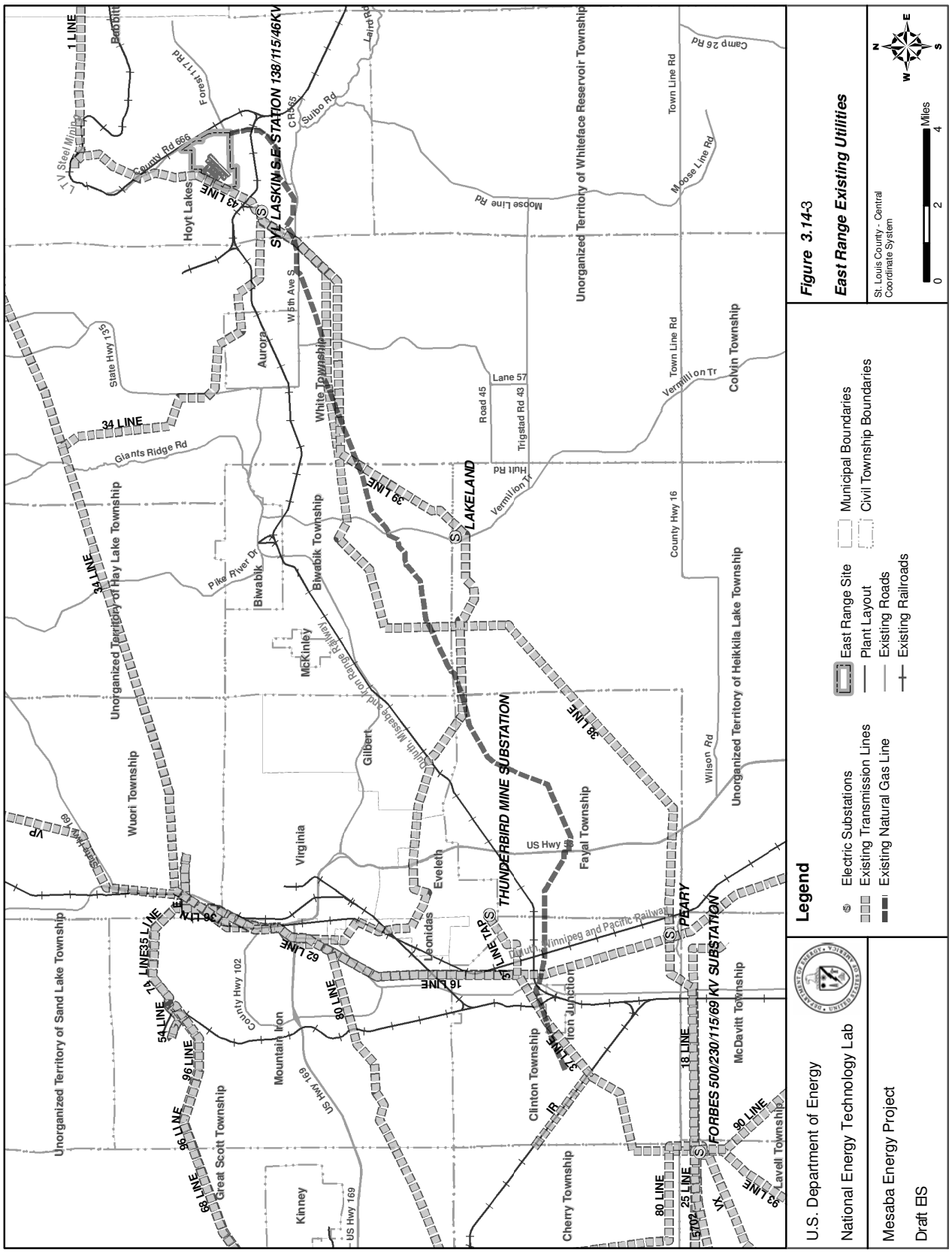


Map ID	Tracking ID	Description
A	2003-NE-N1	Tower-Ely-Babbitt Area
B	2003-NE-N2	Cromwell-Wrenshall-Mahtowa Area
C	2003-NE-N3	Pequot Lakes-Badoura Area (2003 Report – NW Zone Section: referenced as Badoura Area)
D	2003-NE-N4	Central Lakes Area
E	2003-NE-N5	Pierz-Genola Area
F	2003-NE-N6	Taconite Harbor-Grand Marais Area
G	2003-NE-N7	Mille Lacs Area
H	2003-NE-N8	Floodwood Area
I	2003-NE-N9	Nashwauk Area
J	2003-NW-N5	Hubbard-Badoura Area
K	2005-NE-N1	Long Lake-Badoura Area
L	2005-NE-N2	Mesaba IGCC Generation Facility

Figure 3.14-1. Minnesota Transmission Lines, Northeast Planning Zone

Source: PUC, 2005.


NATIONAL TACONITE PLANT-HANNA 115KV
NASHWAUK 115/23 KV SUBSTATION
FORMER GREENWAY 115/23 KV SUBSTATION
BLACKBERRY 230/115 KV SUBSTATION
BLACKBERRY (DIST)
LAKEHEAD BLACKBERRY
GOODLAND
GRAND RAPIDS 115/23KV SUBSTATION
GUNN
ARBO
COHASSET
CLAYBOSWELL S. E. STATION 230/115/23KV SUB
POTLATCH 115KV SUB (Grand Rapids)
BLANDIN 115KV PAPER MILL and BLANDIN 115KV GROUNDWOOD MILL
Keewatin
Nashwauk
Hibbing
Lone Pine Township
Greenway Township
Marble
Calumet
Unorganized Territory of Little Sand Lake
Goodland Township
Cedar Valley Township
Nashwauk Township
Lawrence Township
Iron Range Township
Taconite
Coleraine
Bovey
Trout Lake Township
Harley Township
Warba
Unorganized Territory of Deer Lake
Grand Rapids
La Prairie
Blackberry Township
Wabana Township
Arbo Township
Unorganized Township
Harris Township
Deer River Township
Cohasset
Legend
Electric Substations
Existing Natural Gas Line
Existing Transmission Lines
West Range Site
Plant Layout
Existing Roads
Existing Railroads
Municipal Boundaries
Civil Township Boundaries
Figure 3.14-2
West Range Existing Utilities
Itasca County - South Coordinate System
Miles
0
2
4
U.S. Department of Energy
National Energy Technology Lab
Mesaba Energy Project
Draft EIS


Legend
Electric Substations
Existing Transmission Lines
Existing Natural Gas Line
East Range Site
Plant Layout
Existing Roads
Existing Railroads
Municipal Boundaries
Civil Township Boundaries
Figure 3.14-3
East Range Existing Utilities
St. Louis County - Central Coordinate System
Miles
0
2
4
U.S. Department of Energy
National Energy Technology Lab
Mesaba Energy Project
Draft EIS
SYL LASKIN S.E. STATION 138/115/46KV
LAKELAND
THUNDERBIRD MINE SUBSTATION
PEARY
FORBES 500/230/115/69 KV SUBSTATION
1 LINE
43 LINE
34 LINE
39 LINE
38 LINE
36 LINE
35 LINE
62 LINE
16 LINE
80 LINE
54 LINE
96 LINE
68 LINE
27 LINE
18 LINE
90 LINE
93 LINE
25 LINE
Hoyt Lakes
Aurora
White Township
Biwabik Township
Biwabik
McKinley
Gilbert
Eveleth
Virginia
Wuori Township
Unorganized Territory of Hay Lake Township
Unorganized Territory of Sand Lake Township
Great Scott Township
Mountain Iron
Kinney
Clinton Township
Iron Junction
Cherry Township
Fayal Township
McDavitt Township
Lavell Township
Colvin Township
Unorganized Territory of Whiteface Reservoir Township
Unorganized Territory of Heikkila Lake Township
Duluth, Winnipeg and Pacific Railway
Mesabi and Iron Range Railway
US Hwy 53
US Hwy 169
State Hwy 135
County Hwy 102
County Hwy 16
Town Line Rd
Moose Line Rd
Giants Ridge Rd
Pike River Dr
Vermillion Tr
Trigstad Rd 43
Road 45
Lane 57
Wilson Rd
Camp 26 Rd
Moose Line Rd
Land Rd
Suibo Rd
Forest 117 Rd
County Rd 666
CR 565
W 5th Ave S
Hull Rd
Bedrock
T.V. Steel Mining

3.14.4.1 West Range Site

Natural gas in the area of the West Range Site is supplied by either the GLG pipeline located about 12 miles due south of the West Range Site or from NNG's tapping point located in La Prairie, Minnesota, about 10 miles west-southwest of the West Range Site.

3.14.4.2 East Range Site

The NNG pipeline is the only natural gas pipeline serving the vicinity of the East Range Site. An existing branch pipeline (known as the Erie Branch line) from NNG's main pipeline (which originates at a tap of the GLG pipeline in Carlton, Minnesota), directly abuts the eastern boundary of the East Range Site.

INTENTIONALLY LEFT BLANK

3.15 TRAFFIC AND TRANSPORTATION

This section describes the existing transportation infrastructure within the vicinity of the proposed Mesaba Energy Project (West Range and East Range Sites), including the regional railway system. Transportation safety issues, including traffic accidents and rail crossings, are presented in section 3.17, Health and Safety.

3.15.1 Regional Transportation System

Northeastern Minnesota's transportation system connects the region to the local, regional, and national transportation system through air, land, and water-based transport.

3.15.1.1 Modes of Transportation

Northeastern Minnesota's aviation infrastructure includes 23 public-use airports. Scheduled commercial air passenger service is provided at five of the 23 airports in northeastern Minnesota. These airports include Duluth International, Falls International, Grand Rapids, Chisholm-Hibbing, and Ely (seasonal). All the airline services provided at these five airports feed into networks of domestic and international services at Minnesota's major hub airport of Minneapolis-St. Paul International.

The structure of the region's current transit system is highly influenced by variables such as population, age, disabilities, population density, and employment characteristics. Transit service in the region's rural areas presents a challenge because of low population densities and the distance between destination points. The region has a number of transit options for the traveling public. Some of the service is limited to defined city boundaries, while much of the service is between cities, both within and outside of the region. The vast majority of travelers using transit service in the northeastern Minnesota region rely on public transit operated by public and private non-profit entities.

There are four major water ports in northeastern Minnesota: Duluth/Superior, Two Harbors, Silver Bay, and Taconite Harbor. Approximately 40 million metric tons of bulk and packaged general cargo pass through the Duluth-Superior Port on Lake Superior annually, which is ranked among the nation's top ports based upon tonnage. Outbound ships carry more than 17 million tons of taconite pellets and iron ore from Minnesota annually, along with millions of tons of other commodities destined for eastern U.S. markets and for eight ports via the Great Lakes and the St. Lawrence Seaway.

Railroads traverse the landscape of northeastern Minnesota, providing major hauling and shipping capacities for area manufacturers and industries. As a direct result of the region's wood products and iron ore industries, along with grain shipments to the Port of Duluth-Superior, most of the communities in northeastern Minnesota are served by four rail carriers: BNSF, CN, Canadian Pacific (CP), and Union Pacific/Wisconsin Central (UP). BNSF and CN are the two rail lines that service the vicinity of the project and are discussed in greater detail in Section 3.15.3.

Most major northeastern Minnesota communities are connected by a four-lane highway system and have easy access to state and Federal roads. In this region, US 2, 53, and 169 are the major routes for U.S. and Canadian trucking companies, which move wood products, agricultural products, and other goods. These roads are part of a well-established highway network that provides access from the Canadian border to Duluth, Minneapolis/St. Paul, Wisconsin, North Dakota, and the rest of the country.

3.15.1.2 Transportation Trends and Planning

With respect to transportation planning, Itasca and St. Louis Counties are part of the Mn/DOT District 1, the Arrowhead Regional Development Commission (ARDC), and the Northeast Minnesota Area Transportation Partnership (NE MN ATP) planning areas. These transportation planning organizations support the transportation network of northeastern Minnesota, which includes the counties of Cook, Lake, St. Louis, Carlton, Pine, Aitkin, Itasca, and Koochiching.

Increased development and recreational travel within Itasca and St. Louis counties could have impacts on transportation needs and traffic volumes. However, because of northeastern Minnesota's mainly rural characteristics, there is limited traffic information in local transportation plans for each community. In conjunction with the ARDC, Mn/DOT District 1 has developed a transportation plan (Northeast Minnesota Long Range Transportation Plan Fiscal Years 2008-2030) that covers northeastern Minnesota. The transportation plan is the agency's instrument used to implement the plans resulting from the statewide and other regional planning organizations' transportation planning process. At this time, there are no scheduled improvement projects identified in this transportation plan that would be considered immediately significant to this project.

As stated in Section 3.11 (Socioeconomics), northeastern Minnesota has experienced a population decrease beginning in 1980 that was spurred by a decline in the national steel industry and the subsequent downturn in taconite mining operations on Minnesota's Iron Range. Beginning in 1991 the region reversed this trend and generally experienced slow, but steady growth throughout the 1990s. Seven of the eight counties started to gain back population, with only Koochiching County losing population in the 1990s. Several counties in the northeastern Minnesota region are projected to experience considerable growth through 2030, with Itasca and St. Louis Counties projected at approximately 22 percent and 9 percent projected growth rates, respectively (Mn/DOT, 2005a).

In addition to the permanent population identified as residents of northeastern Minnesota, recreational and seasonal visitors make up a population component that greatly affects the transportation system but is difficult to estimate. At various times during the year, substantial numbers of people visit the northeastern Minnesota region and reside on a part-time or weekend basis at recreational accommodations. While occupancy of these housing units varies seasonally, it is possible for all of the seasonal units to be occupied during peak summer and holiday periods, resulting in a substantial shift in population and accompanying traffic to northeastern Minnesota. Therefore, while this "temporary" population is not included in the census totals or population estimates, their presence often has major impacts on the transportation and infrastructure system of the region, particularly as it relates to potential traffic congestion and safety problems.

As manufacturing and mining activities decline there will be less heavy goods moving on the trunk highway system in northeastern Minnesota. This may lead to changes in pavement life and traffic patterns. Considering the importance of tourism to the region's economy, the needs of visitors and the businesses that serve them need to be taken into account in the development, maintenance, and investment planning of the area's transportation system and infrastructure. The transportation needs of these commercial centers and larger communities will play an important role in the continuing development of the region's economy.

3.15.2 Roadway System and Local Traffic

Figures 2.3-1 and 2.3-5 illustrate the existing highway system in the West Range and East Range Sites, respectively. The significant roads that service the West Range Site include US 169 and CR 7. For the East Range Site, the significant roads include CR 666 and CR 110.

3.15.2.1 Load Limits

Minnesota roadways are generally categorized into two specific groups. One group consists of all state trunk highways, which includes all state, U.S., and interstate highways, and certain other routes designated by the commissioner of transportation. These are commonly referred to as 10-ton routes. All routes other than state trunk highways and designated routes are commonly referred to as 9-ton routes. Minnesota statutes provide for maximum loads which may be carried upon any wheel, any single axle, any group of consecutive axles, and the gross vehicle weight (MN State Patrol, 2006).

In the spring of each year, county and town roads not paved with concrete are restricted to 10,000 pounds on single axles and 5/9 of the weight restrictions prescribed for two or more consecutive

axles, unless otherwise posted. The starting and ending dates for these restrictions is determined by the commissioner of transportation for each of the frost zones in the state. Any road may be restricted at any other time by the appropriate jurisdiction when conditions threaten damage or deterioration. Bridges with rated capacities less than the maximums permitted on Minnesota highways will have restricted weights posted and all drivers must observe these restrictions.

3.15.2.2 Traffic

All references to level of service (LOS) of a road are defined by the Highway Capacity Manual (HCM), published by the Transportation Research Board (TRB), which is an industry standard for traffic engineering. LOS is a qualitative measure that is typically used to describe operational conditions within a traffic flow and the perception of these conditions by drivers or passengers. The HCM defines six levels of service that reflect the level of traffic congestion and qualify the operating conditions of a roadway or intersection. The six levels are given letter designations ranging from A to F, with "A" representing the best operating conditions (free flow, little delay) and "F" the worst (congestion, long delays) (TRB 2000). Various factors that influence the operation of a roadway or intersection include speed, delay, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety. The Highway Capacity Manual describes the levels of service as follows:

- LOS A describes completely free-flow conditions. Individual users are virtually unaffected by the presence of others in the traffic stream.
- LOS B also indicates free flow, but the presence of other vehicles becomes more noticeable. Freedom to select desired speeds is relatively unaffected, but there is a slight decline in the freedom to maneuver within the traffic stream from Level of Service A.
- LOS C is in the range of stable flow, but marks the beginning of the range of flow in which operation of individual users becomes significantly affected by interactions with others in the traffic stream. The selection of speed is now affected by others and maneuvering requires substantial vigilance on the part of the user.
- LOS D represents high density but stable flow. Speed and freedom to maneuver are severely restricted, and the driver experiences a generally poor level of comfort and convenience.
- LOS E represents operating conditions at or near capacity level. All speeds are reduced to a low but relatively uniform value.
- LOS F is used to define breakdown of traffic flow or stop and go traffic. This condition exists wherever the amount of traffic approaching a point exceeds the amount that can traverse the point. Queues form behind such locations. Operations within the queue are characterized by stop-and-go waves, and they are extremely unstable.

LOSs A, B, or C are typically considered good operating conditions in which minor or tolerable delays of service are experienced by motorists. Both the West Range and East Range Sites are located in low population density areas, which do not see significant traffic volumes on a daily basis. In general, Itasca and St. Louis Counties' local traffic can be described as relatively slow due to the rural nature of the region, with insignificant traffic delays and low annual average accident rates. LOSs of the existing network of roads surrounding both project sites are generally operating at an LOS of C or better.

3.15.2.3 West Range Site and Corridors

Roadways

The existing roadway system in the area of the West Range Site is shown in Chapter 2, Figure 2.3-1. US 169 traverses east-west through Itasca County and borders the West Range Site on the south. US 169 is classified as a principal arterial road and is generally a four-lane highway extending across the Iron Range from Grand Rapids to Virginia, Minnesota; however, it is a two-lane roadway in the vicinity of the West Range Site. Many historical mining areas are located along US 169 between Virginia and Grand

Rapids. Mn/DOT has developed preliminary plans to expand US 169 to four lanes in the project area, but these plans are unfunded to date, and therefore, not yet scheduled. The posted speed limit on US 169 is 55 miles per hour and the legal load limit is 10 tons. US 169 is designated as a Trunk Highway and receives funding for construction and maintenance mainly from Federal funds (Itasca County, 2003).

The West Range Site is bordered on the west by CR 7. Though not officially designated as a state byway, CR 7 is sometimes locally referred to as Scenic Highway 7. CR 7 is a winding two-lane roadway stretching from Taconite to Bigfork. CR 7 is a 9-ton roadway except during spring load restrictions when it is posted at 7-tons/axle. The posted speed limit on CR 7 is 55 miles per hour. CR 7 is designated as a County State Aid Highway and receives funds from the state mainly for construction and maintenance (Itasca County, 2003).

Another existing road corridor in the project area is the Cross-Range Heavy Haul Road, which is a gravel road in place for generations as a way to allow heavy or slow loads to be transported between mines across the Iron Range; however, because of numerous winding and high gradient topography, Excelsior has not pursued the use of this road any further. In the West Range project area, the Cross-Range Heavy Haul Road also serves as access to a cluster of homes in the Big Diamond Lake/Dunning Lake area.

Traffic Volumes

Table 3.15-1 lists historical annual average daily traffic (AADT) volumes and the associated levels of service along US 169 and CR 7 near the West Range Site.

Table 3.15-1. Annual Average Daily Traffic Volumes and Levels of Service on US 169 and CR 7 (Itasca County, Minnesota)

Year	US 169		CR 7	
	West of CR 7	East of CR 7	North of new CR 7[1]	South of new CR 7[1]
2000	5,800 (C)	5,500 (C)	1,100 (A)	1,100 (A)
2002	6,500 (C)	5,800 (C)	N/A	N/A
2004	7,200 (C)	5,700 (C)	N/A	N/A

[1] From western-most point of the new CR 7, just south of West Range power plant site.
N/A – data not available
Source: SEH, 2006a

During 2004, US 169 had between 5,700 to 7,200 vehicles per day near the West Range Site. According to Mn/DOT data for the year 2004, average volumes of commercial trucks on US 169 ranged between 300 and 599 heavy trucks per day (Mn/DOT, 2005b). For two-lane roads in fairly rural areas, these AADT levels on US 169 reflect relatively moderate traffic flow with an LOS of C. As Table 3.15-1 indicates, the traffic volumes on US 169 are heavier west of CR 7. The main reason for this can be attributed to the residential areas just northwest of the site near Riley Lake. Vehicles from this area most likely travel through CR 7 en route to Grand Rapids. Although not reflected in the table, these areas mainly influence traffic on a seasonal basis as these are mainly vacation homes.

Traffic volume data for CR 7 was available only during the year 2000 at approximately 1,100 vehicles per day. These volumes on CR 7 reflect relatively less than average daily traffic with an LOS of A.

3.15.2.4 East Range Site and Corridors

Roadways

The East Range Site is located approximately 2 miles north of Hoyt Lakes and is bordered on the south by Colby Lake, on the east by St. Louis CR 666, and on the north and west by various mine pits and operations. The existing roadway system in the vicinity of the East Range Site consists entirely of county roads with a load limit of 9 tons. The nearest state highway is US 135 that serves the western portion of Aurora, approximately 7 miles west of the project site. CR 666 begins at its intersection with CR 110 (also referred to as Kensington Drive near the East Range Site) that traverses east-west through Hoyt Lakes. Hampshire Drive is a short connector between CR 110 and CR 666.

The primary county road in the area is CR 110 (designated as a County State Aid Highway) which connects with US 135 in Aurora, then passes through Hoyt Lakes. The east-west section of CR 110 that runs through Hoyt Lakes parallels and is approximately 1.6 miles south of the southern border of the East Range Site. From Hoyt Lakes to Aurora, CR 110 forms the western terminus of the Superior National Forest Scenic Byway. This byway, also known as Forest Highway 11, has been recently constructed and serves to connect the North Shore of Lake Superior with the Mesabi Iron Range. The Superior National Forest Scenic Byway also provides access to a historical drilling site, known as the Longyear Drill Site. This historic site is located approximately 3 miles north of Hoyt Lakes on CR 666 (see Section 3.9, Cultural Resources).

There are no other roadways in the area of the proposed East Range Site. The existing roadway system in the area is shown in Chapter 2, Figure 2.3-5.

Public Law 109-59 was signed in August 2005 and $2.4 million was authorized for construction of a new highway between the bridge over the Partridge River on CR 565 in Hoyt Lakes to the intersection of Highways 21 and 70 in Babbitt. Currently, the only approach from the north (e.g., town of Babbitt) to Hoyt Lakes is a circuitous trip south on US 135. The new highway would create a feasible option for approaching the Hoyt Lakes area from the north.

Traffic Volumes

Table 3.15-2 lists the AADT volumes and the associated levels of service along CR 110 and CR 666 near the East Range Site. There is no AADT data available for Hampshire Drive.

Table 3.15-2. Annual Average Daily Traffic Volumes and Levels of Service on CR 110 and CR 666 (St. Louis County, Minnesota)

Year	CR 110		CR 666	
	West of CR 666	East of Hampshire Rd	North of CR 110	East of Hampshire Rd
1995	4,400 (B)	520 (A)	N/A	N/A
1999	2,950 (B)	650 (A)	930 (A)	830 (A)
2003	2,950 (B)	710 (A)	750 (A)	520 (A)

N/A – data not available
Source: SEH, 2006b

Table 3.15-2 reflects relatively low AADT volumes near the East Range site. The operating levels of these roads are currently at LOS A or B.

3.15.3 Rail System

The rail network in Minnesota is important for moving heavy bulk goods and a variety of commodities. Approximately 23 railroad companies and three private industries haul rail freight in Minnesota on approximately 4,500 miles of track.

Rail companies are divided into three classes (I, II, and III), established by the Federal Surface Transportation Board (STB). These classes are based upon a railroad company's gross operating revenues and generally reflect the type of service provided: long haul, regional and local. In general, the higher the rail class, the more daily trains, the greater tonnage, and the longer the haul route. The Class I railroads in Minnesota provide service in corridors connecting the region with the Chicago rail hub and its connections with the eastern seaboard lines; south to Mexico through Texas; and west to the major California ports and the ports in the Pacific Northwest. Class I companies operate approximately 3,200 miles of rail lines in Minnesota and include:

- BNSF (1,600 miles);
- CN (450 miles);
- Canadian Pacific Railway (CP) (650 miles); and
- Union Pacific Railroad (UP) (500 miles).

3.15.3.1 Regional Rail Network

Northeastern Minnesota has an extensive system of rail lines serving the region and the Lake Superior ports. Taconite, coal, and grain are major commodities transported primarily by rail to the Duluth/Superior Port, a bulk transshipment port. There are a total of nine railroads that provide services within the state's northeastern region, running nearly 1,000 miles of track. As shown in Figure 3.15-1, the BNSF and CN rail services are the two lines that service the vicinity of the project.

The BNSF is an important railway within northeastern Minnesota. The BNSF line operates two primary lines in the region and has track running through Itasca, Aitkin, Carlton, and St. Louis Counties. The northern line brings grain from Canada and the western U.S. to the ports of Duluth and Superior. The other, more southern line connects central Minnesota, South Dakota, and the coal mining areas of the western U.S. to the ports. In total, there are approximately 380 miles of BNSF tracks running through the northeastern region of the state. The bulk of this is located within the boundaries of St. Louis County, where the BNSF has 133 miles of track. Itasca County contains the second most with 87 miles.

The CN Railroad recently completed purchasing the Duluth, Missabe, and Iron Range (DMIR) line. The DMIR has been the main arterial for the transportation of taconite pellets from the Iron Range to the port cities Duluth and Two Harbors. The DMIR, soon to bear the CN name to reflect its new ownership, consists of two primary lines. The first is the western line, or Missabe, that connects the iron ore mines to the ore docks in Duluth. The Iron Range line is the eastern line and connects the mines to the loading docks in Two Harbors. The main cargos transported on the DMIR include taconite pellets, limestone, coal, and miscellaneous freight.

With the addition of DMIR's 254 miles of track and another 155 miles that CN added to its track inventory with the acquisition of the Duluth, Winnipeg, and Pacific Railroad, CN is the largest railroad in the northeastern Minnesota region. CN owns and operates 409 miles of track in the region; the most significant of which is a 209-mile stretch of DMIR track in St. Louis County. Lake County, containing the port of Two Harbors, has the second most miles of former DMIR track with 42 miles. The DMIR line runs through a small portion of both Itasca and Carlton counties with 3 miles and 0.6 miles of track, respectively.

The western Missabe line that serves the port of Duluth has an average volume of 13 trains per day. The eastern Iron Range line sees an average of approximately 12 trains a day. For both portions of the DMIR line, the track speed limit is 35 miles per hour (Mn/DOT, 2004b).

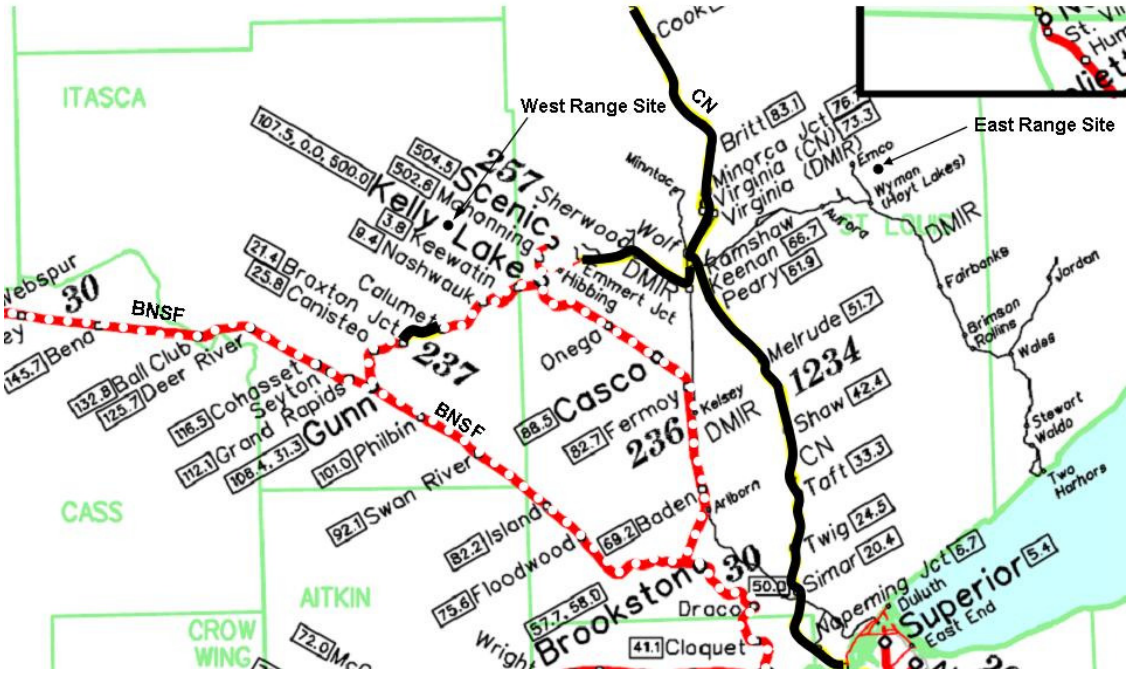


Figure 3.15-1. BNSF and CN Rail Lines in Vicinity of Project Sites (BNSF, 2005)

3.15.3.2 West Range Site and Corridors

The proposed West Range Site is located approximately 1.5 miles north of the mainline tracks of the BNSF and CN. The existing layout of the BNSF and CN trackage in the region are provided in Figure 3.15-1 and in Chapter 2, Figure 2.3-2.

Historically, the BNSF and CN railroads had their own mainline tracks throughout the area around Grand Rapids, Minnesota. In the 1960s, the BNSF and CN railroads combined their regional operations to a single track. The BNSF currently owns most of the 80-mile track from Gunn (an unincorporated "railroad town" located immediately east of La Prairie, Minnesota) to Brookston (near Carlton, Minnesota), except for approximately 4.5 miles of track, owned by CN, beginning about 0.5 miles east of CR 7 and west to Bovey. Since railroads are restricted from originating or delivering traffic from another railroad's line, even though many share each other's tracks, this short section of rail track owned by CN allows it direct access to the West Range Site.

The BNSF lines in the region have a wide range of daily train volume and speed limits. The existing railroad system in the area has generally handled between four and 10 trains per day when the taconite industry was producing. With the slump in taconite production the track has seen infrequent use between Keewatin and Gunn. The greatest volume of trains on the BNSF line occurs in the southeast corner of Carlton County and Pine County, where approximately 16 trains per day make use of the track. Between Grand Rapids and Cloquet, the BNSF line has a speed limit of 50 miles per hour and a volume of approximately nine trains per day, while the portion from Hibbing to Cloquet has a speed limit of 50 miles per hour and approximately four trains per day (Mn/DOT, 2005a). The BNSF line that runs between the cities of Grand Rapids and Hibbing has a speed limit of 35 miles per hour.

The shortest route for delivering coal from the Powder River Basin in Wyoming to the West Range Site is via the BNSF trackage across North Dakota. The preferred route would go through Fargo, North Dakota; north to Grand Forks, North Dakota; and across Minnesota through Grand Rapids to Gunn and then to Taconite. About six trains per day currently travel on the BNSF line through Grand Rapids at speeds up to 25 miles per hour (MEP, 2004).

The track from Gunn to the West Range site (approximately 12.5 miles in length) operates at speeds of 25 miles per hour, has traditionally carried 4 to 10 trains per day and has six public grade crossings. Currently, this segment of track is inoperable due to rising water levels in the CMP. The CMP is an approximately 300-foot deep mine pit, where no ore has been mined for over 20 years, but has continued filling with water at such a rate that it is projected to overflow into the towns of Bovey and Coleraine sometime in the next 7 to 14 years (MEP, 2004). The sloughing of bank material separating the track from the steep edge of the mine pit has decreased in distance from 100 feet to 50 feet and has therefore weakened the structural support along this section of track near Bovey. An alternative route to the West Range Site via BNSF tracks would be from Brookston northward to Kelly Lake and Keewatin and westward to the plant site.

The use of CN rail would be from the Superior, Wisconsin area northward to Virginia and then west past Hibbing and Keewatin to Taconite/Bovey for the West Range Site. The route from Superior to Virginia typically sees 13 trains per day and the route from Virginia to Hibbing sees approximately four trains per week (Mn/DOT, 2005a). The short length of CN track in the vicinity of the West Range Site (approximately 4 to 4.5 miles in length) is temporarily out of service because of rising water levels in the CMP.

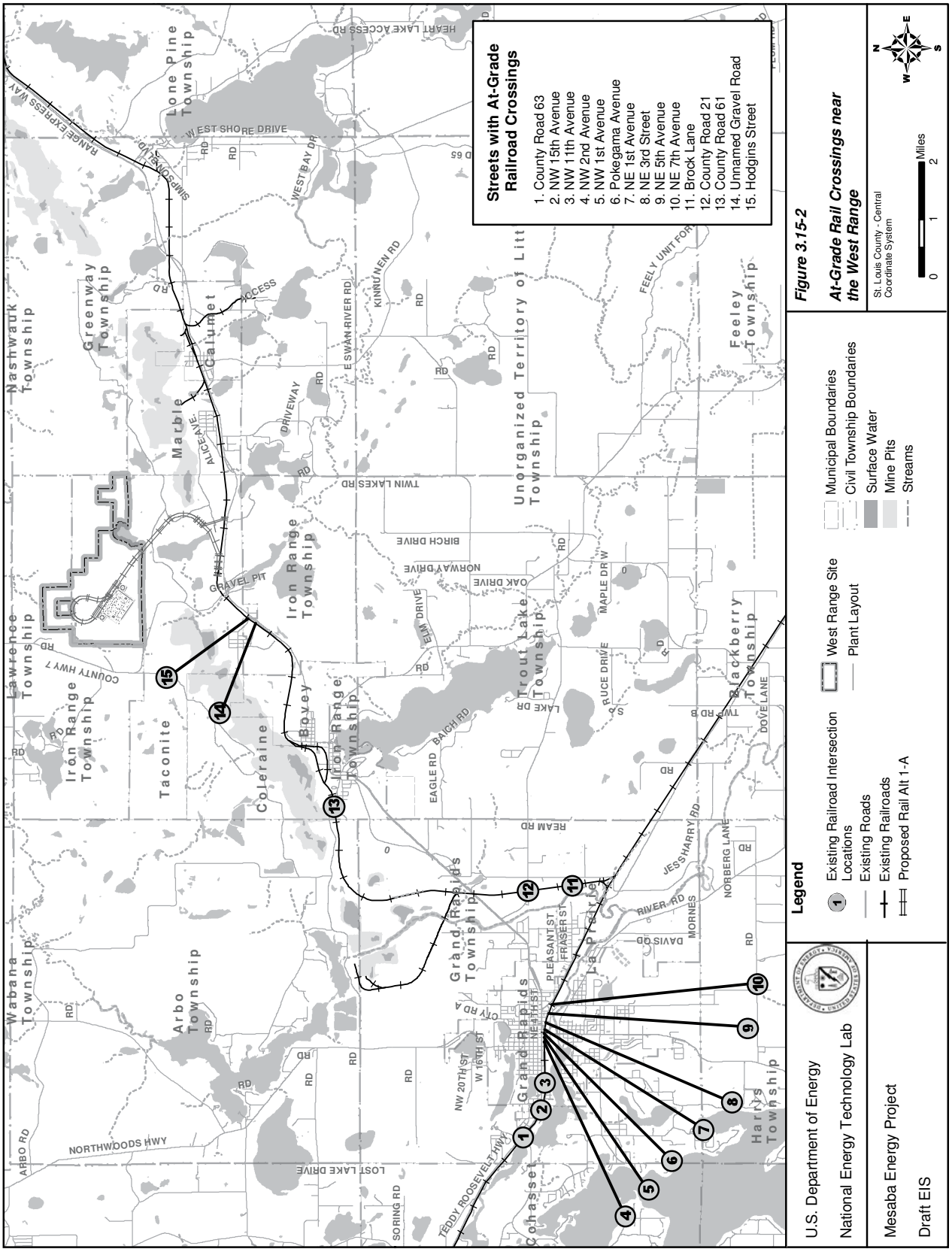
Approximately six trains (i.e., three roundtrips) currently pass through the city of Grand Rapids in Itasca County each day. Ten at-grade crossings (i.e., when a road crosses a railroad track at the same level) are located within the city limits of Grand Rapids and La Prairie. Public roads that are crossed at-grade by the existing rail lines from Grand Rapids en route to the West Range site are listed in Table 3.15-3 and shown in Figure 3.15-2.

Table 3.15-3. Location of Railroad At-Grade Crossings – West Range Site

Map ID*	Road Crossed
1	County Road 63
2	NW 15th Ave
3	NW 11th Avenue
4	NW 2nd Avenue
5	NW 1st Avenue
6	Pokegama Avenue
7	NE 1st Avenue
8	NE 3rd Street
9	NE 5th Avenue
10	NE 7th Avenue
11	Brock Lane
12	County Route 21
13	County Route 61
14	unnamed gravel road
15	Hodgins Street

*See Figure 3.15-2

Based on 2004 annual average daily traffic volumes, the vehicular traffic at the crossings listed in Table 3.15-3 in La Prairie and Grand Rapids experience low to moderate volumes (e.g., from 4,250 to 12,500 vehicles per day) (Mn/DOT, 2005c).


Streets with At-Grade Railroad Crossings
1. County Road 63
2. NW 15th Avenue
3. NW 11th Avenue
4. NW 2nd Avenue
5. NW 1st Avenue
6. Pokegama Avenue
7. NE 1st Avenue
8. NE 3rd Street
9. NE 5th Avenue
10. NE 7th Avenue
11. Brock Lane
12. County Road 21
13. County Road 61
14. Unnamed Gravel Road
15. Hodgins Street
Legend
Existing Railroad Intersection Locations
Existing Roads
Existing Railroads
Proposed Rail Alt 1-A
West Range Site
Plant Layout
Municipal Boundaries
Civil Township Boundaries
Surface Water
Mine Pits
Streams
Figure 3.15-2
At-Grade Rail Crossings near the West Range
St. Louis County - Central Coordinate System
Miles
0
1
2
U.S. Department of Energy
National Energy Technology Lab
Mesaba Energy Project
Draft EIS
Grand Rapids
Cohasset
La Prairie
Harris Township
Blackberry Township
Trout Lake Township
Unorganized Territory of Litt
Feeley Township
Lone Pine Township
Nashwauk Township
Greenway Township
Marble
Calumet
Iron Range Township
Bovey
Coleraine
Taconite
Lawrence Township
Wabana Township
Arbo Township

3.15.3.3 East Range Site and Corridors

The East Range Site is located approximately 1 mile north and 1 mile west of two CN tracks. The east-west track runs from Eveleth to Two Harbors. The north-south track connects with the east-west track southeast of the site and extends north to Embarrass. The north-south track connects with the east-west track at Wyman Junction (approximately 1.7 miles southeast of the East Range site) and extends northward to Embarrass. The CN track can be accessed by other railroads via Superior, WI and/or a railroad yard south of Eveleth. The nearest competitive rail provider is located at the BNSF Railway near Hibbing, approximately 40 miles west of the site. The CN rail system near the project is shown in Figure 2.3-6.

The CN operates daily on the track servicing the MP's Syl Laskin Generating Station, the former Erie Mining Taconite Plant and several existing and proposed industrial customers. The CN rail line near the East Range site sees approximately 12 trains daily (i.e., six roundtrips per day) (Excelsior, 2006c). The posted track speed is 35 miles per hour.

At-grade crossings located on the CN rail route between Clinton Township and Hoyt Lakes (East Range Site) are listed in Table 3.15-4 and shown in Figure 3.15-3.

Table 3.15-4. Location of Railroad At-Grade Crossings – East Range Site

Map ID*	Road Crossed
1	Keenan Road (CR 310)
2	Iron Junction Road (CR 452)
3	Main Street (CSAH 127)
4	County Highway 7 (CSAH 7)
5	Township Road 6718 (T 1248)
6	Sparta Road (CSAH 97)
7	Heritage Tr (CSAH 20)
8	N. Main Street W (CSAH 100)

*See Figure 3.15-3

Based on 2004 annual average daily traffic volumes, the vehicular traffic at the crossings listed in Table 3.15-4 experience low volumes (Mn/DOT, 2004a).

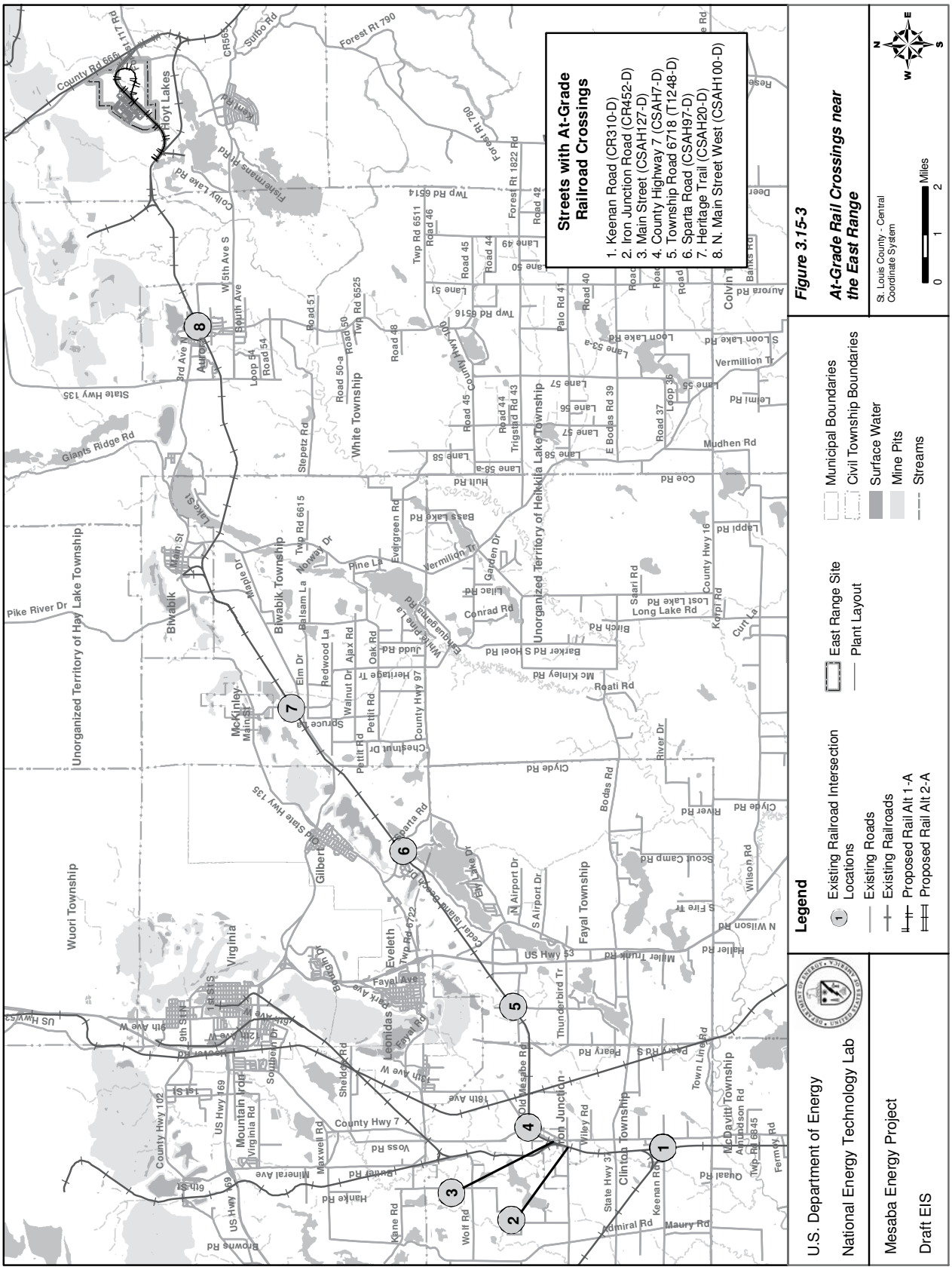


Figure 3.15-3
At-Grade Rail Crossings near the East Range

INTENTIONALLY LEFT BLANK

3.16 MATERIALS AND WASTE MANAGEMENT

3.16.1 Regional and Local Conditions

3.16.1.1 Construction Materials and Suppliers

Common construction materials such as ready-mix concrete, wood, gravel fill, reinforcing steel fabrication, equipment rentals, and office supplies are available by in-state suppliers with out-of-state suppliers being used as necessary. In-state, national, or international suppliers provide materials, such as specialized operating equipment, to Minnesota companies. Construction water is provided to construction sites by pumping and treating surface waters or by connection to the local municipal water system. Construction materials in the Iron Range are delivered by either truck or rail, depending on a site's locality.

3.16.1.2 Fuels, Feedstocks, and Other Materials and Suppliers

Wyoming, Montana, and Canada are common suppliers of coal, petroleum coke, or feedstock. These materials are either shipped by truck or rail. As described in Chapter 2, the Duluth, Missabe, and Iron Range Railroad, recently acquired by the CN, and the BNSF Railway serve the area of the West Range Site. Rail service to the East Range Site would be provided by two CN rails located approximately one mile north and one mile west of the East Range Site in Eveleth, Minnesota. Local highways also connect the West Range and East Range Sites to interstate highways for truck deliveries. As described in Chapter 2, existing natural gas pipelines are present in the vicinities of both the West Range and the East Range Sites.

3.16.1.3 Hazardous Waste Management

The Minnesota Office of Environmental Assistance (MOEA) (currently part of the MPCA) compiled data on the quantity of hazardous waste generated from 1996 to 1999 in Minnesota in a report titled "Manifested Shipments of Hazardous Waste by Minnesota Generators (1996-1999)" (MOEA, 2001). Based on the 2001 report, 8,037 companies generated approximately 87,000 tons of hazardous waste in Minnesota in 1999; of this, 69 companies generated 109 tons of hazardous waste in Itasca County (West Range Site locale) and 422 companies generated 1,146 tons of hazardous waste in St. Louis County (East Range Site locale). Hazardous waste generated in the state is sent to both in-state and out-of-state treatment, storage, and disposal facilities. Table 3.16-1 summarizes the types of facilities that accepted hazardous waste for treatment or disposal in 1996 and 1999. There are at least 35 companies (not including company subsidiaries) both in state and out of state that accept hazardous waste from generators in Minnesota.

Table 3.16-1. Shipments of Manifested Waste from Minnesota Generators to Treatment, Storage or Disposal Facilities (1996 and 1999)[a]

Facility Type	Quantity of Hazardous Waste in 1996 (tons)	Quantity of Hazardous Waste in 1999 (tons)
Aqueous Treatment/Stabilization	5,354	5,654
Fuel Blending	3,737	4,636
Landfills	8,548	9,140
Metal Recovery	34,979	37,426
PCB Treatment	767	620

Table 3.16-1. Shipments of Manifested Waste from Minnesota Generators to Treatment, Storage or Disposal Facilities (1996 and 1999)[a]

Facility Type	Quantity of Hazardous Waste in 1996 (tons)	Quantity of Hazardous Waste in 1999 (tons)
Solvent Recovery	14,988	15,813
Thermal Treatment	6,343	6,333
Transfer/Storage (In-State)	4,187	1,936
Transfer/Storage (Out-of-State)	993	5,133
Total	79,896	86,691

[a]Does not include waste manifested from cleanup sites
Source: MOEA, 2001

3.16.1.4 Non-Hazardous Waste Management and Recycling

In 1989, the Minnesota Legislature adopted comprehensive waste reduction and recycling legislation and adopted the Governor's Select Committee on Recycling and the Environment (SCORE), which is a program under Minnesota's Waste Management Act that provides counties with funding to develop effective waste reduction, recycling, and solid waste management programs. Annual SCORE reports present recycling and municipal solid waste (MSW) data for each county in Minnesota (MOEA, 2004). In addition, MPCA prepares a Solid Waste Policy Report in odd-numbered years, which presents trends in landfill use and recycling in Minnesota. The 2005 Solid Waste Policy Report (the most recent report available) identified MPCA's strategic plan to increase the statewide recycling rate from 43 percent (2005) to 50 percent by 2010, and to increase Minnesota's waste reduction goal from 2 percent (140,000 tons) in 2005 to 10 percent (750,000 tons) by 2010 (MPCA, 2006b). The 2005 Solid Waste Report also called for Minnesota to send 35 percent of its total waste to waste-to-energy and source-separated composting processing facilities by 2011. Currently, 21 percent of total waste is sent to such processing facilities.

Landfills

Minnesota generated approximately 6 million tons of solid waste in 2004. In 2004, waste remaining for disposal after recycling and reduction efforts totaled nearly 3.6 million tons, a decrease of 1.6 percent from 2003. Mixed MSW (i.e., garbage, refuse, and other solid waste from residential, commercial, industrial, and community activities that the generator of waste aggregates for collection) is sent to 33 MSW landfills located both in state (22) and out of state (11) (MPCA, 2006b). In 2005, out-of-state landfills accepted 840,000 tons (36 percent) of all Minnesota solid waste going to MSW landfills, an increase of 20 percent from 2004. The total landfill capacity for in-state and out-of-state landfills in 2005 was just below 65 million tons and is projected to decrease to approximately 55 million tons by 2010 (MPCA, 2006b).

West Range Site

In April 1994, the Itasca County Transfer Station was constructed, providing the county with a means to transport MSW out of the county and to close its landfill. Licensed haulers and individual self-haulers deliver most of the MSW to the Itasca County Transfer Station. The remainder goes to transfer stations in both Aitkin and Cass Counties. Waste delivered to the transfer stations is directed to the Elk River Landfill located in Elk River in Sherburne County (MOEA, 1999). In 2004, Itasca County sent 25,173 tons of MSW to the Elk River Sanitary Landfill (MOEA, 2004). According to the EPA, the Elk River Landfill has approximately 1.5 million tons of solid waste in place and will not reach capacity until 2042 (EPA, 2006d).

Based on information available from MPCA, there are two closed landfills in Itasca County: the Iron Range Sanitary Landfill and the Grand Rapids Landfill (MPCA, 2006c). The Iron Range Sanitary Landfill is located along the southern border of the West Range Site adjacent to the Itasca County Transfer Station, and the Grand Rapids Landfill is located approximately 10 miles southwest of the West Range Site. At the Iron Range Landfill, groundwater monitoring in 2002 to 2003 indicated that levels of total VOCs had decreased since 2001, but remained relatively stable with total VOCs measured at approximately 24 micrograms per liter. Exceedances of the Health Risk Limits maximum contaminant level (MCL) were detected for arsenic, barium, and manganese in a monitoring well (W-3) that is hydraulically downgradient from the landfill. Monitoring well W-4 also had an exceedance of manganese in 2003. According to the MPCA, no potable water supply wells are at risk (MPCA, 2004a).

East Range Site

St. Louis County sent 54,560 tons of municipal solid waste to the St. Louis County Sanitary Landfill in 2004 (MOEA, 2004). MSW landfilled in the county increased from approximately 65,000 tons in 1991 to over 80,000 tons in 1998 (MOEA, 1999). The St. Louis County Solid Waste Landfill in Virginia, Minnesota, accepts the county's solid waste, and has the capacity to accept almost 1.4 million cubic yards of MSW per year (MCPA, 2006c).

There are 16 closed landfills in St. Louis County (MPCA, 2006d). One closed landfill, the Hoyt Lakes Sanitary Landfill, is located approximately 3,000 feet south of the East Range Site. According to the MPCA, groundwater monitoring at the closed landfill indicates that impacts to the groundwater are minimal and that natural attenuation is occurring. No exceedances of drinking water standards have occurred based on groundwater sampling performed from 2003 to 2004 (MPCA, 2006d).

Recycling Facilities

In 2004, the state's base recycling rate was 41 percent, with recycling programs accepting over 2.42 million tons of recyclable materials (e.g., paper, metals, glass, plastic, and food) (MOEA, 2004). The MPCA maintains a list of companies that accept materials from Minnesota for recycling. Most of the companies listed are located in Minnesota, however, facilities located in other states are also listed.

West Range Site

In Itasca County, recycling is a primary element in the county's solid waste management plan. Private contractors provide recycling services to businesses and other institutions in the county. In 2004, recycling programs collected 18,831 tons of recyclable materials from residents and organizations (MOEA, 2004).

East Range Site

In St. Louis County, the current waste reduction and recycling program consists of a volume-based collection and disposal pricing structure, support for regional materials exchange programs, and public education and information programs encouraging reuse and reduction. Approximately 52,619 tons of recyclable materials were collected in 2004 (MOEA, 2004).

3.16.2 West Range Site and Corridors Site Assessment

The West Range Site is located in an area formerly mined for iron ore and taconite, and there are several mine pits, rock stockpiles, and tailing basins in the vicinity. Mining activities ceased in the 1970s, and mined areas of the Canisteo complex and Hill Annex complex have subsequently filled with water.

Industrial or commercial areas near the West Range Site include the Itasca County Solid Waste Transfer Station and a closed landfill located along the southern boundary of the West Range Site. Other industrial uses in the area include substations, communication facilities, power plants, private air strips, landfills, storage maintenance yards, businesses, factories, lumber mills, and commercial livestock/poultry/grain operations.

A Phase I site assessment was performed for the West Range Site and surrounding areas in 2005 (SEH, 2005a) that included a search of available Federal and state databases for information pertaining to the location of contaminated sites in the vicinity of the West Range Site. Based on the database searches, no contaminated sites or sites undergoing cleanup or remediation are located near the West Range Site.

The Phase I site assessment also included a review of aerial photographs. Mining activities, including the Arcturus Mine Complex, are evident in aerial photographs for 1947 and 1966. The Arcturus Mine Complex appears as a lake in a 1991 photograph with portions of the tailings pile covered with vegetation. In a 2003 photograph, small cleared areas are visible north of Big Diamond Lake (SEH, 2005a).

Topographic maps (1952 Bovey, Minnesota USGS 7.5 minute) revised in 1969 and 1977 were also reviewed as part of the Phase I Assessment. During the 1950s through 1970s, the area was mostly forested with the Arcturus Mine pit, tailings ponds, and mine stockpiles as prominent features. Numerous roads, trails, and railroad corridors also were present. The 1969 map shows a road north of Big Diamond Lake, and the extent of tailings ponds associated with the Arcturus Mine is expanded from the 1952 map. The 1977 map is similar to the 1952 map, revised in 1969 (SEH, 2005a).

A site reconnaissance performed in 2005 for the Phase I Assessment observed the following at the site or surrounding areas (SEH, 2005a):

- Remnants of mining activities in the area; however, no structures were observed on the site.
- Numerous dumpsters and solid waste containers at the entrance of the capped landfill located south of the site.
- Small burn piles (approximately 4 feet in diameter), which appeared to contain household waste, near all-terrain vehicle (ATV) trails.
- Solid waste, including tires, household waste, and building materials. One empty container of paint thinner was observed.
- Stockpiled batteries and old equipment at an offsite property located southwest of the property in the northeastern portion of Taconite.
- Railroad tracks along the eastern boundary of the site.

A site visit performed in May 2006 for the preparation of this EIS noted some areas where household trash was discarded on and adjacent to the West Range Site.

3.16.3 East Range Site and Corridors Site Assessment

Land north and west of the East Range Site was part of a large mining complex now owned principally by CE, where a mineral sales business (decorative and other specialty rock) is currently in operation. Other industrial uses in the vicinity of the East Range Site include the Minnesota Power Syl Laskin Energy Center (a coal-fired, steam electric generating plant) located about 6,900 feet southwest of the East Range Site, and Laskin Energy Park located about 11,500 feet southwest of the East Range Site.

The East Range Site has been disturbed through years of mining activity and is currently unoccupied with no structures. Past and present mining activity is evident by the presence of mine pits, piles of rock debris, and tailing basins at the former LTV Mining Company. A large pile of rock debris (80 to 100 feet high, covering over 300 acres) is located immediately to the west of the East Range Site and was observed during a site visit to be overgrown with grasses. The rock pile likely resulted from placement of overburden materials excavated as part of past mining operations. A site visit performed in May 2006 for this EIS noted the rock pile as well as some areas where household trash was discarded on and adjacent to the East Range Site.

3.17 SAFETY AND HEALTH

This section describes the affected environment for occupational and public safety and health, including worker injuries, transportation safety, community health, and electromagnetic field (EMF) issues. Baseline data for assessing sensitive receptors within a 2-mile (3-kilometer) radius of the West Range Site and East Range Site, and within a 0.5-mile radius of the proposed HVTL and gas pipeline corridors associated with each site are presented. Transportation safety issues are discussed as it relates to traffic accidents and rail crossings. With respect to EMFs, this section provides a discussion of current standards established for utility lines and the current scientific studies related to potential health concerns associated with EMFs.

3.17.1 Occupational Safety and Health

Worker fatalities and injuries are generally a concern in construction and in industrial facility operation. The OSHA regulates worker safety in both construction and industrial settings. OSHA has promulgated a number of regulations that are codified under Chapter 29 of the CFR that are designed to protect workers from potential construction and industrial accidents, as well as to minimize exposure to work place hazards (e.g., noise, chemicals). Workplace injuries can and still do occur even with these regulations and protections in place. Table 3.17-1 summarizes safety statistics from the Bureau of Labor Statistics for industry categories that are relevant to the Proposed Action. The rate of recordable injury cases for the construction field is nearly twice that of the utility sector.

Table 3.17-1. Statistics for Work Place Hazards

Industry	Total recordable incidents (rate per 100 FTEs)[a]	Lost workday cases (rate per 100 FTEs)[a]	Fatalities (rate per 100,000 FTEs)[b]
Construction	5.8	2.2	14.3
Utilities	3.1	0.9	12.7[c]

Source: a. BLS, 2004 b. BLS, 1999
Notes: c. This fatality statistic is found under the sector "Transportation and Public Utilities." Most fatalities in this group are in the transportation category.
FTE=full-time employee

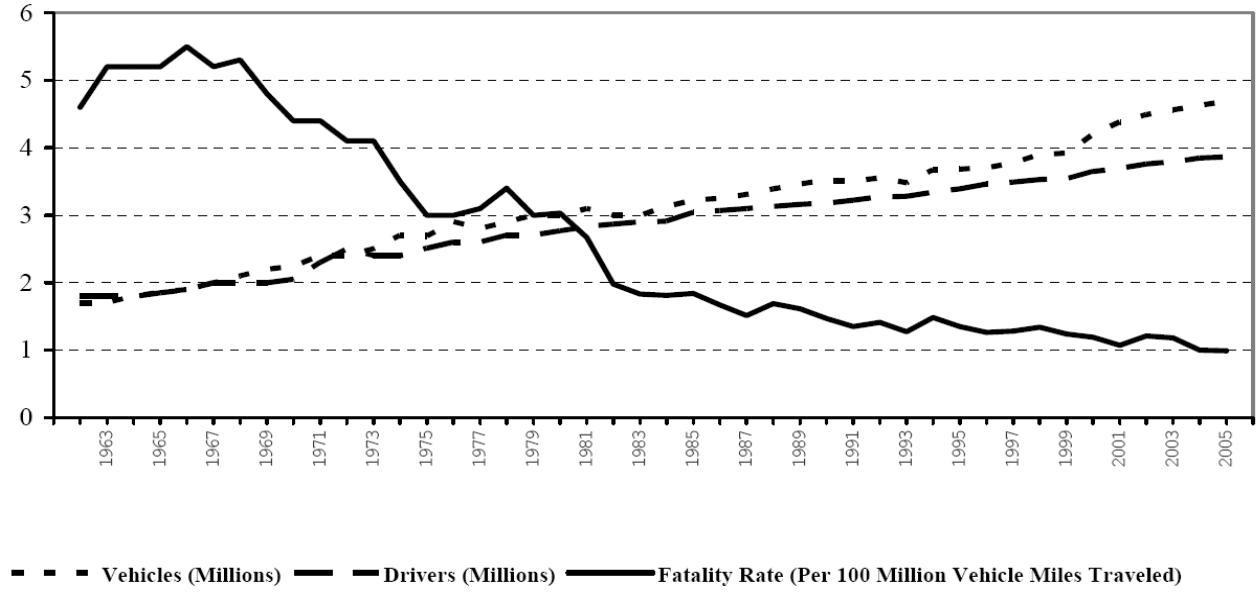
Although power plants are much safer than they once were, plant employees can still encounter workplace hazards. Among the most common hazards to power plant workers are electrical shocks, burns, boiler fires and explosions, and contact with hazardous chemicals (Hansen, 2005). According to the National Board of Boiler and Pressure Vessel Inspectors, between 1999 and 2003 there were 1,477 reported boiler accidents, resulting in 143 injuries and 26 deaths (power boilers include utility boilers as well as boilers used by other industries for cogeneration and on-site power production) (Hansen, 2005). Many power plant workers are also routinely exposed to dangerous chemicals such as corrosives (acids and bases), oxidizers, and solvents. Comprehensive training, detailed pre-job planning, and proper and well-maintained safety equipment are key to accident prevention, regardless of the hazard (Hansen, 2005).

3.17.2 Transportation Safety

3.17.2.1 Roadway Safety

In 1966 there were 53,041 traffic fatalities in the U.S., or 5.7 for every 100 million vehicle miles of travel (VMT) (OTS, 2006). In 1968, there were 1,060 traffic fatalities in Minnesota, or 5.3 per 100 million miles of travel. To date, these represent the worst years for traffic fatalities for the country and Minnesota. Since then, both the rate and the number of fatalities have declined in a fairly steady

pattern for both the country and the state. In 2005, there were 43,200 traffic fatalities throughout the country and 559 in Minnesota. The respective rates per 100 million miles of travel were 1.46 and 0.99, and therefore, represent a relatively dramatic decrease since 1966. In general, the VMT fatality rate in Minnesota has shown dramatic improvement in the last three decades. For example, 1990 had a rate of 1.47, 1980 had a rate of 3.03, and 1970 had a rate of 4.41 (see Figure 3.17-1).



Source: OTS, 2006

Figure 3.17-1. Number of Vehicles, Drivers, and Fatalities in Minnesota from 1962-2005

The decline in traffic fatalities is in large part the result of conscious decision-making on traffic safety issues in the U.S. The National Highway Traffic Safety Administration (originally called the National Highway Safety Bureau) was established by the U.S. Department of Transportation (DOT) in 1967. Since then it has promoted, and Congress has passed, legislation mandating the manufacture of safer cars. At the same time, the Federal interstate highway system has expanded, contributing to a safer roadway environment. Simultaneously there has been an effort to change human behavior factors. Minnesota's legislature has made significant amendments to the Driving While Intoxicated (DWI) law since 1971 and has also passed the child passenger protection law in 1981 and the mandatory seat belt law in 1986. Therefore, although there has been a steady increase in the number of drivers and vehicles, there has been a general steady decrease in the vehicle fatality rate per hundred million miles of travel as evidenced in Figure 3.17-1.

West Range

According to the *2005 Minnesota Motor Vehicle Crash Facts*, of the 729 total vehicular crashes that occurred in Itasca County during 2004, 10 of them were fatal. The year 2005 showed a decrease in accidents with 667 total crashes, four of which were fatal. In general, these represent low numbers relative to the county's population.

Itasca County's Transportation Department provided a listing of reported vehicle accidents within a one-mile radius at the US 169 and CR 7 intersection near the project area. The accident reports cover a five-year period (2001 through 2005). The number of accidents occurring in this area is shown in Table 3.17-2.

Table 3.17-2. Five-Year Traffic Accident History near Intersection of US 169 and CR 7 at West Range Site

Location	2001	2002	2003	2004	2005
US 169	5	3	6	1	10
CR 7	4	5	2	5	4

Source: Itasca County, 2006

As indicated in Table 3.17-2, the number of accidents on key roads remained more or less steady over the five-year period, except for US 169 in 2005, which showed a marked increase. After reviewing the reports, it appears that approximately half of the accidents in 2005 were caused by icy/snowy conditions. There were no recorded fatal accidents within the one-mile radius of this intersection over the five-year period. In general, Itasca County has experienced slope stability problems with CR 7 near its intersection with US 169. According to the County Engineer, this intersection is dangerous for heavy truck hauls because of the steep approach to US 169 (Excelsior, 2006b).

East Range

According to the *2005 Minnesota Motor Vehicle Crash Facts*, of the 2,553 total vehicular crashes that occurred in Itasca County during 2004, 21 were fatal. The year 2005 showed a decrease in accidents with 2,364 total crashes, 19 of which were fatal.

According to accident data from the St. Louis County's Public Works Department, there have been three accidents in the past five years (2001 through 2006) at the intersection of CR 666 and CR 110 in Hoyt Lakes (St. Louis County, 2006). There were no accidents reported at the intersection of CR 110 and Hampshire Drive (Hoyt Lakes) during this same period. From 2000 to 2005, there were 11 accidents reported on CR 110 between CR 665 in Aurora (now referred to as CR 130) and CR 666 in Hoyt Lakes. Five of these accidents were related to poor visibility or icy roads as a result of weather conditions.

3.17.2.2 Railroad Safety

The extensive network of roads crisscrossing over railroads within the region facilitates the potentially dangerous interaction between motor vehicles and freight trains. Each day, thousands of vehicles using local roads cross over active railroad tracks. Including private crossings, there are a total of approximately 740 railroad crossings within the northeastern Minnesota region. Given the fact that some of the high-speed railroads within the region have been experiencing increasing volumes, railroad safety planning has become increasingly important in providing safe interaction between trains and motor vehicles.

A structure that allows one track to cross another track or a highway at the same elevation is referred to as an *at-grade crossing*. A structure or set of structures allowing two tracks, or one or more tracks, and a highway to cross each other at different elevations is referred to as a *grade-separated crossing*. Grade-separated crossings are provided by either a bridge over highway or bridge over rail. At-grade rail-highway crossings can contribute to traffic bottlenecks depending on their location.

As of 2002, Minnesota ranked 17th in the nation for the highest number of collisions and 14th in overall deaths and injuries from crashes at highway-rail intersections. Minnesota has worked actively with counties, cities, townships and railroads to improve safety for at-grade crossings. Active warning devices have been installed at over 1,300 of the approximately 4,500 public grade crossings in the state. The number of at-grade rail crossings with high exposure ratings and hazard ratings has increased significantly from 1996 to 2000 (Excelsior, 2006b). In 2000, 22 percent of the 363 at-grade crossings in the region had high hazard ratings, up from 3 percent in 1996. It is likely that this growth is attributable primarily to increased vehicle traffic rather than increased train traffic. All of the at-grade intersections on

trunk highways are guarded with gates and signals. Safety improvements for at-grade crossings are funded through a shared-cost negotiated between Mn/DOT and the railroad company.

According to the *2005 Minnesota Motor Vehicle Crash Facts*, 17 percent of all vehicle/train crashes in Minnesota resulted in a fatality in 2004 (train collisions with pedestrians or bicyclists were not counted in these crashes). Over the years, the number of vehicle/train crashes in Minnesota has been declining. Seventy-two crashes were reported in 2004, an 18 percent decrease from the 1995-2002 average of 87. Fourteen of the 72 vehicle/train crashes, including three of the 12 fatal crashes, occurred at a railroad crossing signed by a railroad crossbuck. An additional 11 crashes (including three fatal crashes) occurred at crossings with a railroad crossing stop sign. Combined, these two types of traffic control devices were present at 35 percent of the crashes and accounted for nearly half of the fatalities.

Motor vehicle crashes involving a train were a predominantly rural phenomenon, defined as an area with less than 5,000 population. In 2004, 69 percent of the total crashes, 74 percent of the injuries, and 85 percent of the fatalities occurred in rural areas. Furthermore, for the motor vehicles involved in train crashes, failure to yield ROW, driver inattention or distraction, and disregard for traffic control device were the three contributing factors cited most often by officers at the scene. These three reasons accounted for 74 percent of all contributing factors cited.

The location of at-grade crossings and existing traffic volumes at these crossings near the West Range and East Range Sites are discussed in Section 3.15.3.2 and 3.15.3.3, respectively.

3.17.3 Community Health Issues

Information from health profiles for Itasca County and St. Louis County were compiled from the Minnesota Department of Health. The health profiles comprise an overview of the health status of Minnesota residents at the state and county levels.

Minnesota statistics for adults with behavioral health risks (shown as a percentage of the adult population considered at risk due to a particular behavior) on a state-wide and county basis are shown in Table 3.17-3. These behavioral health risk factors of adults are similar rates for both counties and state-wide. Cancer statistics for the state and counties is provided in Table 3.17-4.

Table 3.17-3. Estimated Percent of Adults with Behavioral Health Risk Factors (2004)

Behavioral Health Risk Factors of Adults	Minnesota (percent)	Itasca County (percent)	St. Louis County (percent)
Overweight	59.6	60.0	58.9
Current Smokers	20.8	19.7	20.3
Acute Drinking	19.9	18.0	19.1
Chronic Drinking	5.6	5.5	5.7
Perceiving health status as fair or poor	10.0	11.3	10.7
Limitation of activities due to any impairment or health problem	21.8	23.7	22.7
No exercise	15.9	16.6	16.3
Hypertension	28.5	28.5	26.5

Source: MDH, 2004

Leading causes of mortality (as a total for 2004 and a percent of total deaths) for the state and each county are provided in Table 3.17-5. Overall, health risk factors and mortality rates (percentages) are similar in both counties and to state-wide statistics. Both counties have higher cancer incidence rates when compared to state-wide rates, although this may not be statistically significant due to the small sample size (population) of each county. Itasca County has a slightly higher cancer incident rate than St. Louis County, however, this data may be skewed due to the large difference in the population between the two counties (St. Louis County's population is over four times that of Itasca County).

Table 3.17-4. Estimated Number of Adults with Cancer Incidences (2004)

Type of Cancer	Minnesota Men	Minnesota Women	Itasca County Men	Itasca County Women	St. Louis County Men	St. Louis County Women
Cancer Incidence -all types	14,049 (0.56%)[1]	13,524 (0.53%)[1]	208 (0.94%)[1]	166 (0.75%)[1]	812 (0.83%)[1]	702 (0.70%)[1]
Colon and Rectum Cancer	1,290	1,436	14	21	74	68
Lung Cancer	3,748	3,033	63	43	210	152
Breast Cancer	20	2,054	1	24	2	114
Prostate Cancer	1,797	0	35	0	110	0
Other Types	7,194	6,731	95	78	416	368

Note: [1] Percentages are based on 2000-2002 cancer numbers divided by reported 2003 populations.
Source: MDH, 2002a.

Table 3.17-5. Causes of Mortality, State and County Statistics (2003 and 2004)

U.S. 15 Leading Causes of Death	Minnesota, Percent of Total Deaths (2004)	Itasca County, Percent of Total Deaths (2003)	St. Louis County, Percent of Total Deaths (2003)
Malignant Neoplasms (Cancer)	24.6	24.3	24.5
Diseases of the Heart	21.3	22.1	24.3
Cerebrovascular Diseases (stroke)	6.9	7.0	6.3
Accidents	5.0	4.7	4.7
Chronic Lower Respiratory Diseases	5.0	4.0	5.1
Alzheimer's Disease	3.3	4.0	3.3
Diabetes Mellitus	3.1	3.4	3.4
Influenza and Pneumonia	2.0	3.2	1.8
Nephritis, Nephrotic Syndrome and Nephrosis	1.8	0.6	1.6
Intentional Self-Harm	1.4	2.3	1.8

Table 3.17-5. Causes of Mortality, State and County Statistics (2003 and 2004)

U.S. 15 Leading Causes of Death	Minnesota, Percent of Total Deaths (2004)	Itasca County, Percent of Total Deaths (2003)	St. Louis County, Percent of Total Deaths (2003)
Essential Hypertension and Hypertensive Renal Disease	1.3	1.9	0.9
Parkinson's Disease	1.1	0	0
Chronic Liver Disease and Cirrhosis	0.9	1.3	1.6
Aortic Aneurysm and Dissection	0.8	0	0
Septicemia	0.7	1.1	0.6
All Other Causes	20.8	20.1	20.1

Source: MDH, 2003

3.17.4 Sensitive Receptors and Chemicals of Potential Concern

3.17.4.1 Sensitive Receptors

Sensitive receptors include populations that are the most vulnerable to adverse health effects associated with air pollutants and chemical exposure, such as the elderly and the very young. Sensitive receptor locations are typically associated with residential areas, hospitals, long-term health care facilities, playgrounds, and schools. Additionally, farms and fishable bodies of water are also considered significant receptor locations because potential chemical or pollutant deposition at these sites can affect food supplies. Aerial photography, current as of 2003, was used to identify significant receptors in Itasca County and St. Louis County in relation to the proposed West Range Site and East Range Site, respectively.

3.17.4.2 West Range Site and Corridors

There are no farms, schools, daycare centers, recreation centers, playgrounds, nursing homes, or hospitals located within 0.5 miles of the West Range Site.

The residences nearest to the West Range Site are located to the southeast on the north shore of Big Diamond Lake and the southeast shore of Dunning Lake (approximately 0.6 to 0.8 miles from the West Range Site). The residences along the lakes are a mix of seasonal and year-round dwellings. The City of Taconite, located approximately 1.7 miles from the West Range Site, has both single-family and multi-family residential houses that are occupied year-round. Based on a review of aerial photography, there are as many as 214 residences (depending on corridor) located within 0.5 miles of the centerline of the proposed HVTL corridors, and a maximum of 935 residences (depending on corridor) located within 0.5 miles of the centerline of the proposed natural gas pipelines associated with the West Range Site. No hospitals, long-term health care facilities, playgrounds, schools, farms or fishing areas were noted to be within 0.5 miles of the centerline of the proposed HVTLs based on aerial photographs, however, one church and four cemeteries were identified within 0.5 miles of the centerline of the proposed natural gas pipeline corridors associated with the West Range Site.

3.17.4.3 East Range Site and Corridors

The nearest residences to the East Range Site are located about 1 mile directly south of the site in the City of Hoyt Lakes. No sensitive receptors such as schools, daycare centers, recreation centers, playgrounds, nursing homes or hospitals are located within 0.5 miles of the East Range Site. Based on a review of aerial photography, residential areas are located along the corridors proposed for the HVTLs (maximum 962 residences) and natural gas pipelines (856 residences). In addition, two schools (Fayal School and Lincoln School), the Mamrelund Church, Forbes Cemetery, Camp Olcott, and Eveleth Scout Camp are located along the proposed HVTL corridor within 0.5 miles of the HVTL ROW centerline. A 4H Camp and the Eveleth-Virginia Airport are located within approximately 0.5 miles of the natural gas pipelines. No hospitals, long-term health care facilities, playgrounds, or fishing areas are noted within 0.5 miles of the proposed HVTLs or natural gas pipeline corridors.

3.17.4.4 Chemicals of Potential Concern

Exposure to certain chemicals, or chemicals of potential concern (COPCs), can adversely affect human health through toxic and/or carcinogenic effects. Chemical exposure can occur as a result of a variety of human activities ranging from the use of household chemicals and products to the fueling of a motor vehicle. In addition, exposure can result from chemicals that could be present in the air, water, soil, or the food chain through air emissions or other discharges from industrial sources to the environment.

The EPA has developed cancer and non-cancer toxicity values for COPCs that serve as the basis for many of the regulatory standards for emission and exposure limits that have been established to protect human health and the environment. In addition, EPA has established standards for evaluating risks of exposure to chemicals related to specific project and site conditions. For a chemical exposure to occur at a specific site, several conditions must be met, including: (1) a chemical or exposure source; (2) a release mechanism; (3) a migration pathway; (4) an exposure route; and (5) a receptor population. Consequently, if either a chemical-specific (toxic) effect or exposure pathway is not present, there is no unacceptable carcinogenic risk (or non-carcinogen hazard).

To calculate potential risks associated with chemical exposures, categories of sensitive receptor populations are defined. These populations reflect persons with potentially high exposure rates due to the frequency and duration of exposure, or increased sensitivity due to health or age. To estimate the potential risk associated with an action, risk calculations are conducted for the most susceptible populations, including resident/home gardener (adult and child), farmer (adult and child), and fisherman (adult and child).

3.17.5 Electromagnetic Fields

3.17.5.1 Electric and Magnetic Field Primer

High-voltage alternating-current (AC) transmission lines produce extremely low frequency (60 Hertz (Hz)) alternating electric and magnetic fields. Electric fields are lines of force exerted on electrically charged particles. Magnetic fields, on the other hand, are lines of force exerted on moving charged particles (current). Magnetic fields are generally considered to have more potential for affecting human health than electric fields, in part because electric fields are more easily reduced by shielding. The intensity of the electric field is related to the voltage of the line. However, the intensity of the magnetic field is directly related to the amount of current flowing through the conductors, not the voltage. Therefore, a higher-voltage transmission line does not necessarily produce stronger magnetic fields than lower voltage lines.

Electric fields are characterized by their wavelength, frequency, or energy. The frequency of an electromagnetic wave is simply the number of oscillations which pass a fixed point per unit of time. Frequency is measured in cycles per second, or Hz. One cycle per second equals one Hz. Typically, the shorter the wavelength, the higher the frequency. An electromagnetic wave consists of very small packets

of energy called photons. The energy in each packet or photon is directly proportional to the frequency of the wave; the higher the frequency, the larger the amount of energy in each photon.

The voltages on the conductors of transmission lines generate electric fields in the space between the conductors and the ground. Directly under transmission lines, the electric field is nearly constant in magnitude and direction over distances of several feet. Electric fields are vector quantities; that is, they have both magnitude and direction. The direction corresponds to the direction that a positive charge would move in the field. In general, the field decreases with distance from the conductors. If an energized conductor (source) is inside a grounded conducting enclosure, then the electric field outside the enclosure is zero, and the source is said to be shielded.

The strength of the electric field is measured in volts per meter (V/m), and is calculated at a height of 3.28 feet (1 meter) above an un-vegetated, flat earth under straight parallel transmission lines.

In contrast to electric fields, a magnetic field is only produced once a device is switched on and current flows. The higher the current, the greater the strength of the magnetic field. Like electric fields, magnetic fields are strongest close to their origin and rapidly decrease at greater distances from the source. Magnetic fields are not blocked by common materials such as the walls of buildings. In the case of transmission lines, distribution lines, house wiring, and appliances, the 60-Hz electric current flowing in the conductors generates a time-varying, 60-Hz magnetic field in the vicinity of these sources. The strength of a magnetic field is measured in terms of magnetic lines of force per unit area (amperes per meter (A/m)), or magnetic flux density (measured in units of gauss (G), or milligauss (mG)).

The uniformity of a magnetic field depends on the nature and proximity of the source, just as the uniformity of an electric field does. Transmission-line-generated magnetic fields are quite uniform over horizontal and vertical distances of several feet near the ground. However, for small sources such as appliances, the magnetic field decreases rapidly over distances comparable with the size of the device.

The magnetic field generated by currents on transmission-line conductors extends from the conductors through the air and into the ground. The magnitude of the field at a height of 3.28 feet (1 meter) is frequently used to describe the magnetic field under transmission lines. As previously mentioned, the distance from the transmission-line conductors is inversely proportional to the magnetic field.

Electromagnetic waves can be classified as either ionizing radiation (IR) or non-ionizing radiation (NIR):

- IR are extremely high frequency electromagnetic waves (X-rays and gamma rays), which have enough photon energy to produce ionization (create positive and negative electrically charged atoms or parts of molecules) by breaking the atomic bonds that hold molecules in cells together.
- NIR is a general term for that part of the electromagnetic spectrum which has photon energies too weak to break atomic bonds. They include ultraviolet (UV) radiation, visible light, infrared radiation, radiofrequency and microwave fields, extremely low frequency (ELF) fields, as well as static electric and magnetic fields.

3.17.5.2 Current Standards

Regulations that apply to transmission-line electric and magnetic fields fall into two categories: safety standards/codes and field limits/guidelines. Safety standards or codes are intended to limit or eliminate electric shocks that could seriously injure or kill persons. Field limits or guidelines are intended to limit electric- and magnetic-field exposures that can cause nuisance shocks or may cause health effects. In no case has a limit or standard been established because of a known or demonstrated health effect. The majority of the national standards draw on the guidelines set by the International Commission on Non-Ionizing Radiation Protection (ICNIRP). This non-governmental organization evaluates scientific

results from all over the world. ICNIRP has included a safety factor of 10 for occupational exposure levels and a safety factor of 50 for public exposure levels.

An important point is that there is no specific level above which exposures become hazardous to health. Instead, the potential risk to human health gradually increases with higher exposure levels. Guidelines indicate that, below a given threshold, electromagnetic field exposure is safe according to scientific knowledge. However, it does not automatically follow that, above the given limit, exposure is harmful.

At low frequencies, exposure guidelines ensure that the level of currents induced by electromagnetic fields is below that of natural body currents. The main effect of radiofrequency energy is the heating of tissue. Consequently, exposure guidelines for radiofrequency fields and microwaves are set to prevent health effects caused by localized or whole-body heating.

In the United States, there are no Federal standards limiting occupational or residential exposure to 60 Hz EMF. Only six states (Florida, Minnesota, Montana, New Jersey, New York, and Oregon) have set standards limitations for electric fields, and two states (Florida and New York) have standards for magnetic fields as shown in Table 13.17-6.

3.17.5.3 EMF Health Concerns

Some people have attributed a diverse collection of symptoms to low levels of exposure to electromagnetic fields at home. Reported symptoms include headaches, anxiety, suicide and depression, nausea, fatigue and loss of libido. To date, scientific evidence does not support a link between these symptoms and exposure to electromagnetic fields (WHO, 2006).

Scientists are also investigating the possibility that effects below the threshold level for body heating occur as a result of long-term exposure. To date, no adverse health effects from low level, long-term exposure to radiofrequency or power frequency fields have been confirmed, but scientists are actively continuing to research this area (WHO, 2006).

Some initial epidemiological studies of 60 Hz EMF levels showed a weak but possible correlation between magnetic fields and childhood leukemia. However, after over 20 years of research there is general scientific consensus that there is no evidence that power line EMF causes biological responses and health effects in humans. Recent research indicates:

- There is little evidence that power lines are associated with an increase in cancer.
- Laboratory studies have shown little evidence of a link between power-frequency fields and cancer.
- An extensive series of studies have shown that life-time exposure of animals to power-frequency magnetic fields does not cause cancer.
- A connection between power line fields and cancer is physically implausible (Moulder, 2005).

Table 3.17-6. State Transmission Line Standards and Guidelines

State	Electric Field		Magnetic Field	
	On ROW	Edge ROW	On ROW	Edge ROW
Florida	8 kV/m[a]	2 kV/m	NA	150 mG[a] (max load)
	10 kV/m[b]	NA	NA	200 mG[b] (max load)
	NA	NA	NA	250 mG[c] (max load)
Minnesota	8 kV/m	NA	NA	NA

Table 3.17-6. State Transmission Line Standards and Guidelines

State	Electric Field		Magnetic Field	
	On ROW	Edge ROW	On ROW	Edge ROW
Montana	7 kV/m	1 kV/m[e]	NA	NA
New Jersey	NA	3 kV/m	NA	NA
New York	11.8 kV/m	1.6 kV/m	NA	200 mG (max load)
	11 kV/m[f]	NA	NA	NA
	7 kV/m[d]	NA	NA	NA
Oregon	9 kV/m	NA	NA	NA

[a] For lines of 69-230 kV
[b] For 500 KV lines
[c] For 500 KV lines in certain existing ROW
[d] Maximum for highway crossings
[e] May be waived by the landowner
[f] Maximum for private road crossings
ROW = right-of-way; NA= not applicable: kV/m=kilovolts per meter ; mG= miligauss
Source: NIEHS, 2002

In 1999, the National Institute of Environmental Health Sciences (NIEHS) issued its final report on "Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields" in response to the 1992 Energy Policy Act. NIEHS concluded that the scientific evidence linking EMF exposures with health risks is weak and that this finding does not warrant aggressive regulatory concern (NIEHS, 2002).

In 2002, Minnesota formed an Interagency Working Group to evaluate the body of research and develop policy recommendations to protect the public health from any potential problems resulting from HVTL EMF effects. The Working Group consisted of staff from the Minnesota Department of Health, the Department of Commerce, the Public Utilities Commission, the Minnesota Pollution Control Agency, and the Environmental Quality Board. In September 2002, the Working Group published its findings in a White Paper on Electric and Magnetic Field Policy and Mitigation Options (MDH, 2002b). The following summarizes the findings of the Working Group.

Research on the health effects of EMF has been carried out since the 1970s. Epidemiological studies have mixed results – some have shown no statistically significant association between exposure to EMF and health effects, and some have shown a weak association. More recently, laboratory studies have failed to show such an association, or to establish a biological mechanism for how magnetic fields may cause cancer. A number of scientific panels convened by national and international health agencies and the United States Congress have reviewed the research carried out to date. Most concluded that there is insufficient evidence to prove an association between EMF and health effects; however, many of them also concluded that there is insufficient evidence to prove that EMF exposure is safe (MDH, 2002b).

Despite this general consensus, however, there are still concerns. For example, California's Department of Health Services published a report by the California EMF Program in 2002 that concluded there was a weak, but probably real association between EMF and cancer. In addition, on June 3, 2005, the British Medical Journal released a paper entitled "Childhood Cancer in Relation to Distance from High Voltage Power Lines in England and Wales: A Case-Control Study" (Draper, 2005). This paper contained findings from a study on childhood cancer carried out by Oxford University that analyzed and compared 33 years of data (from 1962 to 1995) on 29,000 children diagnosed with cancer. The study found slightly elevated rates of childhood leukemia in children whose residence at birth was close to

power lines. Proponents of the EMF health connection have argued that the magnetic fields produced by the power lines are responsible for this correlation.

The British study found elevated rates of childhood leukemia at distances less than 0.5 miles (approximately 600 meters) from the lines. At such distances, the magnetic fields in homes due to power lines are negligible compared to existing background levels. Moreover, the authors of the study found no causal link between childhood leukemia and EMF, stating "we emphasize again the uncertainty about whether this statistical association represents a causal relation." In addition, the authors state "neither the association reported here nor previous findings relating to level of exposure to magnetic fields are supported by convincing laboratory data or any accepted biological mechanism" (Draper, 2005).

Additional studies and areas of concern include:

- Effects on pregnancy outcome. Many different sources and exposures to electromagnetic fields in the living and working environment, including computer screens, water beds, and electric blankets, radiofrequency welding machines, diathermy equipment, and radar, have been evaluated by the World Health Organization and other organizations. The overall weight of evidence shows that exposure to fields at typical environmental levels does not increase the risk of any adverse outcome such as spontaneous abortions, malformations, low birth weight, and congenital diseases. There have been occasional reports of associations between health problems and presumed exposure to electromagnetic fields, such as reports of premature births and low birth weight in children of workers in the electronics industry, but these have not been regarded by the scientific community as being necessarily caused by the field exposures (as opposed to factors such as exposure to solvents) (WHO, 2006).
- Cataracts. General eye irritation and cataracts have sometimes been reported in workers exposed to high levels of radiofrequency and microwave radiation, but animal studies do not support the idea that such forms of eye damage can be produced at levels that are not thermally hazardous. There is no evidence that these effects occur at levels experienced by the general public (WHO, 2006).
- Electromagnetic fields and cancer. Over the last 20 years, research has been conducted in the United States and around the world to examine whether exposures to electric and magnetic fields at 50/60 Hz from electric power lines are a cause of cancer or adversely affect human health. The research included epidemiology studies that suggested a link with childhood leukemia for some types of exposures, as well as other epidemiology studies that did not; it also included lifetime animal studies, which showed no evidence of adverse health effects. Comprehensive reviews of the research conducted by governmental and scientific agencies in the U.S. and in the United Kingdom (UK) did not find a basis for imposing additional restrictions (NIEHS, 1999; IEE, 2000).
- Electromagnetic hypersensitivity and depression. Some individuals report "hypersensitivity" to electric or magnetic fields. In the past, residents have questioned whether their reported symptoms (e.g., aches and pains, headaches, depression, lethargy, sleeping disorders, and even convulsions and epileptic seizures) could be associated with electromagnetic field exposure near their homes. There is little scientific evidence to support the idea of electromagnetic hypersensitivity. Recent Scandinavian studies found that individuals do not show consistent reactions under properly controlled conditions of electromagnetic field exposure. Currently, there is not an accepted biological mechanism to explain hypersensitivity (WHO, 2006).
- Henshaw Effect. Researchers in England have suggested that the AC electric fields from power lines might affect health indirectly, by interacting with the electrical charges on certain airborne particles. This phenomenon, sometimes referred to as the Henshaw Effect, relates to the hypothesis that particles would be deposited on the skin by a strong electric field, or in the lung by charges on particles (Henshaw et al., 1996; Fews et al., 1999a, 1999b). In their laboratory, Henshaw and colleagues have developed models to test the physical assumptions of their

hypothesis: that an electric field can change the behavior of particulates in the air. For example, they measured the deposition of radon daughter particles on metal plates, in the presence of an electric field at intensities found under or near power lines. Under these conditions, deposition of particles on surfaces was slightly increased, an occurrence that implies that the deposition might also occur on other surfaces, such as skin. However, Henshaw and colleagues have not tested the most speculative parts of their hypothesis: that such changes in deposition rate of particles would lead to an important increase in human exposure and also that the increased skin exposure would be sufficient to affect human health. Henshaw et al. also hypothesized that AC electric fields at the surface of power line conductors lead to increased charges on particles, and thereby increases the likelihood that inhaled particles (including radon daughters) would be deposited on surfaces inside the lungs and airways, even at considerable distances from a power line. Outside air generally contains particles of various sizes, including aerosols from emissions from vehicles and manufacturing, as well as natural sources such as radon from soil, rock, and building materials. If, as hypothesized, charges on aerosol particles were increased, and if this change were to increase deposition in the lungs when inhaled over long periods of time, in theory these events could lead to increases in respiratory disease and other diseases.

Radon daughters are short-lived radioactive decay products of radon that decay into longer-lived lead isotopes that can attach themselves to airborne dust and other particles and if inhaled, damage the lining of the lungs.

An **aerosol** is a mixture of microscopic solid or liquid particles in a gaseous medium. Smoke, haze, and fog are examples of aerosols.

There are many sources of more detailed information on the potential health effects of EMF. For example, the Minnesota Department of Heath maintains information on its web site: http://www.health.state.mn.us/divs/eh/radiation/emf/index.html. Another extensive site maintained by a University of Wisconsin medical research faculty is found at: http://www.mcw.edu/gcrc/cop/powerlines-cancer-FAQ/toc.html#19N.

3.17.5.4 Existing Sources of EMF

Existing sources of EMF in the vicinity of each proposed site include HVTLs and sub-stations. A description of these sources is provided below. However, the electric and magnetic field strengths for these sources are not available.

West Range Site and Corridors

The West Range Site is bounded by CR 7 to the west and the Iron Range Township to the east. MP currently owns an existing 115-kV HVTL (designated as 28Line), located north of the power plant footprint and buffer land (hereafter, all HVTLs will be identified by their number followed by the letter "L" for "Line," e.g., 28L). The line runs between the Clay Boswell Generating Station and a 115-kV substation near Nashwauk, Minnesota.

MP also owns the 83L, a 230-kV HVTL that connects the Clay Boswell Station with the Blackberry Substation, and the 20L, an 115-kV HVTL that interconnects the Grand Rapids and Blackberry Substations. The Blackberry Substation is the major HVTL hub in the area.

Finally, MP operates two 115-kV HVTLs known as 62L and 63L between the Nashwauk and Blackberry Substations. At one time, two 115-kV tap lines identified as 45L ran along the east side of the Project Site and connected 28L to the Greenway 115-kV Substation (just north of Holman Lake). The two 115-kV tap lines have since been de-energized and the Greenway Substation retired.

Two HVTL corridors traverse the West Range Site, one in a north/south direction and a second in an east-west direction. The HVTLs that occupy the north-south corridor are not currently used.

East Range Site and Corridors

The East Range Site comprises approximately 800 acres of undeveloped property currently owned by CE, within the City Limits of the Hoyt Lakes in St. Louis County, Minnesota. This site is bounded by CR 666 to the east, the Superior Natural Forest to the north, and an existing 138-kV HVTL corridor leading to MP's Syl Laskin Energy Center Substation (Laskin Substation) to the west.

Three existing transmission lines emanate from the Laskin Station, located approximately 2 miles southwest of the generating station footprint, and connect with the Forbes and Virginia substations. The three 115-kV lines connect the Laskin Substation (34L, 38L, and 39L) with the Forbes and Virginia substations. These facilities are part of the MP transmission network known as the "North Shore Loop."

The 38L that interconnects directly to the Forbes Substation is about 35.5 miles in length, is rated at 146 Mega Volt-Amps (MVA) , and has one intermediate distribution load service substation (the Peary Substation). For the 39L and 34L routes that connect to the Virginia Substation, there are existing 115-kV lines (37L directly to the Forbes Substation and 16L/18L to the Forbes Substation via United Taconite).

INTENTIONALLY LEFT BLANK

3.18 NOISE

This section presents the current noise conditions at and in the vicinity of the proposed Mesaba Energy Project. It provides background information about noise principles, guidelines, and regulations; noise measurement methods and criteria; and existing noise levels and sources in the West Range and East Range Sites.

3.18.1 Background

3.18.1.1 Noise Principles

Definitions

Noise, simply defined as unwanted sound, can have an adverse effect on humans and their activities as well as the natural environment. Sound pressure (loudness) is the physical force from a sound wave that affects the human ear, and is typically discussed in terms of decibels (dB), which is a logarithmic unit of the sound pressure level (SPL). Zero dB represents the threshold of hearing.

The impact of noise is highly dependent upon the characteristics of the noise (i.e., loudness, pitch, time of day, duration, etc.) and the sensitivity (or perception) of the noise receptor. The EPA has classified noise levels for several common sounds along with typical human responses or perceptions for these noises (Table 3.18-1).

Table 3.18-1. Noise Levels for Common Sounds

Sources*	Noise Level (dBA)	Response
Carrier deck, jet operation	140	Painfully loud
Live rock music	130	Limits amplified speech
New York subway station	90	Hearing damage (8 hours)
Dishwasher	80	Annoying
Freeway traffic (50 ft)	70	Telephone use difficult
Air conditioning unit (20 ft)	60	Intrusive
Light auto traffic (100 ft)	50	Quiet
Breathing	10	Just audible
Silence	0	Threshold of hearing

*Noise levels decrease with distance from the source and are reduced by barriers, both man-made (e.g., sound walls) and natural (forested areas, hills, etc.).

Sound can be quantified in terms of its amplitude (loudness) and frequency (pitch). The standard unit of sound amplitude measurement is the dB; however, since the human ear is not equally sensitive to sound at all frequencies, four weighted scales (A through D) have been developed to measure noise from different sources. Typically, the A-weighted scale is used to measure noise as it relates human sensitivity, by discriminating against frequencies in a manner approximating the sensitivity of the human ear. Sound pressure presented in the A-weighted decibel scale is designated with the symbol dBA. Generally, a change of less than 3 dBA in noise levels with respect to existing conditions is not perceptible to humans in ambient situations. Noise levels for combinations of sounds are added and subtracted based on a

logarithmic scale. As a result, the addition of two noises, such as a garbage truck (100 dBA) and a lawn mower (95 dBA), would result in a cumulative sound level of 101.2 dBA, not 195 dBA. In most cases, where the addition of decibels only needs to be accurate by ±1 dB, the following rule of thumb can be used to add decibels:

When two decibel values differ by:	Add the following amount to the higher value:
0 or 1 dB	3 dB
2 or 3 dB	2 dB
4 or 9 dB	1 dB
10 dB or more	0 dB

Because the decibel scale is logarithmic, a relative increase of 10 decibels represents a sound pressure level that is 10 times higher. However, humans do not perceive a 10-dBA increase as 10 times louder; they perceive it as twice as loud. The following is typical of human response to relative changes in noise level:

- ±3 dBA change is the threshold of change detectable by the human ear, in ambient environments;
- ±5 dBA change is readily noticeable;
- +10 dBA increase is perceived as a doubling of noise level/loudness; and
- +20 dBA increase is perceived as a fourfold increase in noise level/loudness.

The SPL that humans experience typically varies from moment to moment. Therefore, a variety of descriptors are used to evaluate noise levels over time. Some typical descriptors are defined below:

- L_{eq} is the continuous equivalent sound level. The sound energy from the fluctuating sound pressure levels is averaged over time to create a single number to describe the average energy or intensity level. High noise levels during a monitoring period will have greater effect on the L_{eq} than low noise levels. The L_{eq} has an advantage over other descriptors because L_{eq} values from different noise sources can be added and subtracted to determine cumulative noise levels.
- L_{dn} is the day-night equivalent sound level. It is similar to a 24-hour L_{eq}, but with 10 dBA added to SPL measurements between 10:00 pm and 7:00 am to reflect the greater intrusiveness of noise experienced during these hours. L_{dn} is also termed DNL.
- L_{min} is the lowest SPL measured during a given period of time and L_{max} is the highest.
- L_{10} is the SPL exceeded 10 percent of the time. Similar descriptors are the L_{50}, L_{01}, and L_{90}.

Noise Loss Over Distance

Sound travel over distance is acted upon by many factors. Temperature, humidity, wind direction, barriers, and absorbent materials such as soft ground and light snow are all factors in how sound will be perceived at different distances.

Sound energy is lost at higher humidity conditions due to the combined action of the viscosity and heat conduction of the air, and the behavioral state of the molecules therein. When humidity rises, there is an increase in the high frequency absorption of air. Thus, in the summer months, and assuming a higher relative humidity, less of the high frequency noise will be heard. As well, leaves and shrubs while in bloom during the summer months will further serve to attenuate propagated noise.

Noise from a fixed location (e.g., industrial equipment) is termed a stationary or point source. Point sources of noise attenuate at a rate of 6 dBA per doubling of distance when traveling through air over a

hard surface and up to 7 or 8 dBA when traveling over a soft surface. These attenuation rates are general rules for total noise levels from a given source.

A roadway or railway is considered a line source because a motor vehicle or diesel engine moves from one point to another along a fixed linear route, and the receiver experiences noise from all points along the line. Noise from a line source typically attenuates at the rate of 3 dBA per doubling of distance based on a reference distance of 50 feet. Thus, traffic noise level of 65 dBA at a distance of 50 feet from a roadway would be 62 dBA at a distance of 100 feet from the roadway, and it would be 59 dBA at a distance of 200 feet from the roadway. The 3-dBA attenuation rate is used for noise traveling through the air or over a hard surface. Noise traveling over a soft surface, such as grass or other vegetation, may attenuate at a more rapid rate of approximately 4.5 dBA.

Vibration

Ground vibration is commonly viewed as the major concern for off-site damage to existing structures. The measurement of ground vibration is Peak Particle Velocity (PPV), which is the maximum speed (measured in inches per second or millimeters per second) at which a particle in the ground is moving relative to its inactive state. The U.S. Bureau of Mines and the Office of Surface Mining (OSM) have conducted extensive research over the last 40 years to develop acceptable vibration standards, vibration damage criteria, and techniques to predict and control blast vibrations that greatly reduce the risk of off-site impacts.

The OSM initially found that if PPV were limited to 1 inch per second, then 95 percent of the damage to surrounding houses and structures would be prevented. After more recent research, the PPV limit was changed to 0.5 inches per second to avoid off-site damage.

A PPV of 0.5 is generally equivalent to the vibration caused by a loaded truck or bus passing by 50 to 100 feet away. As a general rule, a person will begin to feel blast vibrations at levels as low as 0.02 inches per second. This is well below the level at which research has shown that damage may occur.

3.18.1.2 Methodology

Ambient Noise

In order to describe baseline noise conditions, ambient noise monitoring was performed in key areas throughout the West Range and East Range Sites, including areas of common use by residences. Descriptions of the noise monitoring locations (i.e., receptor locations) are detailed in subsequent paragraphs in this section under respective site-specific discussions.

MPCA guidelines for noise equipment calibration and monitoring procedures were followed in order to establish accuracy and consistency (MPCA, 1999). All monitoring was completed using a Type II, ANSI-approved noise level meter with calibration being performed before and after each monitoring cycle. A windscreen was also used to counter any wind effects and no monitoring was performed during times when winds greater than 15 miles per hour were measured or when precipitation was occurring.

The results of the ambient noise levels discussed in this section were used to predict traffic noise levels at chosen virtual receptor sites as a result of the Proposed Action. Virtual receptor sites refer to sites that were not included in the original ambient noise monitoring, but nonetheless, were modeled to describe future noise levels (i.e., no actual field measurements were taken at these locations). The virtual receptor locations and predicted noise levels are discussed in Section 4.18.

Guidelines and Regulations

Several agencies have noise regulations for different noise sources. Noise regulations are either source standards or receiver-based standards. The MPCA has a receiver-based standard intended to limit noise levels and protect the health and welfare of the general public. These standards were used for comparison in describing baseline noise conditions measured at each of the receptor locations.

The MPCA noise standards are grouped according to land activities by the noise area classification (NAC) system (MPCA, 1999). The NAC has four classes. NAC-1 includes household units, including farmhouses, as well as religious activities. NAC-2 applies to more commercial development, such as retail, businesses, government services, and parks. NAC-3 and NAC-4 are less stringent and are composed primarily of industrial uses. NAC-3 and NAC-4 were not used for this monitoring.

The MPCA guidelines, measured in dBA, are stipulated in the form of L_{10} and L_{50}. Simply stated, L_{10} means that the measured SPL (in dBA) must not exceed a certain threshold more than 10 percent of the time (for a 1-hour survey), and L_{50}, being a level that must not be exceeded more than 50 percent of the time (again, for a 1-hour survey). These thresholds for NAC-1 and NAC-2 are listed in Table 3.18-2 as SPL maximums by the MPCA.

Table 3.18-2. Noise Area Classification (NAC) Thresholds for NAC-1 and NAC-2

	NAC-1		NAC-2	
	L_{50}	L_{10}	L_{50}	L_{10}
Daytime (7:00 a.m. to 10:00 p.m.)	60 dBA	65 dBA	65 dBA	70 dBA
Nighttime (10:00 p.m. to 7:00 a.m.)	50 dBA	55 dBA	65 dBA	70 dBA

Source: MPCA, 1999

For this project, ambient monitoring at each location was performed for no less than one hour and during both times specified as “night” (i.e., 10:00 pm to 7:00 am) and “day” (7:00 am to 10:00 pm) by the MPCA classification.

Other agency noise guidelines that were reviewed include guidelines under the Federal Highway Administration (FHWA) and the Federal Rail Administration (FRA) for traffic- and rail-related noise, respectively. The FHWA does not provide actual noise standards, but has guidelines of an L_{10} of 70 dBA, which are used to trip a Federal funding mechanism for noise abatement on highway projects. The FRA provides noise impact criteria for railroad projects, which are dependent on land use categories as defined by the U.S. Department of Transportation (DOT). Further details on these agencies’ requirements are discussed in Section 4.18 as these were examined in relation to predicted noise levels as a result of the Proposed Action.

Investigations regarding noise ordinances at the West Range and East Range sites revealed little to no written local noise ordinances. In general, noise is dealt with on a complaint basis and is determined by general annoyance and disruption of the common peace. Discussions with local officials at both sites confirmed that the MPCA regulations should be used for noise monitoring and analysis (SEH et al., 2005 and SEH, 2005b).

3.18.2 Existing Noise Levels

As stated earlier, to establish and characterize the baseline noise environment, a noise monitoring program was developed and implemented. The program focused on potential noise-sensitive receptors in areas near proposed project activities in the West Range and East Range Sites. Noise sensitive receptors are defined as homes, schools, hospitals, etc., which are especially sensitive to high noise levels. The monitoring results and descriptions of the significant receptors are provided below.

3.18.2.1 West Range Site

Existing noise levels were monitored at five receptor locations near the proposed plant site, the railroad and roadways, or both. Monitoring events took place during the months of June and July 2005.

Results of the ambient noise monitoring during the daytime and nighttime for the West Range Site are provided in Table 3.18-3. It is presumed that noise levels that equaled or exceeded the MPCA noise thresholds occurred because of a receptor location's proximity to a major transportation corridor (i.e., CR 7).

Table 3.18-3. Existing Noise Levels at Ambient Noise Receptors for West Range Site

Receptor	Approximate Distance from nearest edge of Plant Footprint	Time of Monitoring	L_{10}	L_{50}	$L_{10\ dB}$ over State Compliance	$L_{50\ dB}$ over State Compliance
Receptor 1, Reclaimed County Landfill	1,700 ft south	9:15 am – 10:15 am	53 dBA	52 dBA	0 dB	0 dB
		10:04 pm – 11:04 pm	51dBA	49 dBA	0dB	0dB
Receptor 2, Residence Big Diamond Lake	3,900 ft southeast	3:15 pm – 4:15 pm	54 dBA	53 dBA	0 dB	0 dB
		11:15 pm – 12:16 am	50 dBA	49 dBA	0 dB	0 dB
Receptor 3, 31950 CR7	3,900 ft west	1:03 pm – 2:04 pm	59 dBA	55 dBA	0 dB	0 dB
		11:15 pm – 12:16 am	**59 dBA**	**55 dBA**	4 dB	0 dB
Receptor 4, 32423 CR7	4,400 ft west	2:30 pm – 3:30 pm	59 dBA	52 dBA	0 dB	0 dB
		11:45 pm – 12:45 pm	**56 dBA**	**53 dBA**	1 dB	3 dB
Receptor 5, Dunning Lake	4,100 ft southeast	4:00 pm – 5:00 pm	51 dBA	50 dBA	0 dB	0 dB
		correlated with Receptor 2	50 dBA	49 dBA	0 dB	0 dB

Values in bold indicate areas in which MPCA noise thresholds have been reached or exceeded.
Source: Noise Analysis, West Range Site; SEH et al., 2005

In general, results of the monitoring at the West Range Site indicate noise levels typical of townships and locales of this size and are below those of typical urban environments that are in close proximity to major transportation corridors. Since the setting surrounding the West Range Site can generally be described as a quiet, rural area with sparsely-spaced residential areas, any significant increases in noise levels could result in substantial acoustical impacts to surrounding receptors.

Receptor Location 1, Reclaimed County Landfill

Receptor 1 was the closest measurement point towards the proposed facility; however its proximity to CR 7 accounted for a small amount of traffic noise especially during the daytime monitoring event. The area where this receptor resides is within a reclaimed waste management sight. Although no residences are within this area, monitoring at this location was performed in an attempt to collect readings as close to the proposed facility as possible.

Ambient noise recorded during the daytime event consisted mainly of slight winds through the surrounding woods, and car and truck passes along CR 7. Ambient noise during the nighttime hours consisted mainly of insect noise, slight winds through the surrounding woods, and three cars passing along CR 7. Results from both monitoring events fall within the MPCA thresholds for acceptable noise daytime and nighttime criteria.

Receptor 2, Residence Big Diamond Lake

Receptor 2 was located along a cluster of residential and summer homes along the northern edge of Big Diamond Lake. These homes are situated along an undeveloped roadway with access off of CR 7 and proceeding east north of Big Diamond Lake. The roadway itself consists of dirt and red clay and is, at times, difficult to navigate without a four-wheel drive vehicle.

Daytime ambient noise consisted of slight winds through the surrounding woods, some slight traffic along the adjacent roadway and insect noise. Since winds were calm and there was no traffic along the adjacent roadway, ambient noise during the nighttime event almost exclusively consisted of insect noise. Results from both monitoring events fall within the MPCA thresholds for acceptable noise for daytime and nighttime criteria.

Receptor 3, 31950 CR 7

Receptor 3 was located at 31950 Scenic CR 7 and was within the property of a medium-sized residential home with a small hobby farm attached. The residents run a small tourist-orientated horse-riding business.

Traffic during the daytime monitoring event was consistent with car passes 2 to 3 times per minute, and cement trucks proceeding south and exiting CR 7 and proceeding south along CR 7. The cement trucks were counted traveling both north and south (presumed laden and then empty) at a consistent rate of two passes every 2 to 3 minutes for a large part of the daytime monitoring event. These cement trucks were also observed traveling at a relatively high rate of speed, which also heightened pavement noise. Noise levels during the nighttime monitoring event were equal to or exceeded MPCA noise thresholds presumably due to their proximity to CR 7.

Receptor 4, 32423 Scenic Highway 7

Receptor 4 was located along CR 7 near a residential area. Traffic-related noise along CR 7 was the predominant noise source during times of monitoring. Noise levels during the nighttime monitoring event exceeded MPCA noise thresholds presumably due to their proximity to CR 7.

Receptor Location 5, Dunning Lake

Receptor 5 was located along the southern end on North Dunning Lake and represented one residential location and the location of future potential residential expansion. Because of its remote location and the fact that there was a locked and gated roadway, no nighttime measurements were made (i.e., after 10:00 pm). Nighttime measurements are therefore correlated with the nearest receptor, Receptor 2.

The results of the daytime monitoring event fall within the MPCA thresholds for acceptable noise for daytime criteria.

3.18.2.2 East Range Site

Existing noise levels were monitored at four receptor locations throughout the East Range Site and within areas of common use by residences. These areas included one residential location and three locations surrounding the proposed plant site. Monitoring events took place during the month of July 2005. Results of the ambient noise monitoring during the daytime and nighttime for the East Range Site are provided in Table 3.18-4.

In general, Hoyt Lakes and the surrounding areas are in relatively quiet places. During daytime hours there is little to no manufacturing noise other than from the Laskin power plant across Colby Lake. There are limited traffic passes along Kennedy Memorial Drive proceeding through town and very few school related noise sources such as buses and playgrounds.

The preponderance of noise observed during daytime monitoring events related to lawn mowers in the distance, a small amount of light plane passes overhead, and distant noise from the Laskin power plant when in the vicinity of Colby Lake. Nighttime monitoring events were equally quiet with readings 1-2 decibels lower than daytime readings in most instances. Daytime and nighttime noise levels fluctuated slightly due to insect noise during evening events, and higher traffic and wind noise generated during the day.

Table 3.18-4. Existing Noise Levels at Ambient Noise Receptors for East Range Site

Receptor	Approximate Distance from nearest edge of Plant Footprint	Time of Monitoring	L_{10}	L_{50}	$L_{10\ dB}$ over State Compliance	$L_{50\ dB}$ over State Compliance
Receptor 1, Access Road Southeast of Plant	800 ft northwest	8:23 a.m.–9:23 a.m.	50 dBA	50 dBA	0 dB	0 dB
		10:12 a.m.–11:13 p.m.	49 dBA	49 dBA	0 dB	0 dB

Table 3.18-4. Existing Noise Levels at Ambient Noise Receptors for East Range Site

Receptor	Approximate Distance from nearest edge of Plant Footprint	Time of Monitoring	L_{10}	L_{50}	$L_{10\ dB}$ over State Compliance	$L_{50\ dB}$ over State Compliance
Receptor 2, Boat Landing and Park	9,200 ft southwest	9:50 a.m.–10:50 a.m.	52 dBA	51 dBA	0 dB	0 dB
		11: 30 p.m.–12:30 a.m.	50 dBA	49 dBA	0 dB	0 dB
Receptor 3, Colby Ridge Development	8,300 ft southwest	10:23 a.m.–11:23 a.m.	53 dBA	51 dBA	0 dB	0 dB
		12:40 a.m.–1:40 a.m.	50 dBA	49 dBA	0 dB	0 dB
Receptor 4, 321 Kent St, Hoyt Lakes, MN	11,500 ft south	12:30 p.m.–1:30 p.m.	52 dBA	50 dBA	0 dB	0 dB
		1:45 a.m.–2:45 a.m.	49 dBA	48 dBA	0 dB	0 dB

Source: Noise Analysis, West Range Site, SEH et al., 2005

Receptor Location 1, Access Road Southeast of Plant

Receptor 1 was the closest measurement point from the East Range Site. This location is fairly remote residing on an old township highway (6401) with no throughway.

Daytime monitoring conditions were calm with light cloud cover and variable winds. Any slight noise that was collected by the sound level meter during daytime hours was from leaves rustling through the trees and one small plane pass. Ambient noise during the nighttime hours consisted mainly of insect noise and slight winds through the surrounding woods. Results from both monitoring events fall within the MPCA thresholds for acceptable daytime and nighttime noise criteria.

Receptor Location 2, Boat Landing and Park

Receptor 2 was located along a public boat landing and city park. The sound level meter was placed near the waters edge and away from the park users.

There was no traffic entering and exiting the park. Daytime ambient noise consisted of slight winds through the surrounding woods, some slight boating traffic, and water noise. Ambient noise during the nighttime event consisted of insect noise and slight wind noise (leaves rustling). Results from both monitoring events fall within the MPCA thresholds for acceptable daytime and nighttime noise criteria.

Receptor Location 3, Colby Ridge Developments, Pospeck Lane

Receptor 3 was within a newly developed area along the southern end of Colby Lake on Pospeck Lane, adjacent the property of a medium sized residential lake home and 50 ft from the waters edge. The existing Laskin plant across the lake was a continual source of noise.

Results from both monitoring events fall within the MPCA thresholds for acceptable daytime and nighttime noise criteria.

Receptor Location 4, 321 Kent St, Hoyt Lakes

Receptor 4 was located within the southeastern neighborhoods of Hoyt Lakes, directly south of the proposed plant site.

Both daytime and nighttime monitoring sessions were quiet with the occasional car passing though the neighborhood. Additionally, during daytime monitoring, lawn mower noise was slightly evident in the distance. Results from both monitoring events fall within the MPCA thresholds for acceptable daytime and nighttime noise criteria.

INTENTIONALLY LEFT BLANK