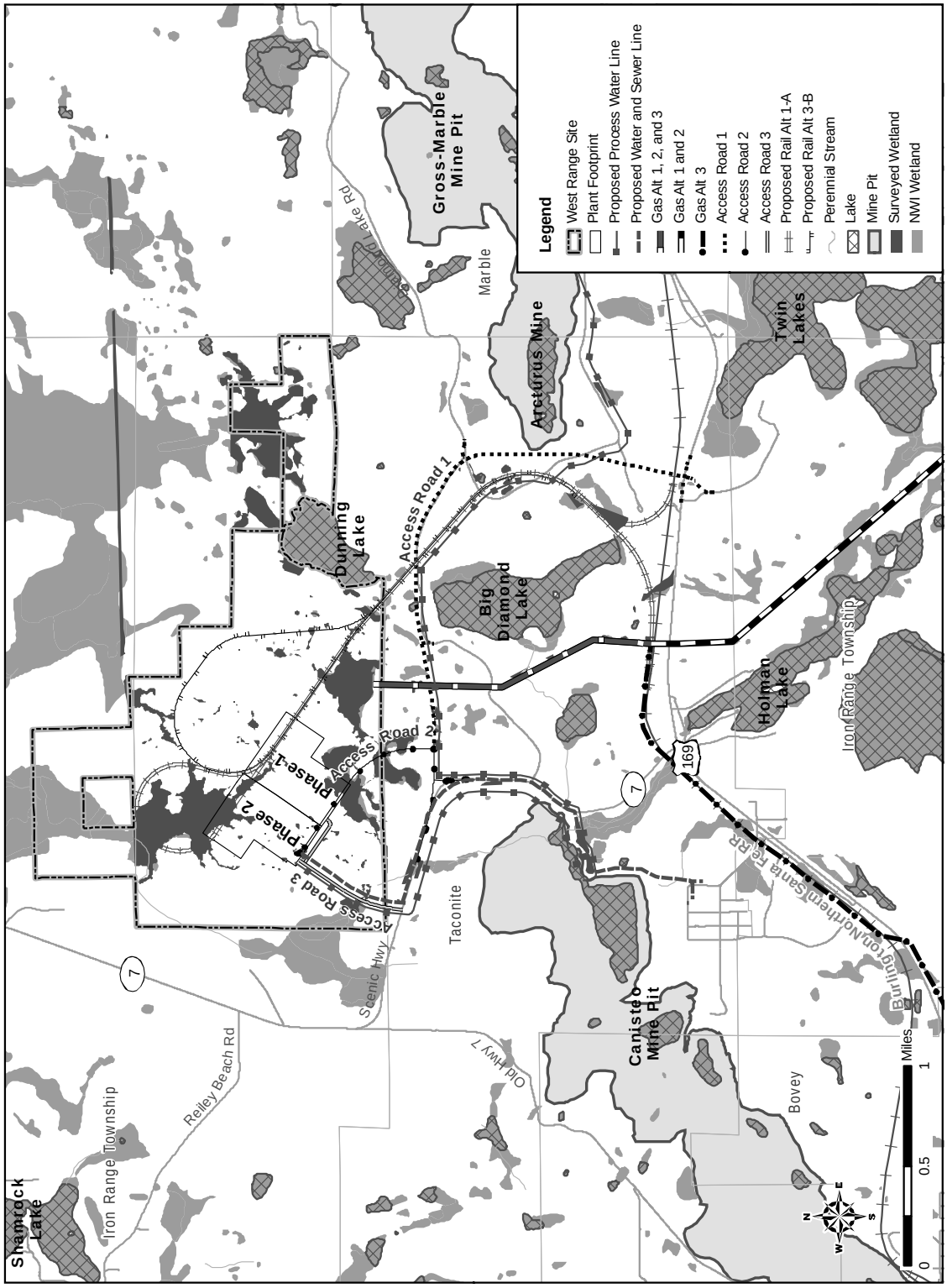

Figure 3.7-1A. Wetlands at West Range Site

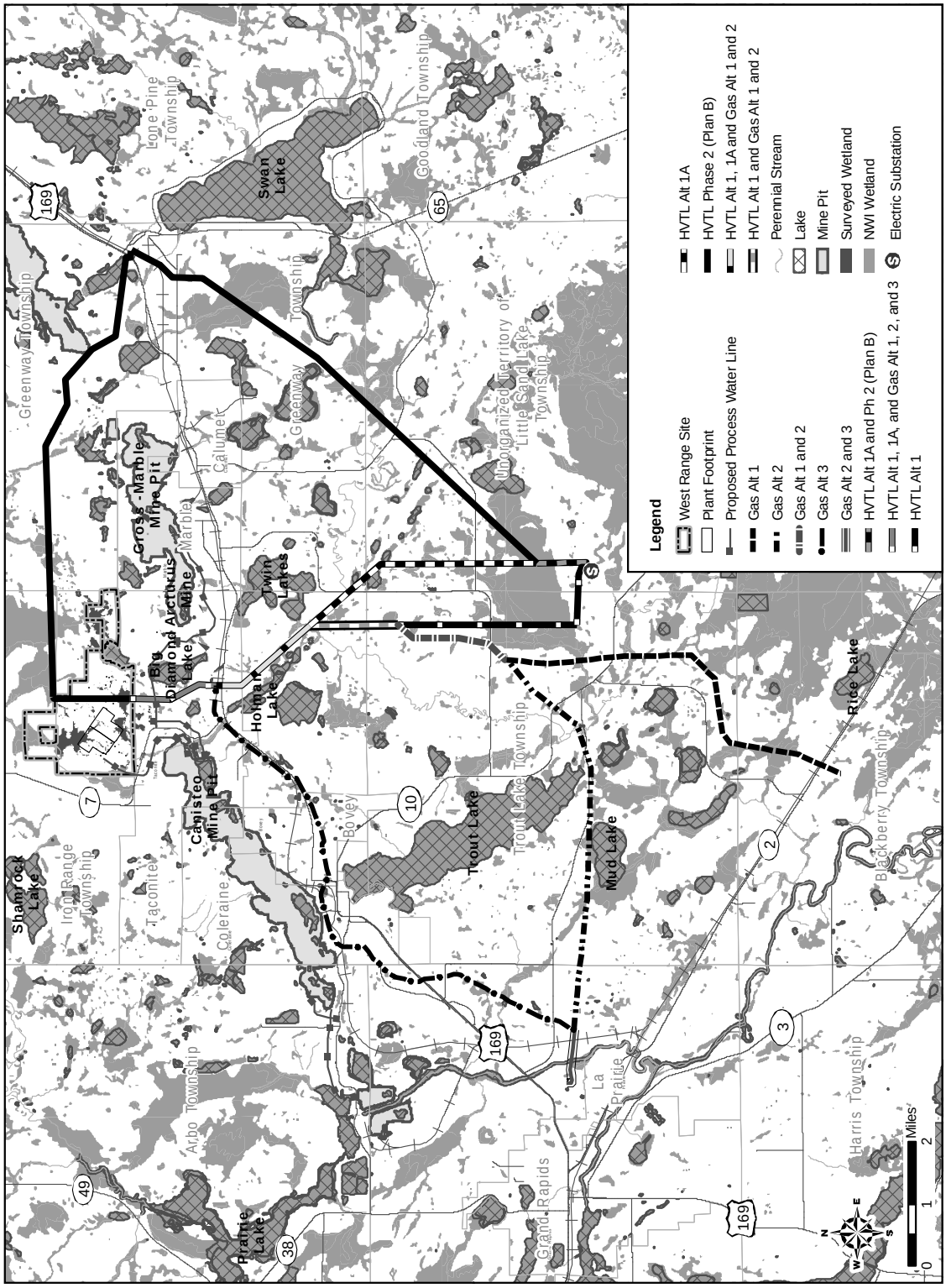

Figure 3.7-1B. Wetlands along West Range Corridors

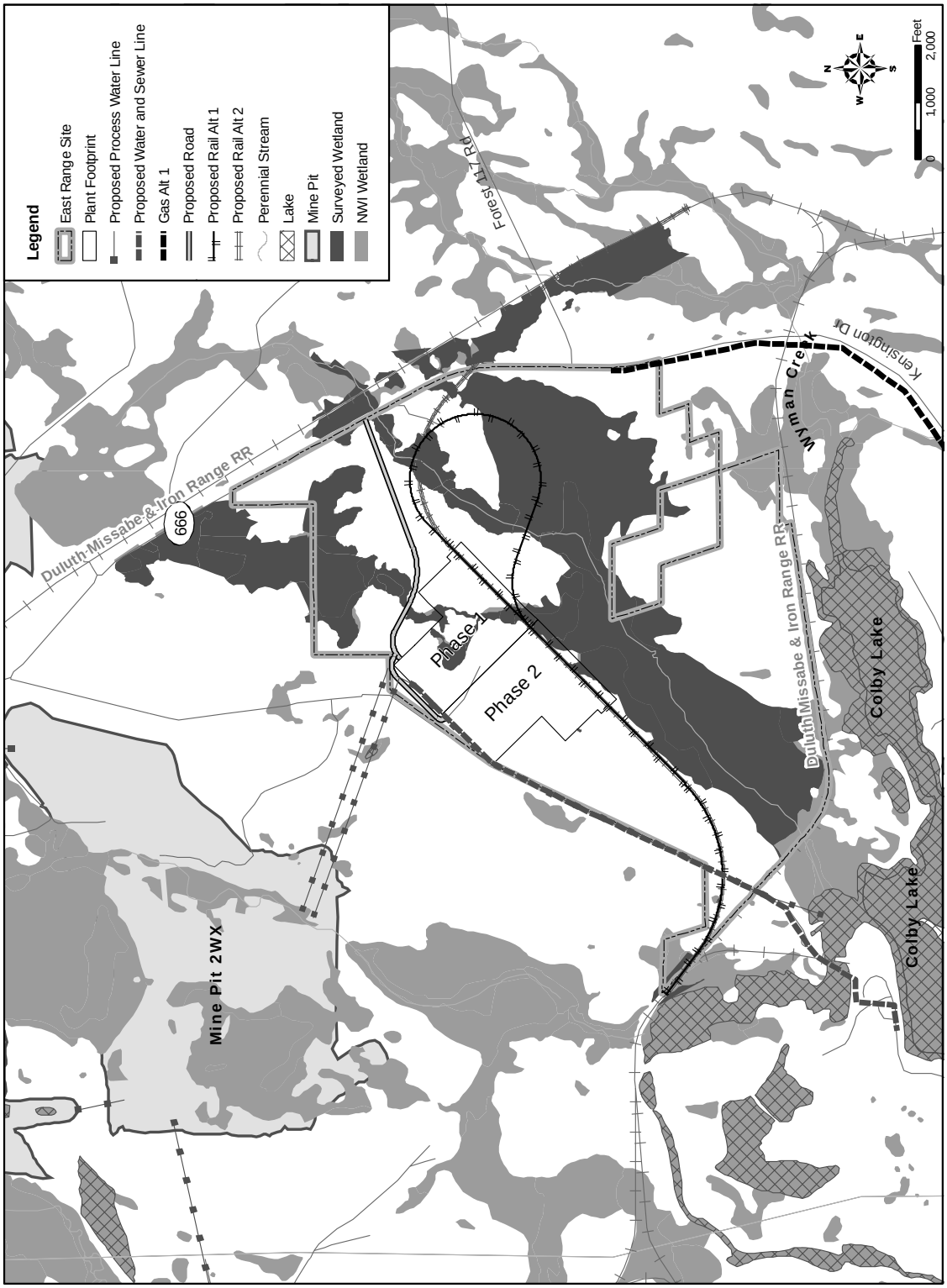

Figure 3.7-2A. Wetlands at East Range Site

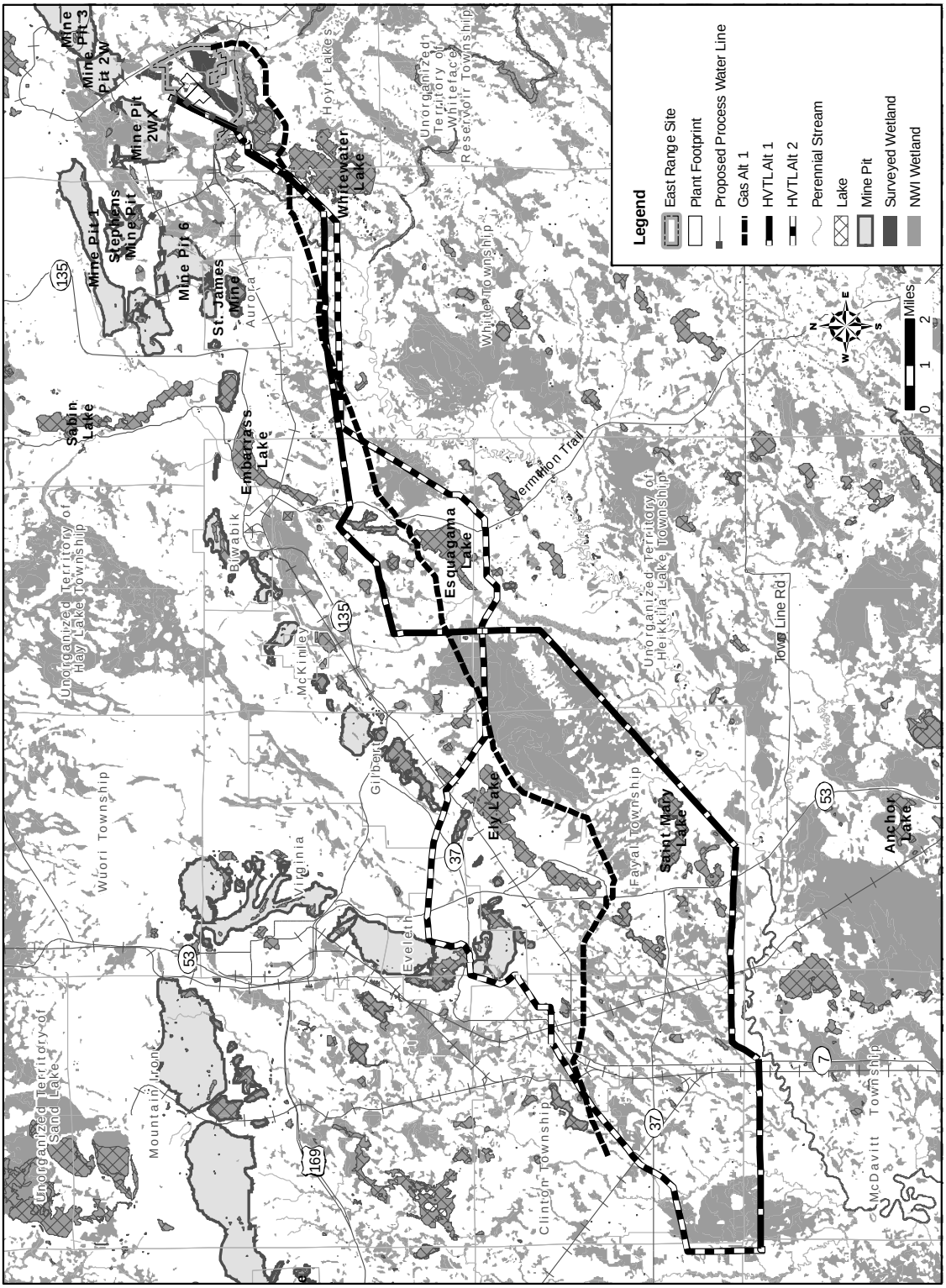

Figure 3.7-2B. Wetlands along East Range Corridors

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.

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.

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 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.

3.7.4.4 Refined Off-Site Assessment

In an effort to improve the accuracy of estimation of wetland habitat along the inaccessible linear utility corridors, an exercise comparing aerial photography, hydric soils, and the NWI was performed along the gas pipeline corridor. The exercise included assessment of the entire length of pipeline corridor inaccessible to field investigation.

Where the NWI identified wetland habitat, aerial photography was interpreted to confirm and refine wetland boundaries. Where hydric soils mapping identified hydric soils, with or without NWI wetland identification, aerial photograph interpretation was used to identify the presence of wetlands and to estimate wetland boundaries if present. NWI wetland classifications were maintained where defined, and signatures on the aerial photography used where NWI classification was unavailable.

The result of the exercise provided a refined inventory of wetlands along the gas pipeline corridor. This inventory differed only slightly from the NWI, and resulted in an overall reduction of wetland habitat within the West Range corridor from 30.07 acres to 28.29 acres, a difference of less than six percent. The exercise reduced the amount of wetland represented by the NWI and added only 0.50 acres of previously unidentified wetland along the length of the 15-mile corridor. A similar exercise was performed on a 15-mile segment of gas pipeline corridor for the East Range Site with similar results.

The refined NWI data was used to estimate temporary impacts associated with the gas pipeline. Because the level of effort required to refine wetland habitat estimates using aerial photography and hydric soils mapping did not provide substantial differences in the wetland inventory, further use of this methodology on the HVTL and other inaccessible corridors was not performed. It is assumed that the NWI provides a reasonable estimate of wetlands in areas not yet field delineated.

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

A total of **108** wetlands and associated corridors were delineated at the West Range Site and its respective corridors (in areas where access was **available)**. Table 3.7-2 lists wetlands near the West Range Site **(revised for Final EIS)**. Section 4.7.3 includes a description of specific wetlands that may be impacted by proposed project features in the West Range Site and associated corridors.

Table 3.7-2 West Range Site Wetland Summary

ID[1]	Area within Site (Acres)	Wetland Classification			Isolated Wetland
		Cowardin	Circular 39	Eggers & Reed	
A1	78.26	PEMB, PSS1, PFO4	Type 3/6/8	Shallow Marsh, Shrub Carr, Coniferous Bog	No
A2	0.06	PFO1B	Type 7	Hardwood Swamp	Yes
A3	0.10	PFO1C	Type 7	Hardwood Swamp	Yes
A4	96.34	PFO1C/F	Type 7	Hardwood Swamp	No
A6	0.38	PEMC/PFO1C	Type 7	Hardwood Swamp	Yes
A7	0.04	PFO1C	Type 7	Hardwood Swamp	Yes
A8	0.04	PEMC	Type 3	Shallow Marsh	Yes
A9	1.18	PFO1B	Type 7	Hardwood Swamp	Yes
A10	0.17	PEMC	Type 3	Shallow Marsh	Yes
A11	0.13	PEMC	Type 3	Shallow Marsh	Yes
A12	0.35	PSS1B	Type 6	Alder Thicket	Yes
A13	0.45	PFO1B	Type 7	Hardwood Swamp	Yes
A14	0.44	PFO1B	Type 7	Hardwood Swamp	Yes
A15	0.26	PEMC/PFO1C	Type 3/7	Shallow Marsh/Hardwood Swamp	Yes
A16	0.07	PEMC	Type 3	Shallow Marsh	Yes

Table 3.7-2 West Range Site Wetland Summary

ID[1]	Area within Site (Acres)	Wetland Classification			Isolated Wetland
		Cowardin	Circular 39	Eggers & Reed	
A17	0.02	PEMC/PFO1C	Type 3/7	Shallow Marsh/Hardwood Swamp	Yes
A18	0.11	PEMC/PFO1C	Type 3/7	Shallow Marsh/Hardwood Swamp	Yes
A19	0.02	PEMC/PFO1C	Type 3/7	Shallow Marsh/Hardwood Swamp	Yes
A20	0.19	PFO1C	Type 7	Hardwood Swamp	Yes
A21	0.01	PEMC/PFO1C	Type 3/7	Shallow Marsh/Hardwood Swamp	Yes
A22	0.04	PEMC/PFO1C	Type 3/7	Shallow Marsh/Hardwood Swamp	Yes
A23	0.24	PEMC/PFO1C	Type 3/7	Shallow Marsh/Hardwood Swamp	Yes
A25	0.18	PFO1C	Type 7	Hardwood Swamp	Yes
A26	0.03	PFO1C	Type 7	Hardwood Swamp	Yes
A27	0.07	PFO1C	Type 7	Hardwood Swamp	Yes
A28	0.22	PEMC/PFO1C	Type 3/7	Sedge Meadow/Hardwood Swamp	Yes
A29	0.08	PEMC/PFO1C	Type 3/7	Sedge Meadow/Hardwood Swamp	Yes
A30	0.04	PEMC	Type 3	Shallow Marsh	Yes
A31	0.48	PFO1C	Type 7	Hardwood Swamp	Yes
A32	0.14	PEMC	Type 3	Shallow Marsh	Yes
A33	0.07	PEMC	Type 3	Shallow Marsh	Yes
A34	0.08	PEMC	Type 3	Shallow Marsh	Yes
A35	0.02	PEMC	Type 3	Shallow Marsh	Yes
A36	0.04	PEMC	Type 3	Shallow Marsh	Yes
A37	0.36	PEMC	Type 3	Sedge Meadow	Yes
A38	0.07	PSS1C/PFO1C	Type 6/7	Alder Thicket/Hardwood Swamp	Yes
A39	0.27	PEMC/PSS1C	Type 3/6	Sedge Meadow/Alder Thicket	Yes
A40	0.06	PEMC/PSS1C	Type 3/6	Shallow Marsh/Alder Thicket	Yes
B1	0.15	PFO1B	Type 7	Hardwood Swamp	Yes
B2	0.38	PFO1A	Type 7	Hardwood Swamp	Yes
B3	1.06	PFO1A	Type 7	Hardwood Swamp	Yes
B4	0.25	PFO1A	Type 7	Hardwood Swamp	Yes
B5	0.02	PFO1A	Type 7	Hardwood Swamp	Yes
B6	0.03	PFO1A	Type 7	Hardwood Swamp	Yes
B7	0.03	PFO1A	Type 7	Hardwood Swamp	Yes
B8	0.06	PFO1A	Type 7	Hardwood Swamp	Yes
B9	0.29	PFO1A	Type 7	Hardwood Swamp	Yes
B10	0.06	PFO1A	Type 7	Hardwood Swamp	Yes
B11	0.29	PFO1A	Type 7	Hardwood Swamp	Yes
B12	0.05	PFO1A	Type 7	Hardwood Swamp	Yes
B13	0.16	PFO1A	Type 7	Hardwood Swamp	Yes
B14	0.37	PFO1A	Type 7	Hardwood Swamp	Yes
B15	9.12	PEMB/PSS1C/ PFO1A	Type 2/6/7	Wet Meadow/Alder Thicket	Yes
B16	0.27	PEMC	Type 3	Sedge Meadow	Yes
B17	0.03	PEMB	Type 2	Sedge Meadow	Yes
C1	0.31	PEMC	Type 3	Shallow Marsh	No
C2	0.13	PEMB	Type 3	Shallow Marsh	Yes
C3	2.47	PEM1H	Type 5	Shallow Open Water	No
C4	71.67	PEM1H	Type 5	Shallow Open Water	No
C6	0.16	PEMC	Type 3	Shallow Marsh	No
C9	21.35	PEMC/PFOB7	Type 3/8	Shallow Marsh/Coniferous Bog	No
C10	4.89	PSS1A	Type 6	Alder Thicket	No
C11	0.88	PEM2H	Type 5	Shallow Open Water	No
C12	0.67	PSSC1	Type 6	Alder Thicket	No
C13	0.90	PSS1C/PFO1C	Type 6/7	Alder Thicket/Hardwood Swamp	No
C14	1.02	PEM2H	Type 5	Shallow Open Water	No
C15	1.36	PSS1C	Type 6	Alder Thicket	No
C16	6.12	PEMC	Type 3	Sedge Meadow	No

Table 3.7-2 West Range Site Wetland Summary

ID[1]	Area within Site (Acres)	Wetland Classification			Isolated Wetland
		Cowardin	Circular 39	Eggers & Reed	
C17	0.54	LAB2	Type 5	Shallow Open Water	No
C18	0.22	PSS1C	Type 6	Alder Thicket	No
C19	1.42	PEM2H	Type 5	Shallow Open Water	No
C20	0.13	PEMC/PSS1C	Type 3/6	Sedge Meadow/Alder Thicket	No
C21	4.18	PSS1C	Type 6	Alder Thicket	Yes
C22	0.69	PSS1C	Type 6	Alder Thicket	Yes
C23	0.09	PSS1C/PFO1C	Type 6/7	Alder Thicket/Hardwood Swamp	No
C24	0.62	PFO2B	Type 8	Coniferous Bog	No
C26	0.48	PFO1C	Type 7	Coniferous Swamp	No
C27	3.05	PFO1C	Type 7	Coniferous Swamp	No
C28	1.10	PFO1C	Type 7	Coniferous Swamp	No
D1	0.02	PFO1C	Type 7	Hardwood Swamp	Yes
D2	1.64	PEMB	Type 3	Shallow Marsh	Yes
D3	0.01	PEMC/PFO1C	Type 3/7	Sedge Meadow/Hardwood Swamp	Yes
D5	0.10	PEMC	Type 3	Sedge Meadow	Yes
D6	0.09	PEMC/PFO1C	Type 3/7	Shallow Marsh/Hardwood Swamp	Yes
D8	2.61	PEMC/PFO1C/ PFO4B	Type 3/7/8	Shallow Marsh/Hardwood Swamp/Coniferous Bog	Yes
D9	1.46	PEMH/PSS1C	Type 4/6	Deep Marsh/Alder Thicket	No
D10	0.75	PEMC/PSS1C	Type 3/6	Sedge Meadow/Shrub Carr	Yes
D12	0.27	PEMC/PFO1C	Type 3/7	Sedge Meadow/Hardwood Swamp	Yes
D13	0.06	PEMC/PFO1C	Type 3/7	Sedge Meadow/Hardwood Swamp	Yes
D14	1.13	PSS1C/PFO1C	Type 6/7	Shrub Carr/Hardwood Swamp	Yes
E1	1.37	PEMC	Type 3	Shallow Marsh	No
E2	0.70	PEMB	Type 2	Wet Meadow	No
E3	0.08	PEMC	Type 3	Shallow Marsh	Yes
E4	0.67	PEMC	Type 3	Shallow Marsh	Yes
E5	0.65	PEMH	Type 8	Coniferous Bog	Yes
E6	0.42	PEMC	Type 3	Shallow Marsh	Yes
E7	1.44	PEMC	Type 3	Shallow Marsh	Yes
E9	0.19	PEMB	Type 3	Shallow Marsh	Yes
E11	18.34	PEMC	Type 3	Shallow Marsh	No
E12	5.65	PFO2C	Type 8	Coniferous Bog	No
E13	0.13	PEMC	Type 3	Shallow Marsh	No
E14	0.49	PEMC/PEMG	Type 3/4	Shallow Marsh/Deep Marsh	No
E15	0.14	PEMC	Type 3	Shallow Marsh	Yes
E16	0.15	PEMC	Type 3	Shallow Marsh	Yes
E17	0.76	PEMC	Type 3	Shallow Marsh	Yes
E18	8.24	PEMC	Type 3	Shallow Marsh	No
F1	3.52	PSS1C/PFO1C	Type 6/7	Alder Thicket/Hardwood Swamp	No
F2	0.06	PEMC/PFO1C	Type 3/7	Shallow Marsh/Hardwood Swamp	Yes
Total	**369.32**				

[1] The ID numbers in this table correspond to wetland locations identified on illustrations in Appendix F2. Some wetland ID numbers were combined when it was determined that wetlands were connected or part of a large single wetland complex (e.g., A5 is now combined with A4; C5 through C8 are now one wetland).

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). 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 **369** acres (**149** hectares) of wetlands were delineated for 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. Approximately 66 acres (26 hectares) of wetlands, which either are 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 in Draft EIS has been deleted at this point. Refer to Appendix F2 for more information about wetlands in corridors.]**

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 polifolia*). 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 3.7-3 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 3.7-3. 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]

[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 near the East Range Site are listed in Table 3.7-**4 (revised for Final EIS)**. 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.

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.

Table 3.7-4. East Range Site Wetland Summary

ID	Area within Site (Acres)[1]	Wetland Classification[2]			Isolated Wetland
		Cowardin	Circular 39	Eggers & Reed	
A	0.08	PEMC	Type 2	Sedge Meadow	Yes
B	5.53	PFOC	Type 7	Coniferous Swamp	No
C1	18.18	PSS1B	Type 6	Alder Thicket	No
C2	2.09	PFO2B	Type 8	Coniferous Bog	No
C3	28.23	PFO2B	Type 7	Coniferous Swamp	No
C4	62.90	PEMH	Type 4	Deep Marsh	No
C5	3.03	PEMB	Type 2	Fresh Wet Meadow	No
C6	80.52	PFO1B	Type 7	Hardwood Swamp	No
C7	172.29	PSS1B	Type 6	Hardwood Swamp - Logged	No
C8	24.86	PEMC	Type 3	Shallow Marsh	No
C9	174.03	PSS1B	Type 6	Shrub Swamp	No
D	2.03	PSS1B	Type 6	Alder Thicket	No
E	14.20	PSS1B	Type 6	Alder Thicket	No
F	2.11	PFOC/PFO2B	Type 7/Type 8	Hardwood Swamp, Coniferous Bog	No
G	19.23	PFOC/PFO2B	Type 7/Type 8	Hardwood Swamp, Coniferous Bog	No
H	97.24	PEMC/PFOC/ PFO2B	Type 3/Type 7/ Type 8	Shallow Marsh, Hardwood Swamp, Coniferous Bog	No
I	4.95	PSS1B	Type 6	Alder Thicket	No
J	0.07	PEMC	Type 2	Fresh Wet Meadow	Yes
K	0.48	PFO1B	Type 7	Hardwood Swamp	Yes
Total	**712.05**				

[1] Total Wetland Area is an approximation based upon partially delineated wetland boundaries and the NWI. This acreage accounts for wetlands that were not delineated that extend beyond the established project limits.
[2] Circular 39 and Eggers and Reed classifications are assumed from the Cowardin classifications, aerial photograph interpretations, and assumptions based on known characteristics of delineated wetlands.

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-**5** 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 3.7-5. 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

[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

3.7.7 Wetland Functional Assessment

The Minnesota Routine Assessment Method (MnRAM) 3.1 (MBWSR, 2007) was completed for each wetland delineated on the West Range and East Range Sites using data collected at the time of the field wetland delineations. The MnRAM 3.1 rates overall wetland community as well as wetland functions and values using several parameters.

The Wetland Community Summary rates each wetland based upon native plant species diversity, presence of rare plant species, and presence of non-native and invasive species. Of the wetlands surveyed on the West Range, 81 percent had a high rating, 16 percent had a moderate rating, and 3 percent had a moderate/high rating. On the East Range 80 percent had a high rating and 20 percent had a moderate rating. MnRAM 3.1 Comprehensive Guidance (MBWSR, 2007) details the rating system.

The Wetland Functional Assessment Summary rates each wetland on the following parameters on a scale of low, moderate, high, exceptional, or not applicable: maintenance of hydrologic regime, flood/stormwater storage, downstream water quality protection, maintenance of wetland water quality, shoreline protection (if applicable), maintenance of wildlife habitat, maintenance of fish

habitat, maintenance of amphibian habitat, aesthetics and recreation, commercial uses (if applicable), groundwater interaction, and sensitivity to storm water. Optional questions for restoration potential and stormwater treatment needs were not answered.

The results of the MnRAM 3.1, including the Wetland Community Summary and the Wetland Functional Assessment Summary, can be found in Appendix F3.

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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 USFWS. Birds and their nests, including any songbirds or raptors that may inhabit the sites, are protected under the Federal Migratory Bird Treaty Act. **Consultation with Native American tribes is also required when a Federal Action could affect biological resources under their management. Sections 1.6.1.3 and 1.8 describe the consultation with the local Native American tribes in more detail.**

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.

Section 3.8 of this Final EIS includes additional information as compared to Section 3.8 of the Draft EIS. New Table 3.8-1 has been added, which provides detailed information about terrestrial habitats in the areas of the West and East Range Sites as well as some wildlife species that would be expected to utilize those habitats. Section 3.8.2 has been revised to include more information about aquatic biota, and Section 3.8.3 has been revised in response to the December 2008 addition of the gray wolf (*Canis lupus*) to Federal legal protection status, although it is currently unclear what the status will be in the future (see Section 3.8.3.1 for more information). Several minor changes have also been made in response to public comments received on the Draft EIS, as well as editorial revisions.

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 USDA Forest Service 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 pine (*Pinus resinosa*), white pine (*Pinus strobus*), balsam fir (*Abies balsamea*), white spruce (*Picea alba*), and aspen-birch (*Populus spp.-Betula spp.*). 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 (*Haliaeetus leucocephalus)*, Canada lynx (*Lynx canadensis)*, spruce grouse (*Falcipennis canadensis*), American bitterns (*Botaurus lentiginosus*), bobolinks (*Dolichonyx oryzivorus*), Connecticut warblers (*Oporornis agilis*), gray jays (*Perisoreus canadensis*), northern goshawks (*Accipiter gentilis*), ospreys (*Pandion haliaetus*), trumpeter swans (*Cygnus buccinators*), and northern brook lampreys (*Ichthyomyzon fossor*) (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 (*Pinus banksiana*), and red and white pine. Lowland areas contained conifer swamps and bogs. At present, forestry is the most important land use, and quaking aspen (*Populus tremuloides*) 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 (*Dendroica caerulescens*), common loons (*Gavia immer*), gray jays, and heather voles (*Phenacomys intermedius*) (MNDNR, 2006c).

Table 3.8-1 (new in Final EIS) provides descriptions of the ECS habitat types existing in the areas of the West and East Range Sites. Also included are the Species in Greatest Conservation Need (SGCN), as defined by the MNDNR, that typically utilize those habitat types.

Table 3.8-1. Wildlife Species Assemblages by Habitat Association

ECS Habitat Code and Name*	Definition	SGCN Species*
APn80 - Northern Spruce Bog	Includes bogs dominated with black spruce trees (*Picea mariana*). Trees are usually stunted (< 30 feet tall) with 25 – 75% coverage. The understory is dominated by Sphagnum moss (*Sphagnum sp.*) and fine-leaved graminoids such as cotton grass (*Eriophorum vaginatum*) and sedge species (*Carex spp.*) Low-shrubs, such as cranberry species (*Vaccinium sp.*) and Labrador tea (*Ledum groenlandicum*) comprise approximately 25% of the canopy	**Mammals** ***Lynx canadensis* – Canada lynx** *Canis lupus* – grey wolf *Phenacomys intermedius*– heather vole *Snaptomys borealis* – N. bog lemming **Birds** *Chodeiles minor* – Common nighthawk *Contopus cooperi* – olive-sided flycatcher *C. virens* – eastern wood pewee *Empidonax* - flycatchers *Melospiza georgina* – Swamp sparrow *Scolopax minor* – American woodcock **Amphibians** *Hemidactylum scutatum* – four toed salamander *Plethodon cinereus* – E. red backed salamander

Table 3.8-1. Wildlife Species Assemblages by Habitat Association

ECS Habitat Code and Name*	Definition	SGCN Species*
APn81 - Northern Poor Conifer Swamp	Includes bogs dominated by black spruce and tamarack (*Larix laricina*). Trees are usually stunted (< 33 feet tall) with 25 – 50% coverage. The understory is dominated by Sphagnum moss, fine-leaved graminoids, and low-shrubs. The tall shrub layer is dominated by speckled alder (*Alnus incana*) and willow species (*Salix spp.*). The tall and low shrub layers comprise approximately 25% coverage of the canopy.	**Mammals** ***Lynx canadensis* – Canada lynx** *Canis lupus* – grey wolf *Phenacomys intermedius*– heather vole *Snaptomys borealis* – N. bog lemming **Birds** *Chodeiles minor* – Common nighthawk *Contopus cooperi* – olive-sided flycatcher *C. virens* – eastern wood pewee *Empidonax* - flycatchers *Melospiza georgina* – Swamp sparrow *Opornis agilis* – Connecticut warbler *Scolopax minor* – American woodcock *Sphyrapicus varius* – yellow bellied flycatcher *Wilsonia canadensis* – Canada warbler **Amphibians** *Hemidactylum scutatum* – four toed salamander
APn90 - Northern Open Bog	Includes bogs dominated by low-shrubs, Sphagnum moss and fine-leaved graminoids. Graminoids species present include bog wiregrass sedge (*Carex oligosperma*), cottongrass, and miscellaneous other sedge species. Tree cover is sparse or absent (< 25%) and generally comprised of stunted black spruce and tamarack mix.	**Mammals** ***Lynx canadensis* – Canada lynx** *Canis lupus* – grey wolf *Phenacomys intermedius*– heather vole *Snaptomys borealis* – N. bog lemming **Birds** *Chodeiles minor* – Common nighthawk *Melospiza georgina* – Swamp sparrow *Scolopax minor* – American woodcock *Zonotrichia albicollis* – white throated sparrow
FPn73 - Northern Alder Swamp	Includes tall-shrub wetlands dominated by speckled alder, red-osier dogwood (*Cornus sericea*), and current species (*Ribes spp.*). The herbaceous layer is comprised of Canada bluejoint (*Calamagrostis canadensis*), fowl manna grass (*Glyceria striata*), sedge species, common marsh marigold (*Caltha palustris*), touch-me-nots (*Impatiens spp*.), and fern species (*Dryoptteris spp.*)	**Mammals** ***Lynx canadensis* – Canada lynx** *Canis lupus* – grey wolf **Birds** *Chodeiles minor* – Common nighthawk *Botaurus lentiginosus* – American bittern *Melospiza georgina* – Swamp sparrow *Scolopax minor* – American woodcock *Scolopax minor* – American woodcock

Table 3.8-1. Wildlife Species Assemblages by Habitat Association

ECS Habitat Code and Name*	Definition	SGCN Species*
FPn82 - Northern Rich Tamarack Swamp (Western Basin)	Includes wetlands dominated by tamarack trees with black spruce, red maple (*Acer rubrum*), paper birch (*Betula papyrifera*), and balsam fir (*Abies balsamea*) in the understory. Tree canopy is patchy to interrupted with 25-75% coverage. Speckle alder and willows dominate the tall-shrub layer. Sphagnum moss, Canada bluejoint grass, and sedge species comprise the herbaceous layer.	**Mammals** ***Lynx canadensis* – Canada lynx** *Canis lupus* – grey wolf **Birds** *Chodeiles minor* – Common nighthawk *C. virens* – eastern wood pewee *Empidonax* - flycatchers *Melospiza georgina* – Swamp sparrow *Scolopax minor* – American woodcock
LKi54 - Inland Lake Clay/Mud Shore	Includes inland lakes and ponds with plant communities growing in a clay, mud, or silt substrates. Vegetation cover and composition vary seasonally and from year to year dependent on water levels.	**Mammals** *Canis lupus* – grey wolf **Birds** *Chodeiles minor* – Common nighthawk *Botaurus lentiginosus* – American bittern *Gavia immer* – common loon *Haliaeetus leucocephalus* – bald eagle *Melospiza georgina* – Swamp sparrow *Scolopax minor* – American woodcock **Reptiles** *Chelydra serpentina* – snapping turtle **Amphibians** *Rana palustris* – pickerel frog

Table 3.8-1. Wildlife Species Assemblages by Habitat Association

ECS Habitat Code and Name*	Definition	SGCN Species*
MHn35 - Northern Mesic Hardwood Forest	Includes hardwood forest on well-drained to moderately well-drained soils. Tree canopy is usually continuous (> 75% cover) and comprised of sugar maple (*Acer saccharum*), basswood (*Tilia americana*), northern red oak (*Quercus rubra*) with occasional area of paper birch and quaking aspen (*Populus tremuloides*) The shrub layer includes sapling of the tree canopy species with beaked hazelnut (*Corylus cornuta*), chokecherry (*Prunus virginiana*), and balsam fir. The herbaceous layer ranges from 5 – 75% coverage and dominated by Pennsylvania sedge (*Carex pennsylvanica*), large leaved aster (*Aster macrophyllus*), and bedstraw species (*Galium spp.*)	**Mammals** ***Lynx canadensis* – Canada lynx** *Canis lupus* – grey wolf **Birds** *Chodeiles minor* – Common nighthawk *Accipiter gentiles* – N. goshawk *Buteo lineatus* – Red shouldered hawk *Catharus fuscescens* – veery *Coccocyzus erythropthalmus* – black-billed cuckoo *C. virens* – eastern wood pewee *D. castanea* – bay-breasted warbler *D. tigrina* – Cap May warbler *Empidonax*- flycatchers *Haliaeetus leucocephalus* – bald eagle *Hylocichlia mustelina* – wood thrush *Opornis agilis* – Connecticut warbler *Pheuticus ludovicianus* – rose breasted grosbeak *Seiurus aurocapillus* – ovenbird *Sphyrapicus varius* – yellow bellied flycatcher *Wilsonia canadensis* – Canada warbler **Amphibians** *Hemidactylum scutatum* – four toed salamander

Table 3.8-1. Wildlife Species Assemblages by Habitat Association

ECS Habitat Code and Name*	Definition	SGCN Species*
MHn44 - Northern Wet-Mesic Boreal Hardwood-Conifer Forest	Includes forests on generally wet-mesic to mesic soils. Tree canopy is dominated by quaking aspen, paper birch, balsam fir with occasional red maple, white spruce (*Picea glauca*), and black ash (*Fraxinus nigra*). The shrub layer is comprised of beaked hazelnut, chokecherry, and juneberries (*Amelanchier spp.*). The ground layer is dominated by large-leaved aster, bedstraw species, and Canada mayflower (*Maianthemum canadense*).	**Mammals** *Canis lupus* – grey wolf *Lynx canadensis* – Canada lynx **Birds** *Chodeiles minor* – Common nighthawk *Accipiter gentiles* – N. goshawk *Buteo lineatus* – Red shouldered hawk *Catharus fuscescens* – veery *Coccocyzus erythropthalmus* – black-billed cuckoo *C. virens* – eastern wood pewee *Dendroica cearulescens* – black throated blue warbler *D. castanea* – bay-breasted warbler *D. tigrina* – Cap May warbler *Empidonax*- flycatchers *Haliaeetus leucocephalus* – bald eagle *Hylocichlia mustelina* – wood thrush *Opornis agilis* – Connecticut warbler *Pheuticus ludovicianus* – rose breasted grosbeak *Seiurus aurocapillus* – ovenbird *Sphyrapicus varius* – yellow bellied flycatcher *Wilsonia canadensis* – Canada warbler **Amphibians** *Hemidactylum scutatum* – four toed salamander *Plethodon cinereus* – E. red backed salamander
MRn83 - Northern Mixed Cattail Marsh	Includes wetland complexes that are dominated by cattail species (*Typha spp.*). The cattails are often found is dense stands interspersed with pools of open water. Associated species are highly variable.	**Mammals** *Canis lupus* – grey wolf **Birds** *Chodeiles minor* – Common nighthawk *Botaurus lentiginosus* – American bittern *Melospiza georgina* – Swamp sparrow *Scolopax minor* – American woodcock

Table 3.8-1. Wildlife Species Assemblages by Habitat Association

ECS Habitat Code and Name*	Definition	SGCN Species*
MRn93 - Northern Bulrush-Spikerush Marsh	Include emergent marsh communities typically dominated by bulrush species (*Scirpus spp.*) and spike rushes (*Eleocharis spp.*). Associated species include pondweeds (*Potamogeton spp.*), broad-leaved arrowhead (*Sagittaria latifolia*), and bur reed (*Sparganium spp.*). Cattail species present but not dominant.	**Mammals** *Canis lupus* – grey wolf **Birds** *Chodeiles minor* – Common nighthawk *Botaurus lentiginosus* – American bittern *Melospiza georgina* – Swamp sparrow *Scolopax minor* – American woodcock
OW- Other Water Body	Includes open water body not associated with a natural body of water. An example is abandoned open pit mine filled with water.	**Mammals** *Canis lupus* – grey wolf **Birds** *Chodeiles minor* – Common nighthawk *Botaurus lentiginosus* – American bittern *Gavia immer* – common loon *Haliaeetus leucocephalus* – bald eagle **Reptiles** *Chelydra serpentina* – snapping turtle **Amphibians** *Rana palustris* – pickerel frog
WFn55 - Northern Wet Ash Swamp	Includes forested wetlands dominated (50-100% cover) with black ash primarily. Fine-bladed sedges and fern species dominate the herbaceous layer.	**Mammals** ***Lynx canadensis* – Canada lynx** *Canis lupus* – grey wolf **Birds** *Chodeiles minor* – Common nighthawk *C. virens* – eastern wood pewee *Empidonax* -flycatchers *Melospiza georgina* – Swamp sparrow *Opornis agilis* – Connecticut warbler *Scolopax minor* – American woodcock *Sphyrapicus varius* – yellow bellied flycatcher *Wilsonia canadensis* – Canada warbler **Amphibians** *Hemidactylum scutatum* – four toed salamander

Table 3.8-1. Wildlife Species Assemblages by Habitat Association

ECS Habitat Code and Name*	Definition	SGCN Species*
WMn82 - Northern Wet Meadow/Carr	Includes open wetlands dominated by dense cover of broad-leaved graminoids and/or tall shrubs. Tall shrubs include speckled alder, willow species, and red-osier dogwoods. Herbaceous layer dominated by Canada bluejoint, tussock sedge (*Carex stricta*), and lake sedge (*Carex lacustris*).	**Mammals** ***Lynx canadensis* – Canada lynx** *Canis lupus* – grey wolf **Birds** *Chodeiles minor* – Common nighthawk *Coturnicops novaboracensis – Yellow rail* *Zonotrichia albicollis* – white throated sparrow
AFXXXX - Aspen Forest1	Includes forested areas dominated primarily by sapling quaking aspen. Generally these are areas that were logged using clear cutting methods.	**Mammals** *Canis lupus* – grey wolf *Lynx canadensis* – Canada lynx **Birds** *Chodeiles minor* – Common nighthawk *C. virens* – eastern wood pewee *Empidonax* -flycatchers
XDXXOF - Old Field1	Includes native habitats that were disturbed by agricultural, development, or construction activities. The current vegetation likely dominated by non-native vegetation.	**Mammals** ***Lynx canadensis* – Canada lynx** *Canis lupus* – grey wolf **Birds** *Chodeiles minor* – Common nighthawk *Asio flammeus – Short eared owl* *Circus cyaneus* – northern harrier *Zonotrichia albicollis* – white throated sparrow
XDXXXX - Disturbed Land1	Includes primarily mine spoil areas that have not been vegetated.	**Mammals** ***Lynx canadensis* – Canada lynx** *Canis lupus* – grey wolf **Birds** *Chodeiles minor* – Common nighthawk *Asio flammeus* – Short eared owl *Circus cyaneus* – northern harrier *Zonotrichia albicollis* – white throated sparrow

***ECS – Ecological Classification System; SGCN – Species in Greatest Conservation Need**
Note: All SGCN bird species are considered migratory

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 using 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 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. 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 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 diameter at breast height of 8 to 12 inches and sugar maples averaging diameters at breast height 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, 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 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, 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-**2** describes the Land Cover Types from the LandSat-Based Land Use-Land Cover data and Table 3.8-**3** summarizes the Terrestrial Land Cover Types encountered within each utility or transportation ROW during field reconnaissance.

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 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.
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

Table 3.8-3. 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 diameters at breast height 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 (*Procyon lotor*), or large ungulates such as moose (*Alces alces*) and deer (*Odocoileus virginianus*). 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 (*Castor canadensis*) activity was prevalent, especially within the eastern half of the site. During the June 2005 field reconnaissance a gray wolf 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 often more transient than mammals, they can be observed in a variety of habitats; however, they 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-**4** 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 is the only Accipiter considered rare and is a designated sensitive species in Minnesota by the USDA Forest Service. 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 3.8-4. 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
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 sight 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 (*Pseudacris crucifer*), western chorus frog (*P. triserata*), green frog (*Rana clamitans*), and mink frog (*R. 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 viridescens*) 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, Wildlife Refuges, State Natural Areas, 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. **Pickerel Creek, which is a** designated trout stream that 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, balsam fir, white spruce, 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 and smooth brome, 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, typically located within disturbed emergent wetlands; buckthorn, honeysuckle, and black locust, typically located within disturbed forests and along forest edges; and garlic mustard and crown vetch, 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-**5** (refer to Table 3.8-**2** 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.

Table 3.8-5. 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	X	X	X	X	X	X
Gas Pipeline	X	X	X	X	X	X
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

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.

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 (*Lutra canadensis*) 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 (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 lineatus***) 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 USDA Forest Service 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. Migratory birds that may be found near the East Range Site would be comparable to those listed in Table 3.8-**4** for the West 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, Henslow's sparrows, Baird's sparrows, chestnut-collared longspurs, and Sprague's pipit. Grasslands can also provide habitat for numerous species of mammals such as Plain's pocket mice, prairie voles, and Richardson's ground squirrels; as well as herptile species such as western hognose snakes (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 Wildlife Management Areas, Wildlife Refuges, State Natural Areas, 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, Ox Hide 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. **With the exception of the CMP, which has developed a self-sustaining population of lake trout (*Salvelinus namaycush*) due to MNDNR stocking in past**

years, 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. **Pickerel Creek** flows into Swan Lake in the vicinity of the HVTL ROW at the West Range Site. **The target management fish species for Pickerel Creek is brook trout (*Salvelinus fontinalis*), which are currently stocked every other year by the MNDNR, but population surveys also indicate that low amounts of brook trout natural reproduction is occurring (Minnesota Steel, 2007).**

In recent years, Trout Lake has provided a quality northern pike (*Esox lucius*) and walleye (*Sander vitreus*) fishery and these species are the primary species of management, with black crappie (*Pomoxis nigromaculatus*) as the secondary species. A 2004 survey indicated that lake fish populations were dominated by yellow perch (*Perca flavescens*), followed by rock bass (*Ambloplites rupestris*), walleye, and bluegill sunfish (*Lepomis macrochirus*). Other species present in the lake included pumpkinseed sunfish (*Lepomis gibbosus*), northern pike, largemouth bass (*Micropterus salmoides*), and black crappie (MNDNR, 2004c).

Holman Lake has a fairly simple fish community and supports a modest fishery for panfish. Northern pike are the dominant predator. A 2002 survey revealed bluegill sunfish and northern pike as being the most abundant species, and largemouth bass are also fairly abundant. Bluegill sunfish and black crappie catch rates have typically been below the lake class average. Yellow perch abundance has typically been very low in Holman Lake. Other species sampled in the 2002 assessment included black and yellow bullhead (*Ameiurus* spp.), rock bass, pumpkinseed sunfish, bigmouth buffalo (*Ictiobus cyprinellus*), and bowfin (*Amia calva*) (MNDNR, 2002).

Upper and Lower Panasa Lakes are connected through an inlet, and both are affected by mining activities in the watershed. Lower Panasa Lake is managed primarily for walleye, northern pike and panfish (MNDNR, 1998a). Walleye fry are stocked in Lower Panasa Lake and are thought to migrate to Upper Panasa Lake, which is fished for walleye, northern pike, and black crappie (MNDNR 1998b).

The primary management species for Swan Lake are walleye and northern pike, with black crappie as the secondary species. Tullibee (*Coregonus tullibee*), rock bass, and bluegill sunfish are also present (MNDNR, 2005b).

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, largemouth bass, bluegill sunfish, and possibly walleye. Non-game species likely include bowfin, many minnows and shiners (Cyprinidae), white sucker (*Catostomus commersoni*), redhorse (*Moxostoma* spp.), bullhead, and darters (Percidae). Ox Hide Lake, like many of the lakes in the region, supports northern pike, largemouth bass, panfish, and yellow perch.

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 larger trout tend to prey on smaller fish. They spawn 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).

Invertebrate populations in streams around the project area, e.g. Pickerel Creek, generally indicate moderate to good water quality. Genera that are typically representative of good water quality include caddisflies (Family Tricoptera), mayflies (Ephemeroptera), and stoneflies (Plecoptera), which are relatively abundant in most nearby waterways (MNDNR and USACE, 2007).

3.8.2.2 East Range Site

Several small streams and one lake are located near 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 **2005** identified Colby Lake as being generally below average in terms of fish abundance as compared to other lakes in the region**, but also showed a recent increase in bluegill sunfish and channel catfish (*Ictalurus punctatus*) numbers**. Fish populations in **2005** were dominated by bluegill sunfish**,** followed by **black crappie,** northern pike, **channel catfish,** yellow perch, and white sucker.

Other species were present in low numbers, including walleye, yellow bullhead (*Ameiurus natalis*), rock bass**, and largemouth bass** (MNDNR, 2006h).

Mine pits in the East Range vicinity are all located on **former** 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.

Invertebrate populations in streams around the project area generally indicate moderate to good water quality. Genera that are typically representative of good water quality include caddisflies (Family Tricoptera), mayflies (Ephemeroptera), and stoneflies (Pliecoptera), which are relatively abundant in most nearby waterways (MNDNR and USACE, 2007).

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).

The Federal protection status of the gray wolf in the western Great Lakes region has been affected by recent actions and is yet uncertain. In March 2007, the USFWS removed the gray wolf from the endangered species list. But, in September 2008, the U.S. District Court for the District of Columbia overturned that decision, and the USFWS issued a rule in December 2008 to comply with court orders reinstating regulatory protections for the gray wolf in the western Great Lakes and northern Rocky Mountains. The rule reinstated the listing of the gray wolf in Minnesota as threatened and reinstated the former designated critical habitat for gray wolf in Minnesota. Subsequently, on January 14, 2009, the Department of the Interior announced the removal of the gray wolf in the western Great Lakes and portions of the Northern Rocky Mountains from protection under the Endangered Species Act. However, that decision was not published in the *Federal Register* before it was placed under review by the new Presidential administration on January 20, 2009 (USFWS, 2009). On June 29, 2009, the USFWS announced they had reached a settlement agreement with plaintiffs in a lawsuit challenging the removal of Endangered Species Act protections from gray wolves in the western Great Lakes. The agreement provides additional opportunity for public comment on the de-listing to ensure compliance with the Administrative Procedures Act. Therefore, to comply with the court-approved settlement, at this time, gray wolves are afforded the full protection of the Endangered Species Act with threatened status. Should the USFWS choose to de-list again, they will be required to hold a 60-day public comment period prior to the de-listing (USFWS, 2009a; USFWS, 2009b).

One Federally listed species in northern Minnesota **has** been delisted **– the** bald eagle. Consultation with the USFWS is not required for delisted species. Therefore, Canada lynx **and gray wolf are** 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. USFWS 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 might affect this species.

On August 15, 2008, DOE submitted a biological assessment (BA) for the Canada lynx and a determination that the proposed action may affect, but is unlikely to adversely affect, Canada lynx or their critical habitat. In subsequent discussions, the USFWS requested that, due to uncertainty over the listing of the gray wolf, the BA be revised to include potential effects on the gray wolf. On February 25, 2009, DOE submitted the revised BA addressing impacts to both the Canada lynx and the gray wolf. As stated in this version of the BA (ENSR, 2009) (see Appendix E), "impacts associated with project habitat loss and disturbance, and collisions with vehicles and trains, could impact lynx and gray wolf. Using worst case assumptions, 618 acres of wildlife habitat would be lost within the West Range Site and associated utility and transportation corridors; 929 acres of habitat would be lost within the East Range Site and its associated corridors. Noise, light, and glare from the generating facility could cause lynx and wolves to avoid either area. Lynx and gray wolf could be hit by vehicles or trains. Other potential impacts include human encroachment in the backcountry, and increased interspecific competition facilitated by snow compaction." However, the BA concluded that given the large amount of similar habitat in the region and the low predicted density of Canada lynx and gray wolf in the area, these species and their critical habitat may be affected, but are unlikely to be adversely affected by the Mesaba Energy Project. In a letter sent on May 1, 2009, the USFWS concurred with DOE's conclusion that the proposed action may affect, but is unlikely to adversely affect, Canada lynx, gray wolf or their critical habitat at the West Range Site (Appendix E). In the event that the East Range would be selected for the Proposed Action, DOE would resubmit the BA for USFWS concurrence at the East Range site.

West Range Site

The value of habitats for Canada lynx and gray wolf are discussed in detail in the BA (see Appendix E).

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, 2005**c**), 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 9 miles west of the proposed Minnesota Steel Industries mine; therefore, it is even further toward the edge of the lynx's range.

The International Wolf Center posts on their website a database summary of wolf observations. Of the over 9,300 records in the monitoring database, no radio collared wolves were recorded within 10 miles of the West Range Site, although this may be due to a limited amount of wolf

tracking that occurs in the central portion of Minnesota (Appendix E). During field studies of the West Range Site in 2005, a grey wolf was observed preying on a deer fawn.

East Range Site

The value of habitats for Canada lynx and gray wolf are discussed in detail in the BA (see Appendix E).

The USFWS Region 3 list of Federally protected species describes St. Louis County, Minnesota as occurring 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).

The International Wolf Center database shows 32 records involving 10 wolves that have been recorded within about 10 miles of the East Range Site. Except for a single record in December 2006 and two records in 2001, all other records of wolves near the East Range Site were recorded between 1994 and 1997 (Appendix E). During field studies of the East Range Site in 2004, gray wolf tracks and scat were observed occasionally throughout the 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. 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-**6**.

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 3.8-6. MNDNR NHIS Plant Species Occurrences Near 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
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. (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 Critical Connections Ecological Services 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. The maps that accompany the Critical Connections Ecological Services 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-**7**. Species with "yes" marked in the far-right column of Table 3.8-**7** 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 3.8-7. 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)
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*	Non-status	Yes; review habitats if new alignments are proposed within mature conifer forest habitat.
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.
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.

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)
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 nine 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-**8**). 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	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

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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 **potentially** affected by construction, which**, at this time,** 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 Section 4.9, Cultural Resources (Environmental Consequences).

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 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 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. 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 Minnesota Historical Society 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 Aid 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 either were previously destroyed, declared ineligible, or are 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, **was completed in 2005**. The final report consist**s** of historical contexts for the entire Mesabi Iron Range, with brief histories of each community and a chronology of each mine. The document also provide**d** registration considerations and suggestions for resources and landscapes on the Mesabi Iron Range. Communities from Grand Rapids through Hoyt Lakes **were** considered.

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
Commercial buildings	SL-EVC-009	Grant Avenue	Not evaluated	Series of early twentieth century commercial buildings

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

Property Name	Inventory No.	Location	NRHP Status	Description
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

Sections 1.6.1.3 and 1.8 summarize the activities DOE conducted for outreach to Native American tribes during preparation of this EIS. Appendix E includes copies of correspondence received from tribal representatives. To reduce duplication, information presented in the Draft EIS was removed from this section.

The closest tribal land to the West Range Site is the Leech Lake Reservation, located about 20 miles to the West of the West Range Site, which is outside of ceded lands. The closest tribal land to the East Range Site is the Vermillion Reservation, as part of the Boise Forte tribal lands, located approximately 20 miles northwest. The Fond du Lac Reservation,is located about 55 miles to the south of the East Range Site, which lies within the 1854 Ceded Territories to which the Fon du Lac Band of Lake Superior is a signatory and has usufructuary rights (i.e., the legal right to use something belonging to another). In addition, other Native American tribes (e.g., the Boise Forte Band and Grand Portage Band of Lake Superior Chippewa and the Leech Lake Band of Ojibwe) continue to exercise guaranteed rights to hunt, fish, and gather under Treaty with the United States. The tribes believe that resources must be available and safe to use for the exercise of these rights.

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 near 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 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 **approximately 470** 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 **on Diamond Lake Road** are located within 0.25 mile of **the potential realignment of CR 7 (proposed Access Road 1** for the West Range Site**)**, the closest of which would be between 100 and 300 feet away. **The closest residence to proposed Access Road 2 would be more than 0.5 mile away. Access Road 3 would be located approximately 1,000 feet away from two residences located on CR 7 near the southwestern corner of the property boundary for the West Range Site.**

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 blowdown water discharge pipelines described in the Draft EIS would be eliminated by the proposed use of an enhanced ZLD system.**

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 near 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.

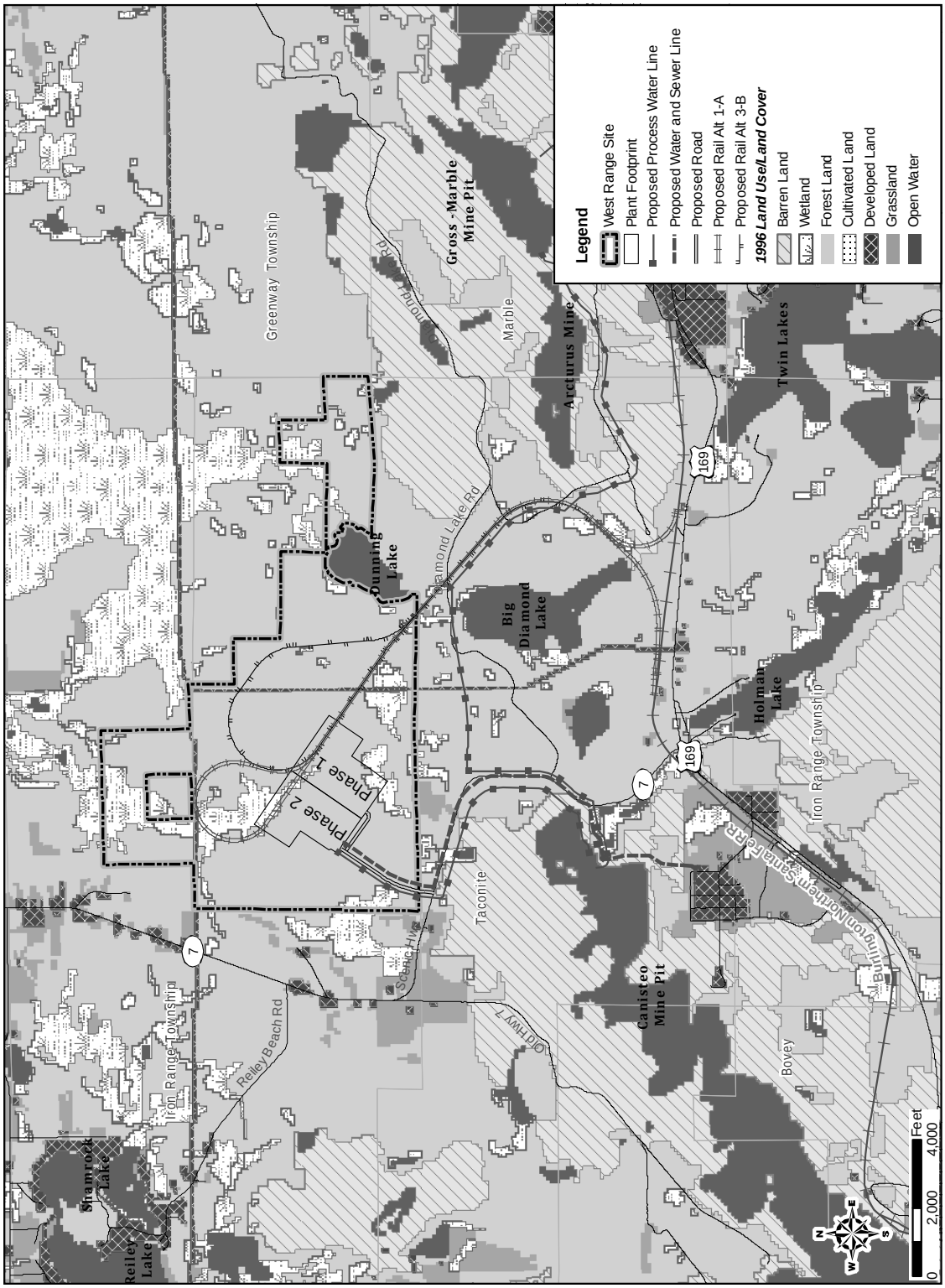

Figure 3.10-1. West Range Site Land Use/Land Cover

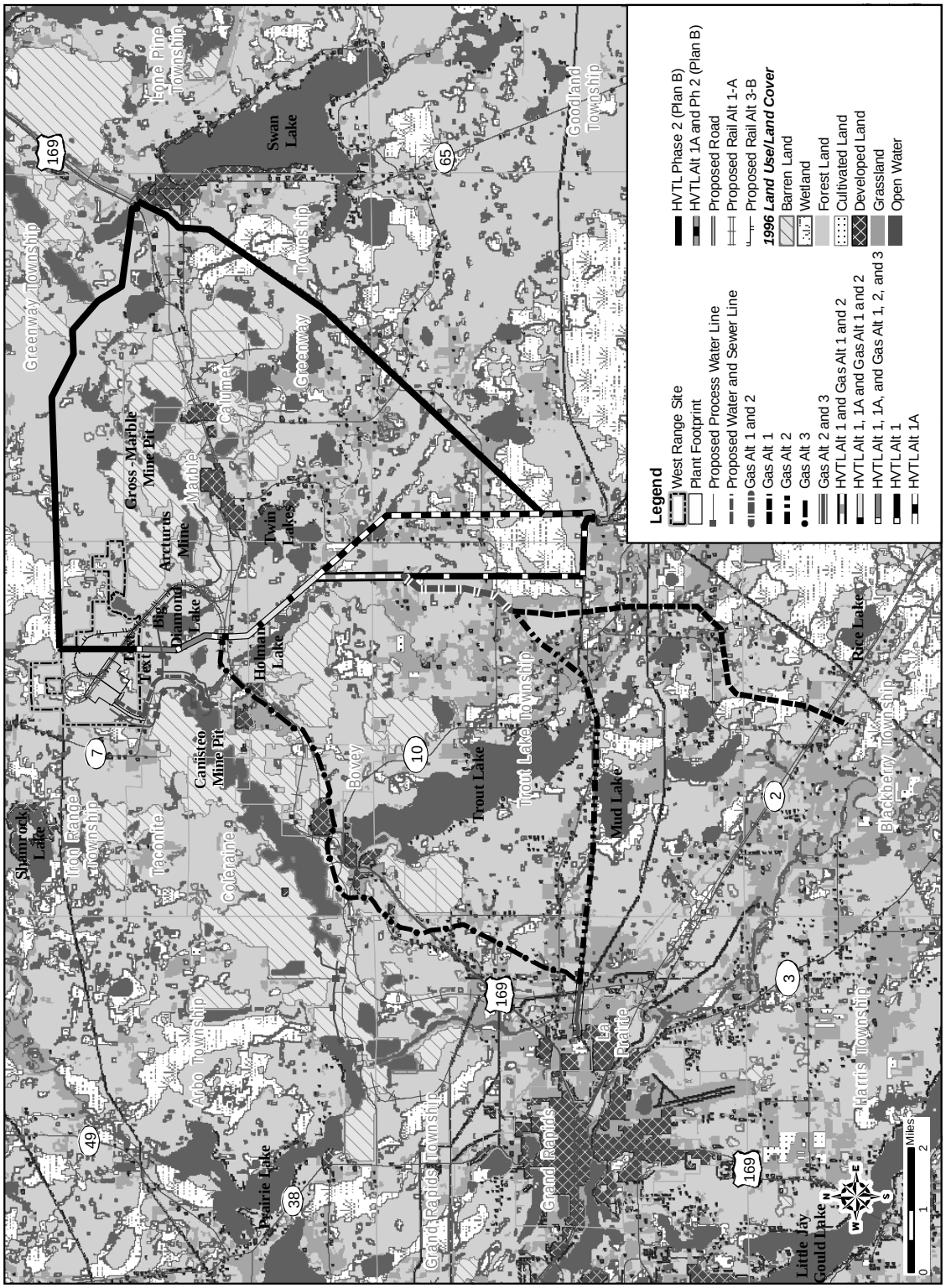

Figure 3.10-2 West Range Corridors and Land Use/Land Cover

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 near 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.

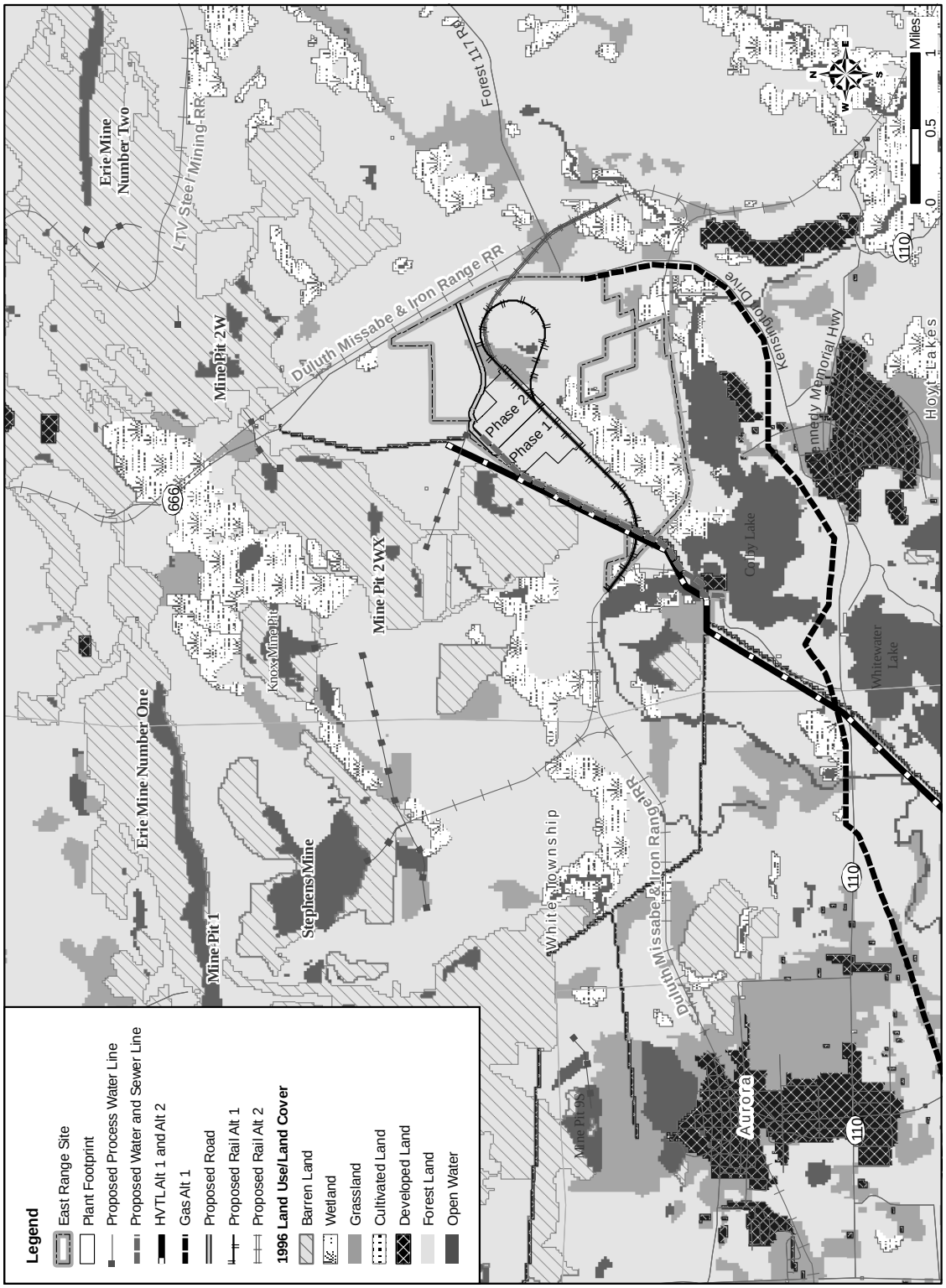

Figure 3.10-3. East Range Site Land Use/Land Cover

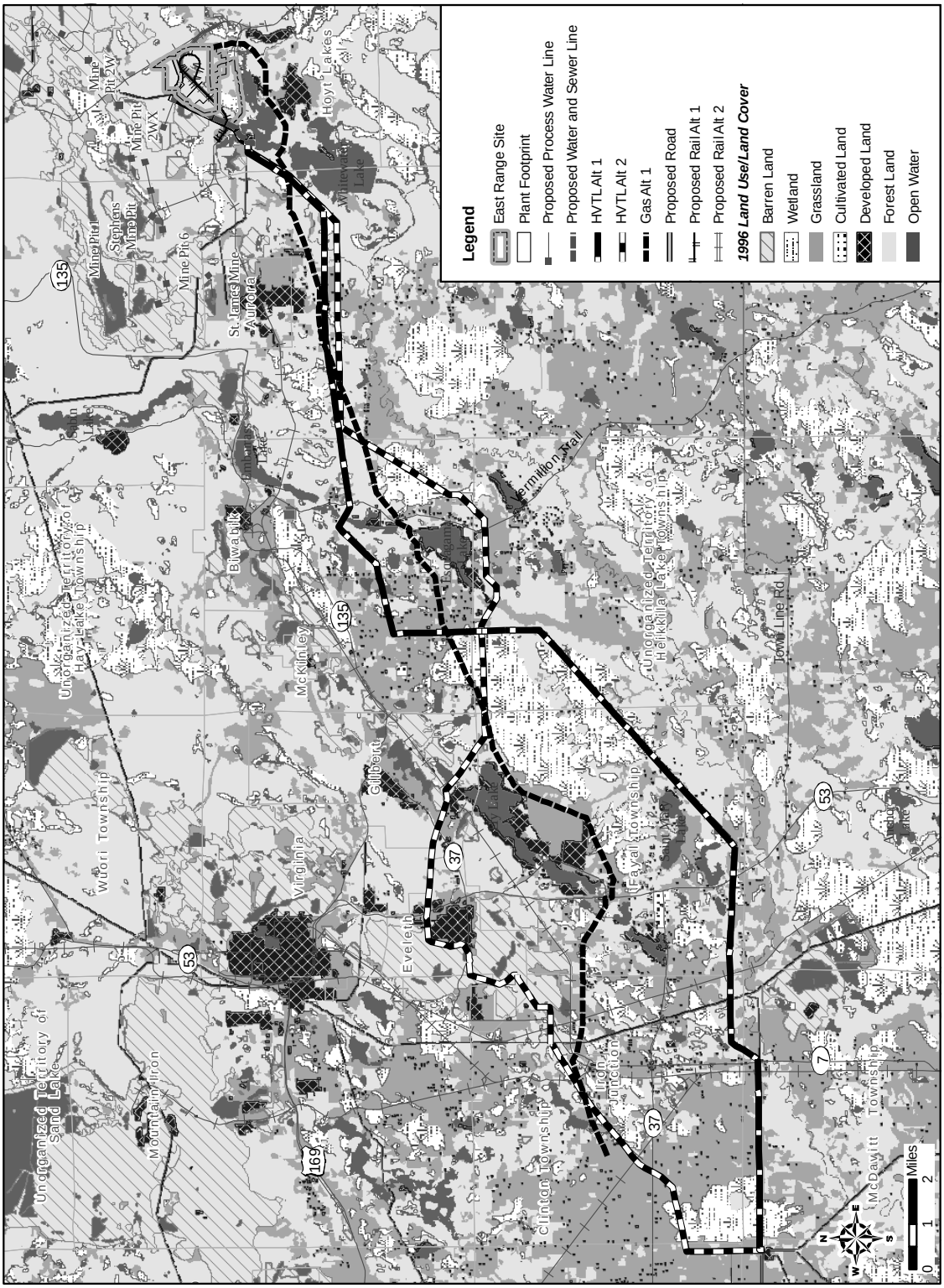

Figure 3.10-4. East Range Corridor Land Use/Land Cover

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**, formerly** owned by CE, which **contains** a mineral extraction and sales business (decorative and other specialty rock). Existing and planned industries near 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 **I**, a planned taconite processing facility permitted for development on **the former** CE property**,** approximately 3 miles northwest of the East Range Site;
- **Mesabi Nugget II, a taconite mining complex, which would supply taconite for Mesabi Nugget I, also located northwest of the East Range Site;** and
- PolyMet Mining Corporation, a precious metals mining operation planned for development on the **former** CE property**,** approximately 3 miles north of the East Range Site.

Publicly Owned Lands

Publicly owned lands near 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 near 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 near 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 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.

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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.

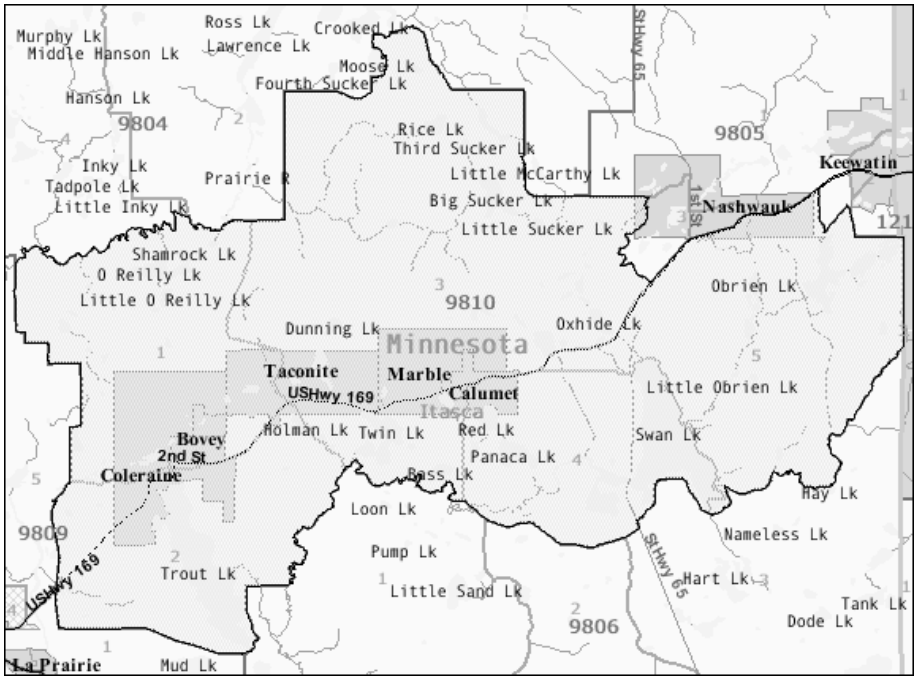

Figure 3.11-2. Census Tract 9810 in Itasca County

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.

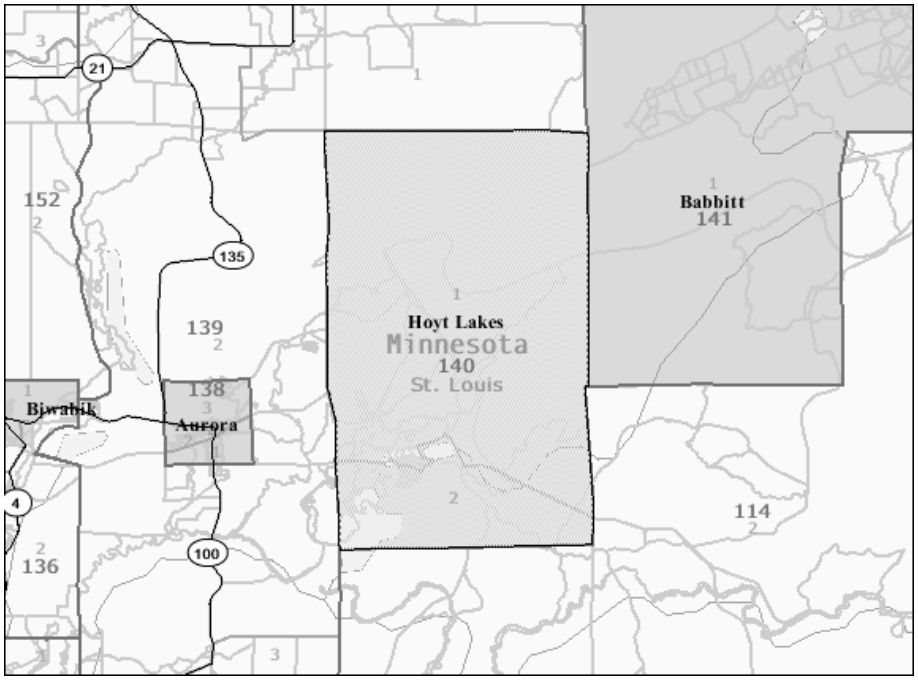

Figure 3.11-3. Hoyt Lakes (Census Tract 140) in St. Louis County

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 affect 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 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. Minnesota Department of Employment and Economic Development 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.

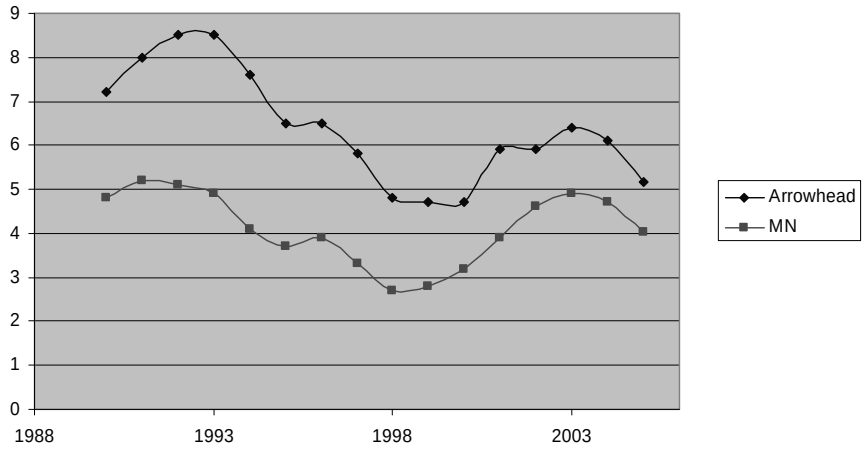

Figure 3.11-4. Annual Unemployment Rate (Percent), Arrowhead Region vs. Statewide Average

Since publication of the Draft EIS, the United States economy entered a recession in 2008. As a result, in January 2009 the national and state unemployment rates both reached 8.5 percent, while the unemployment rate in the Arrowhead Region reached 10.8 percent (DEED, 2009). These rates are not seasonally adjusted.

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). **Since publication of the Draft EIS, the unemployment rate in Itasca County reached 12.7 percent (not seasonally adjusted) in January 2009 (DEED, 2009).** 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.

Itasca County is a Federally designated HUBZone, defined as a historically underutilized business zone, because of high unemployment and low wages. HUBZones receive preferential

treatment in the awarding of Federal contracts administered by the U.S. Small Business Administration (SBA, 2008).

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 were.

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). **Since publication of the Draft EIS, the unemployment rate in St. Louis County reached 10.2 percent (not seasonally adjusted) in January 2009 (DEED, 2009).** 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– 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 **Economic** Development Corporation – This 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 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 **(which reduced its workforce from 800 to 500 in 2003)** and Grand Itasca Clinic and Hospital, as well as numerous small and medium-sized businesses in Grand Rapids and other local communities. **The Ainsworth Grand Rapids OSB Plant was closed in September 2006 with a loss of 135 jobs. In January 2009, two other Ainsworth Lumber Plants (Bemidji and Cook) were also permanently closed, eliminating approximately 280 jobs.** Near the West Range Site, **Minnesota Steel, LLC, now named Essar Steel Minnesota, is developing an integrated facility for ore processing, direct reduced iron production, and steel making based on reactivation of the Butler Taconite mine and tailing basin near Nashwauk. The facility is scheduled to be completed in 2012 and would employ an estimated 700 workers (MNDNR and USACE, 2007). S**maller 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 near 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.

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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 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 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 near 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 near 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 saturation patrol; illegal drug investigation; arson investigation; and membership on the Emergency Response Team.

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. Response activities are coordinated through the Emergency Operations Center 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 near 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. MNDNR 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). **These estimates are based on data collected by MNDNR in summer 2001 and winter 2001-2002 at a time when the lake trout fishery was still developing. MNDNR believes that fishing pressure is increasing as the lake trout fishery matures. Although the pit has been stocked almost annually with lake trout since 1993, MNDNR concluded from survey results in 2005 that natural recruitment is occurring in the lake trout population. The survey also indicated that a bass fishery is developing.**

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 the 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 WWTF 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 NPDES permit (permit # MN0053341) for this facility allows a discharge of 499,000 gallons per day of treated effluent to the Swan River. 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 WWTF collection system is near the Syl Laskin Energy Center, about a mile southwest of the East Range site. This Hoyt Lakes WWTF 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 *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 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). **The HVTL corridor MP-14L in Figure 3.14-2 represents an existing utility corridor, however the transmission line has been removed from service.**

3.14.3.4 East Range Site

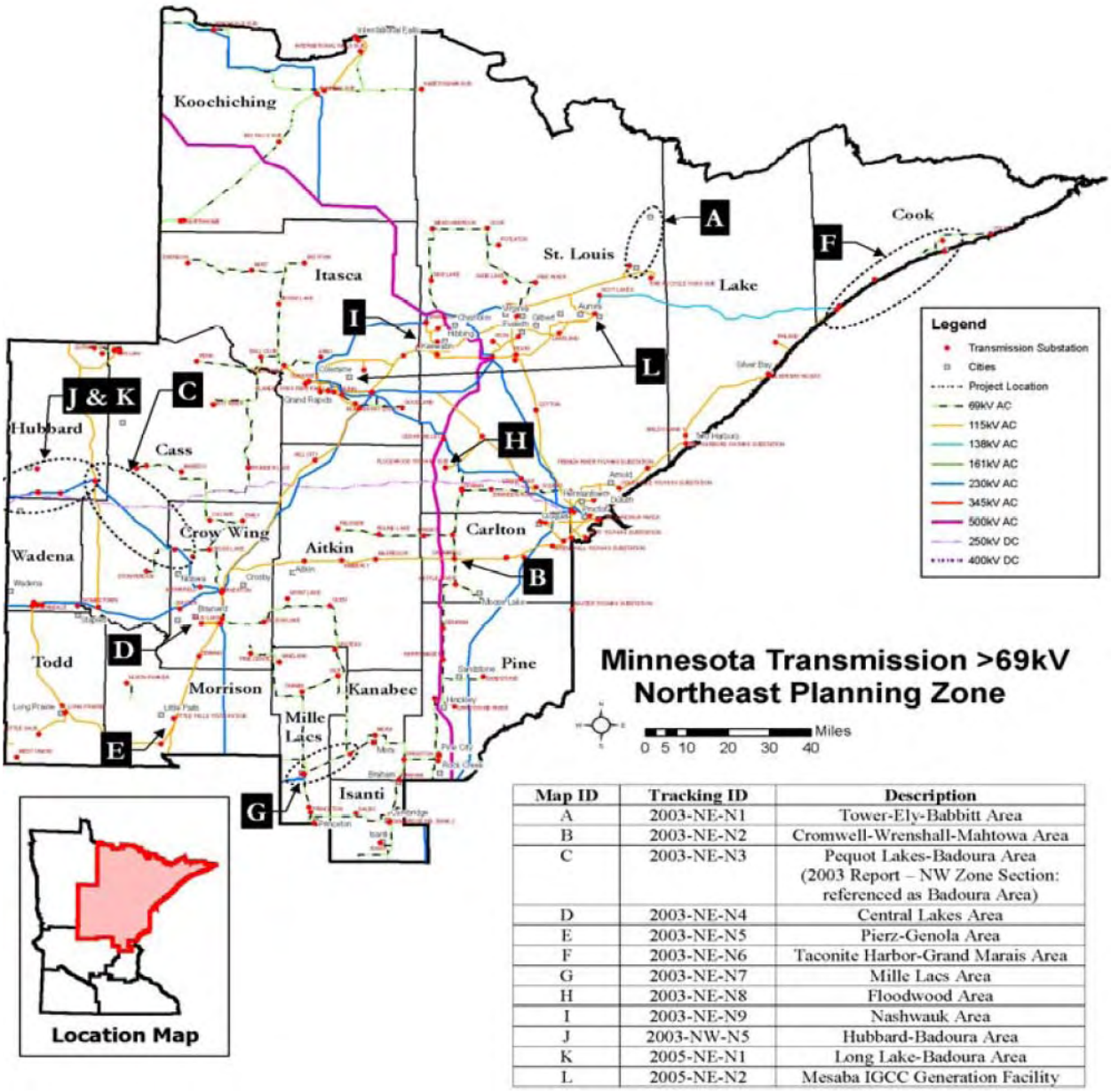
Current municipal utility providers in St. Louis County are: Hibbing Public Utilities; Northern Minnesota Utilities, Ltd.; Peoples Natural Gas Division; and Virginia Department of Public Utilities (Iron Range Resources, 2006).

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 **former** 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

Source: PUC, 2005.

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

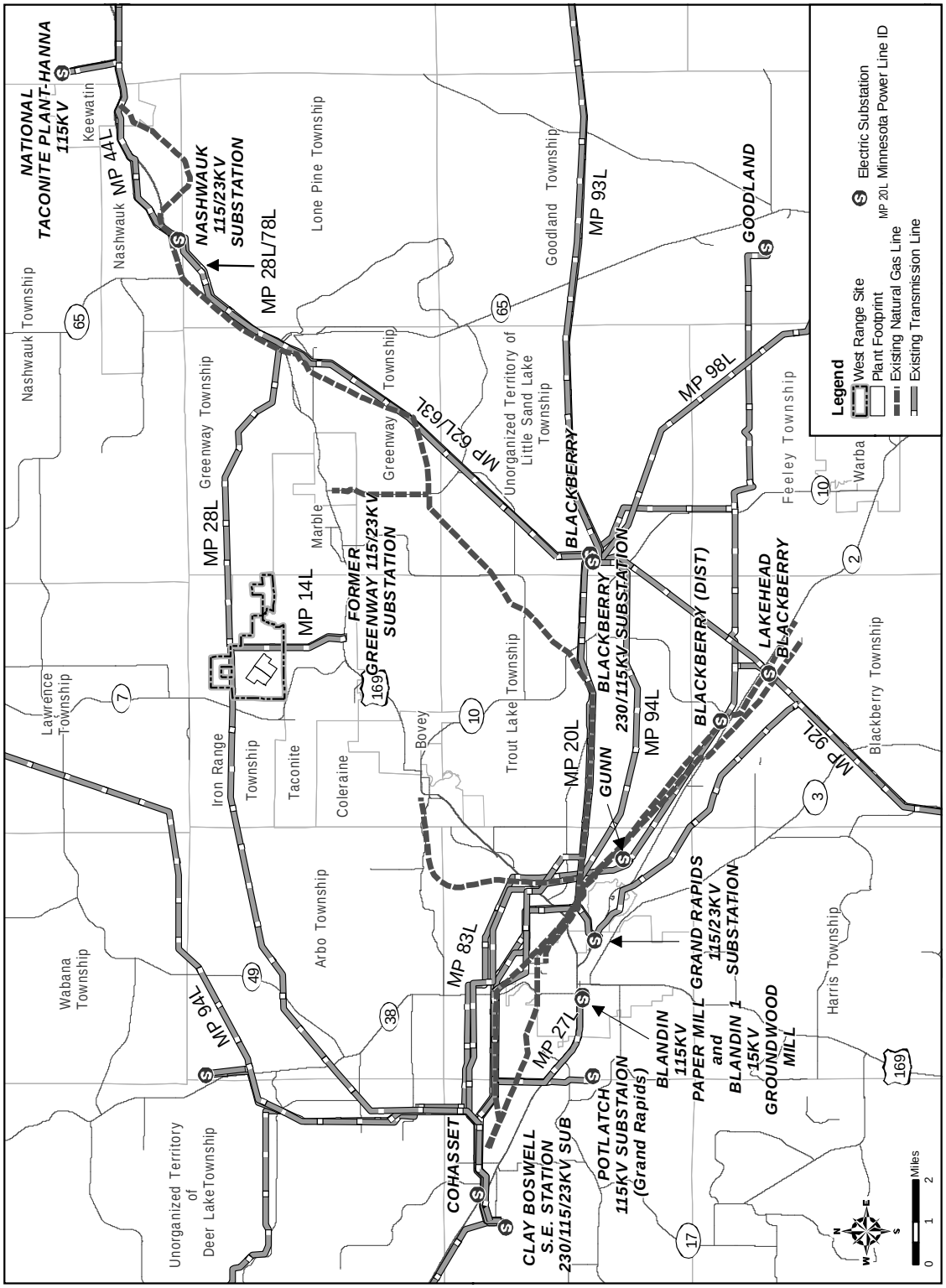


Figure 3.14-2. West Range Existing Utilities

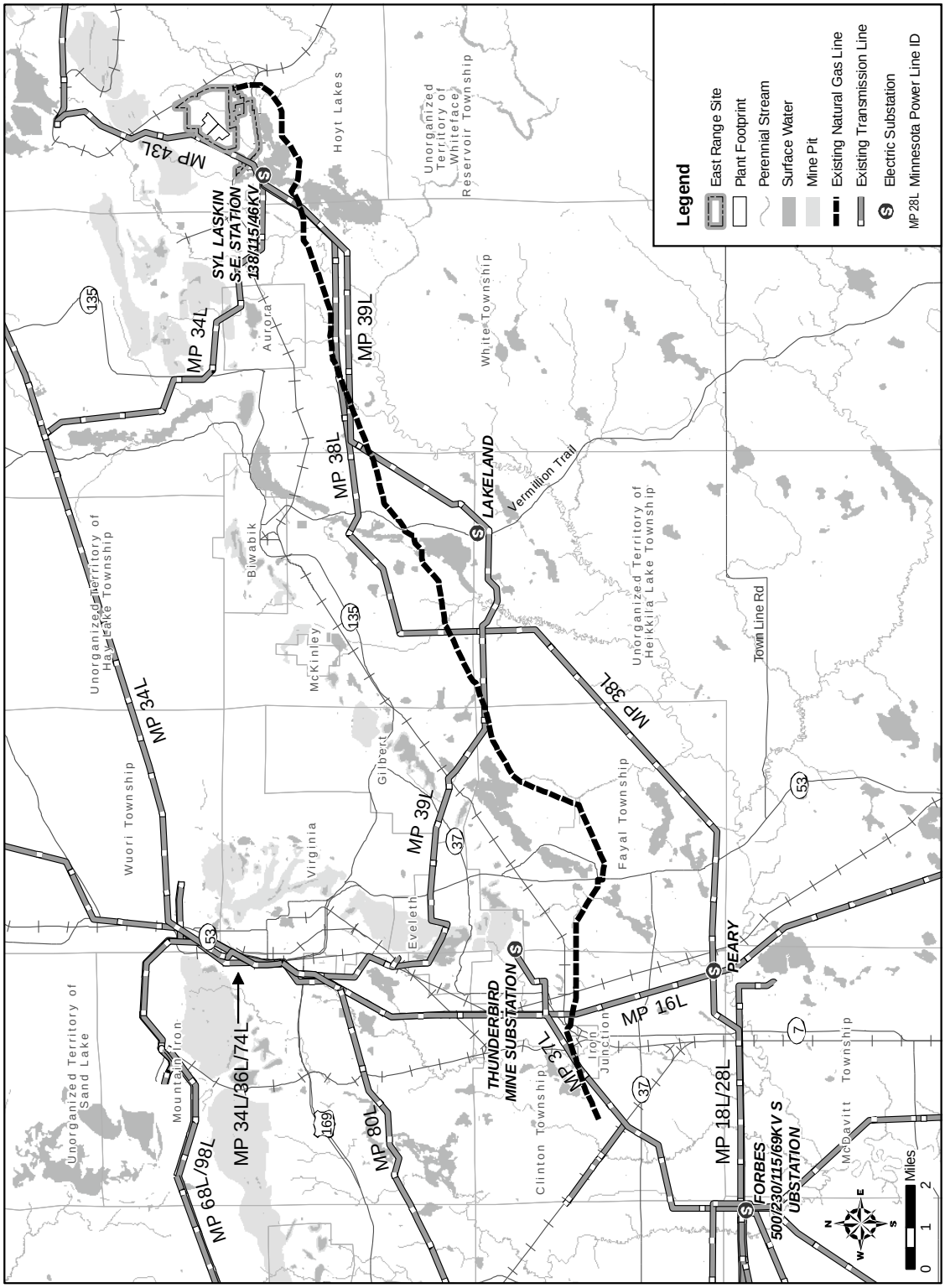


Figure 3.14-3. East Range Existing Utilities

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.

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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

Northern Minnesota's aviation infrastructure includes approximately 23 public-use airports. Scheduled commercial air passenger service is provided at **four** airports in northern Minnesota. These airports include Duluth International, Falls International, Chisholm-Hibbing, and Ely (seasonal) **[Grand Rapids deleted]**. All the airline services provided at these 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, 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.

The highway network linking major communities in northeastern Minnesota ranges from two-lane roads to four-lane, divided highways. 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, and the Northeast Minnesota Area Transportation Partnership 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 Arrowhead Regional Development Commission, 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 must 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, published by the Transportation Research Board, 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 Highway Capacity Manual 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 LOS 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 to west through Itasca County and **passes just south of** the West Range Site. 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. **Since publication of the Draft EIS, Mn/DOT realigned and expanded a portion of US 169 to four lanes between Coleraine and Taconite.** 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 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 **(named Diamond Lake 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. **Since the Draft EIS, additional traffic data for the year 2006 has been added in Table 3.15-1 to provide more recent data.**

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 Diamond Lake Road	South of Diamond Lake Road
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
2006	**7,000 (C)**	**6,500 (C)**	**1,300 (A)**	**1,300 (A)**

N/A – data not available
Source: SEH, 2006a**, SEH, 2009**

During 2004, US 169 experienced 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 **for** the year 2000 at approximately 1,100 vehicles per day **and for 2006 at approximately 1,300 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 near 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 to 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 to 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 from 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. 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 (650 miles); and
- UP Railroad (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 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).

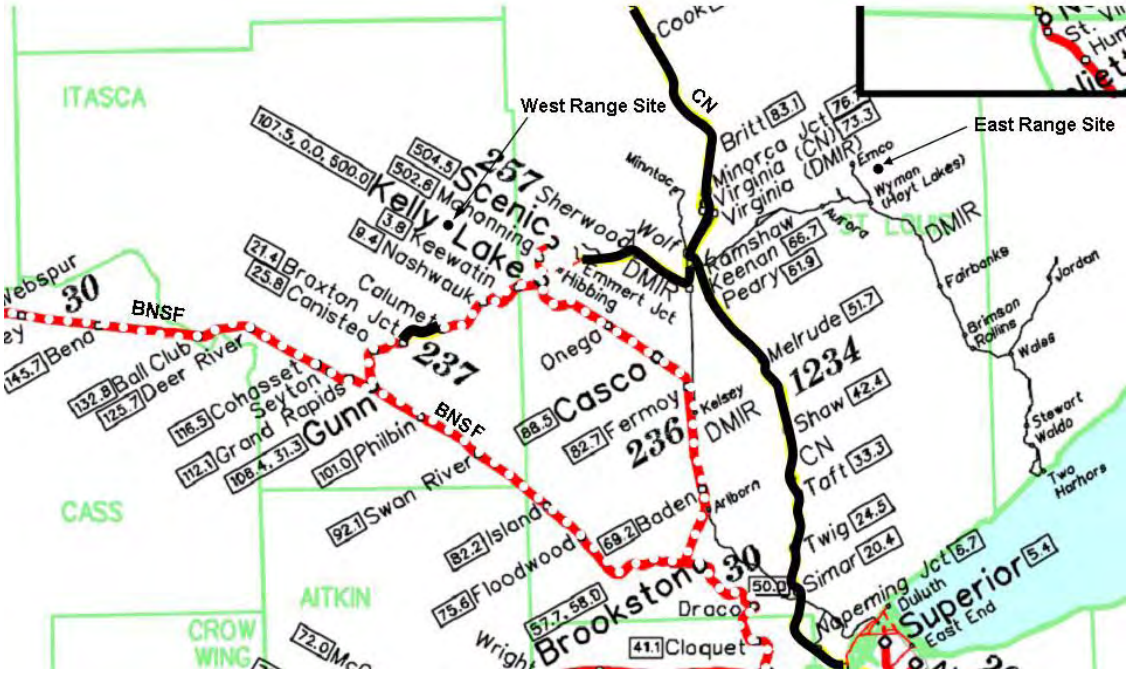

Figure 3.15-1. BNSF and CN Rail Lines in Vicinity of Project Sites (BNSF, 2005)

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 near 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).

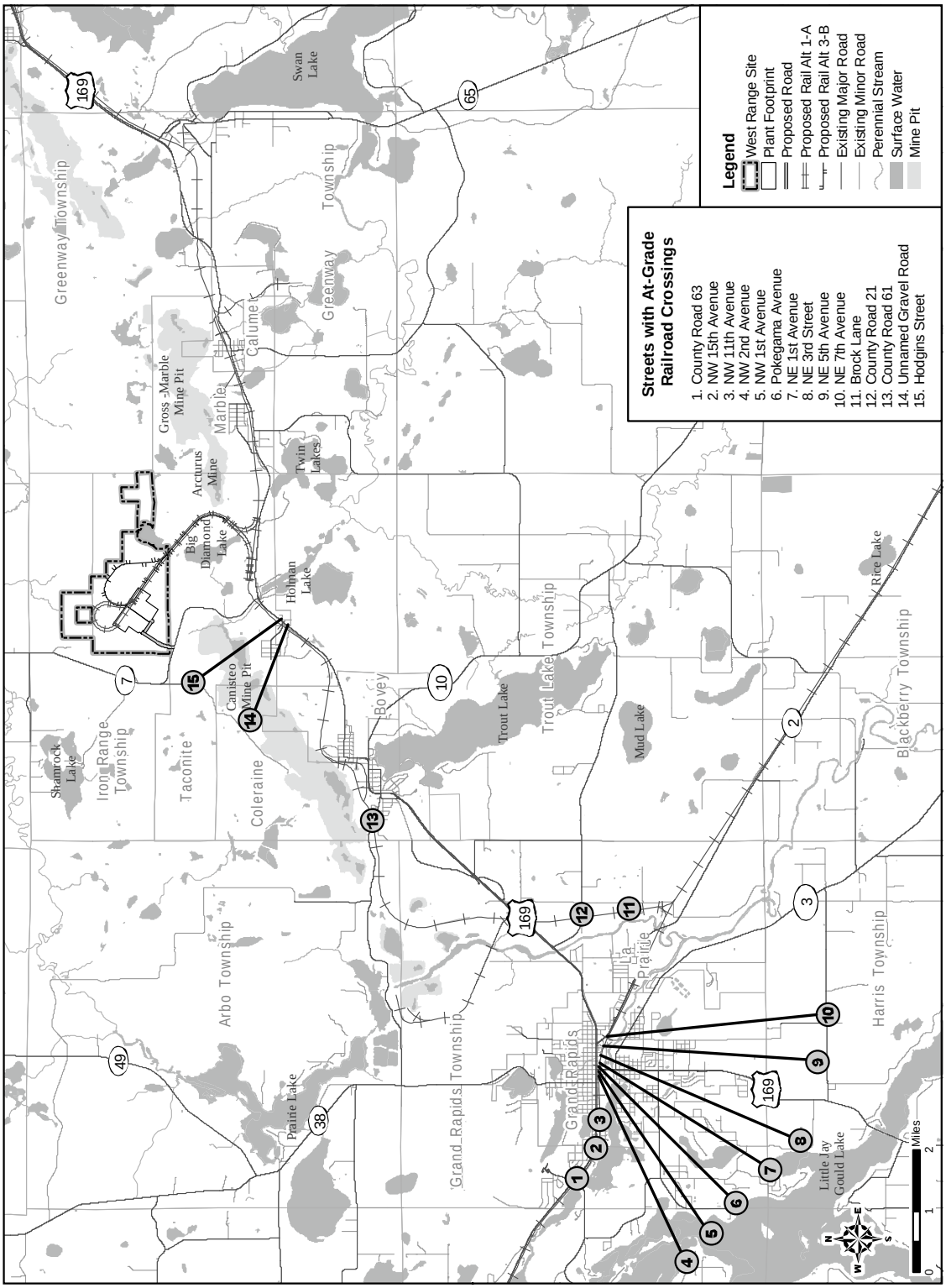

Figure 3.15-2. At-Grade Rail Crossings near the West Range

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).

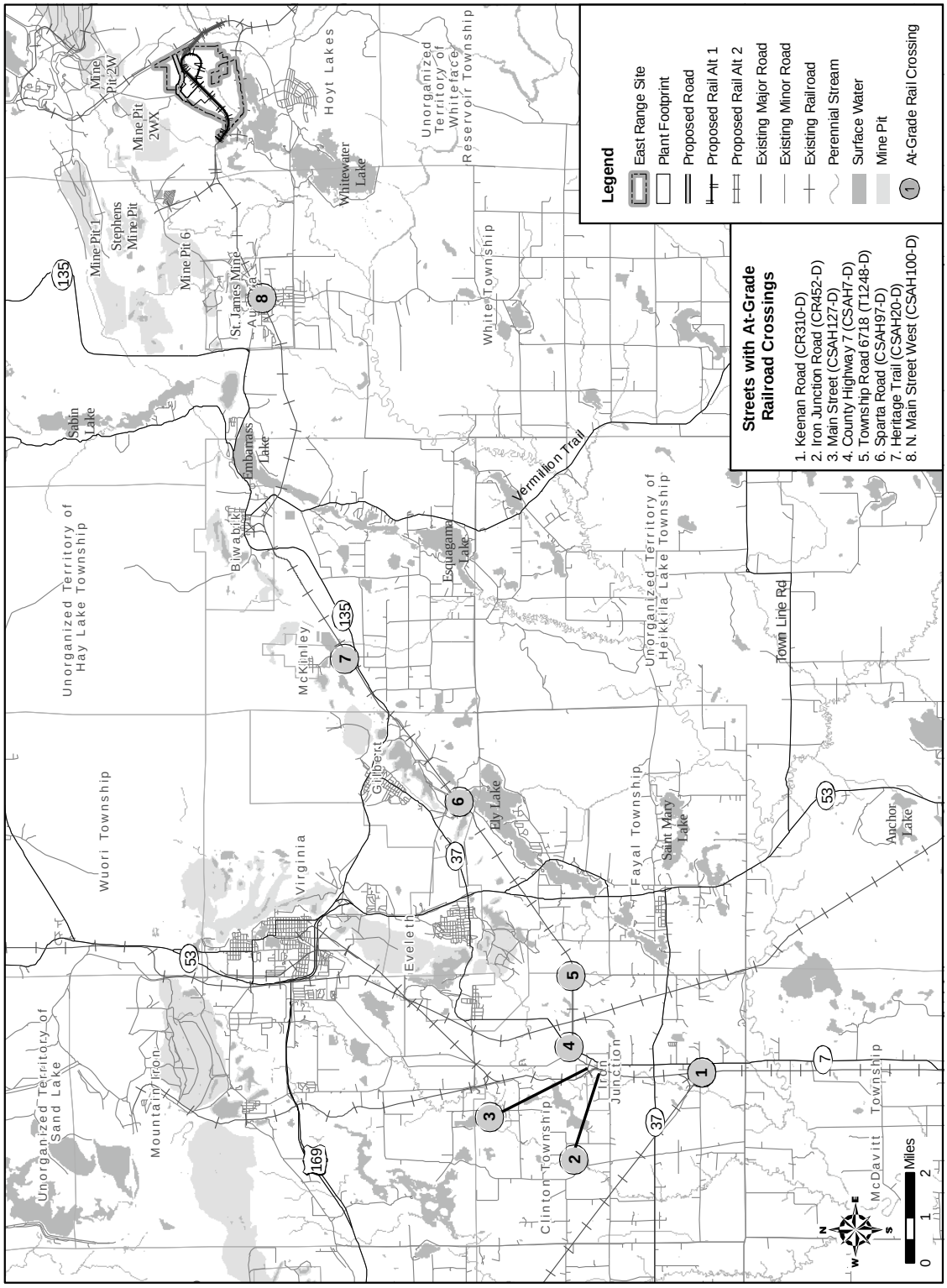

Figure 3.15-3. At-Grade Rail Crossings near the East Range Site

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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 (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)[1]

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
polychlorinated biphenyl (PCB) Treatment	767	620
Solvent Recovery	14,988	15,813

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

Facility Type	Quantity of Hazardous Waste in 1996 (tons)	Quantity of Hazardous Waste in 1999 (tons)
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

[1]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 **for the Draft EIS**) 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 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 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 **formerly** owned 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 related 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)[1]	Lost workday cases (rate per 100 FTEs)[1]	Fatalities (rate per 100,000 FTEs)[2]
Construction	5.8	2.2	14.3
Utilities	3.1	0.9	12.7[3]

Source: [1]BLS, 2004 [2]BLS, 1999
[3] 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

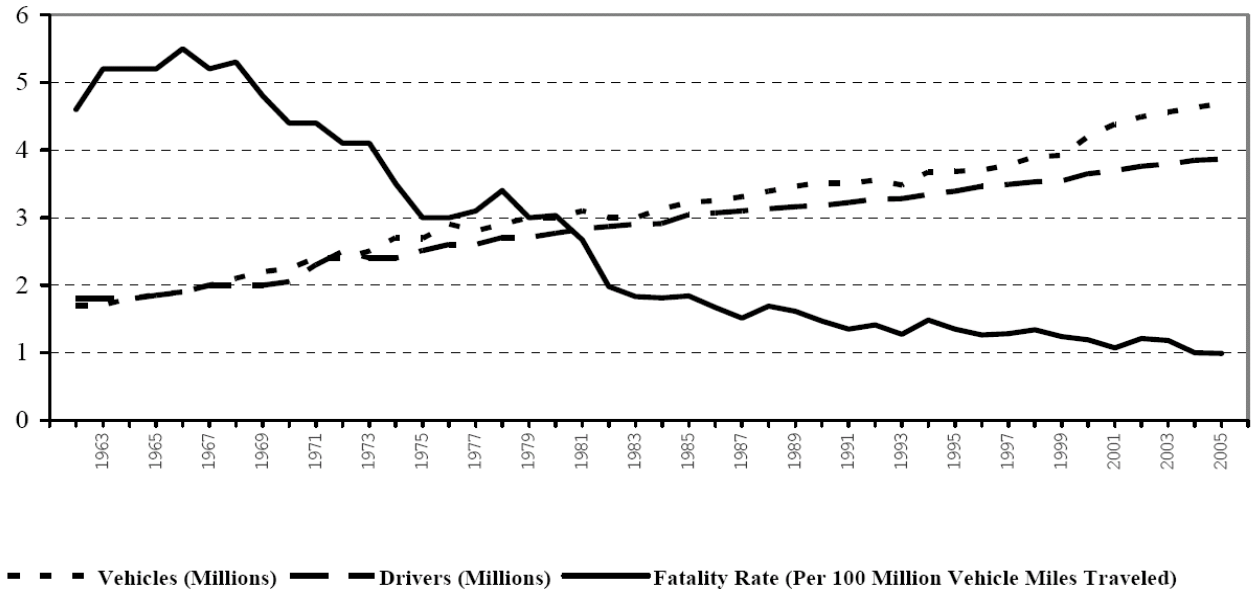
Although power plants are much safer than they once were, plant employees can still encounter workplace hazards. Among the most common hazards to power plant workers are electrical shocks, burns, boiler fires and explosions, and contact with hazardous chemicals (Hansen, 2005). According to the National 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 (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 vehicle miles of travel 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 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 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 **St. Louis** 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 locations 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

[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
Essential Hypertension and Hypertensive Renal	1.3	1.9	0.9

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)
Disease			
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**, Native American tribal communities** 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 **plant footprint**). 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 **plant footprint**, 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 **plant footprint** are located about 1 mile directly south 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 **plant footprint**. 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, 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 chemicals of potential concern 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 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 or non-ionizing radiation:

- Ionizing radiation consists of 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.
- Non-ionizing radiation is a general term for that part of the electromagnetic spectrum, which has photon energies too weak to break atomic bonds. They include ultraviolet radiation, visible light, infrared radiation, radiofrequency and microwave fields, extremely low frequency 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. This non-governmental organization evaluates scientific results from

all over the world. The International Commission on Non-Ionizing Radiation Protection 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, EMF 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 EMFs 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 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 Electromagnetic Field Health Concerns

Some people have attributed a diverse collection of symptoms to low levels of exposure to EMFs 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 EMFs (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[1]	2 kV/m	NA	150 mG[1] (max load)
	10 kV/m[2]	NA	NA	200 mG[2] (max load)
	NA	NA	NA	250 mG[3] (max load)
Minnesota	8 kV/m	NA	NA	NA
Montana	7 kV/m	1 kV/m[5]	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[6]	NA	NA	NA
	7 kV/m[4]	NA	NA	NA
Oregon	9 kV/m	NA	NA	NA

[1] For lines of 69-230 kV
[2] For 500 KV lines
[3] For 500 KV lines in certain existing ROW
[4] Maximum for highway crossings
[5] May be waived by the landowner
[6] 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 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 EMFs 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 **(WHO)** 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 EMFs, 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).

- EMFs 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 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 EMF 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 EMF 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 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. **However, a recent study (Jeffers, 2007) could not support the hypothesis that ion exposure from HVTL charges increases lung deposition of airborne particles.**

> **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.

Scientific literature clearly evidences that substantial research has been, and continues to be, conducted by academic laboratories, as well as the most qualified health research organizations in the world, including NIEHS (within the National Institutes of Health) and the WHO, into the potential health risks from EMF exposure. In spite of these efforts, there are no established health criteria or quantifiable impact assessment methods currently accepted for determining adverse effects to human health with respect to EMF exposure or the Henshaw Effect. In a very recent publication, the New Zealand National Radiation Laboratory (NZNRL, 2008) concluded: "In spite of all the studies that have been carried out over the past thirty years there is still no persuasive evidence that the [EMF] fields pose any health risks. The results obtained show that if there are any risks, they must be very small."

3.17.5.4 Existing Sources of EMF

Existing sources of EMF near each proposed site include HVTLs and substations. 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 **formerly** 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, 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).

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3.18 NOISE

This section presents the current noise conditions at and near 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[1]	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

[1]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, 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 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 Office of Surface Mining initially found that if Peak Particle Velocity 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 Peak Particle Velocity limit was changed to 0.5 inches per second to avoid off-site damage.

A Peak Particle Velocity 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, American National Standards Institute-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.

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). The thresholds for NAC-1 **and NAC-3** are listed in Table 3.18-2 **(revised since Draft EIS)** as SPL maximums by the MPCA. **All of the receptors that were analyzed for this project are represented by NAC-1, except for R1 at the East Range Site, which is represented by thresholds under NAC-3.**

Table 3.18-2. Noise Area Classification (NAC) Thresholds

	NAC-1		NAC-3	
	L_{10}	L_{50}	L_{10}	L_{50}
Daytime (7:00 a.m. to 10:00 p.m.)	65 dBA	60 dBA	80 dBA	75 dBA
Nighttime (10:00 p.m. to 7:00 a.m.)	55 dBA	50 dBA	80 dBA	75 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 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. **Locations of the noise receptors for the West Range site are shown in Figure 3.18-1 (added in Final EIS).**

Results of the ambient noise monitoring during the daytime and nighttime for the West Range Site are provided in Table 3.18-3 **(updated for the Final EIS; exceedances of state thresholds are indicated in italicized and underlined typeface)**. 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	**1,870** 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	**4,025** 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	**4,110** ft west	1:03 pm –2:04 pm	59 dBA	55 dBA	0 dB	0 dB
		11:15 pm – 12:16 am	***58 dBA***	***53 dBA***	**3** dB	**3** dB
Receptor 4, 32423 CR7	**4,650** 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	**4,300** 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

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 6. Lutheran Church	**18,060 ft southeast**	**Daytime – correlated with nearby receptors**	**52 dBA**	**50 dBA**	**0 dB**	**0 dB**
		Nighttime – correlated with nearby receptors	**50 dBA**	**49 dBA**	**0 dB**	**0 dB**
Receptor 7. Catholic Church	**9,940 ft northwest**	**Daytime – correlated with nearby receptors**	**52 dBA**	**50 dBA**	**0 dB**	**0 dB**
		Nighttime – correlated with nearby receptors	**50 dBA**	**49 dBA**	**0 dB**	**0 dB**
Receptor AAC-6, AAC-6. Near Beasley Ave., City of Taconite	**9,100 ft southwest**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
AAC-7. North side of Twin Lakes; near City of Marble	**15,000 ft southeast**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
AAC-8. Between O'Reilly Lake & Island Lake (off Reilly Beach Rd.)	**11,050 ft northwest**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

Note: Bold typeface indicates values updated for Final EIS (distances have been updated to reflect adjustment of plant footprint); Values in italics and underlined typface indicate areas in which MPCA noise thresholds have been reached or exceeded. **N/A – Not Available: Note that AAC-6, AAC-7, and AAC-8 were used in construction and rail noise impact analyses and not used for the predictive plant noise modeling discussed in Section 4.18 – no ambient noise measurements were taken for these locations.**
Source: Noise Analysis, West Range Site; SEH et al., 2005**; AAC, 2009**

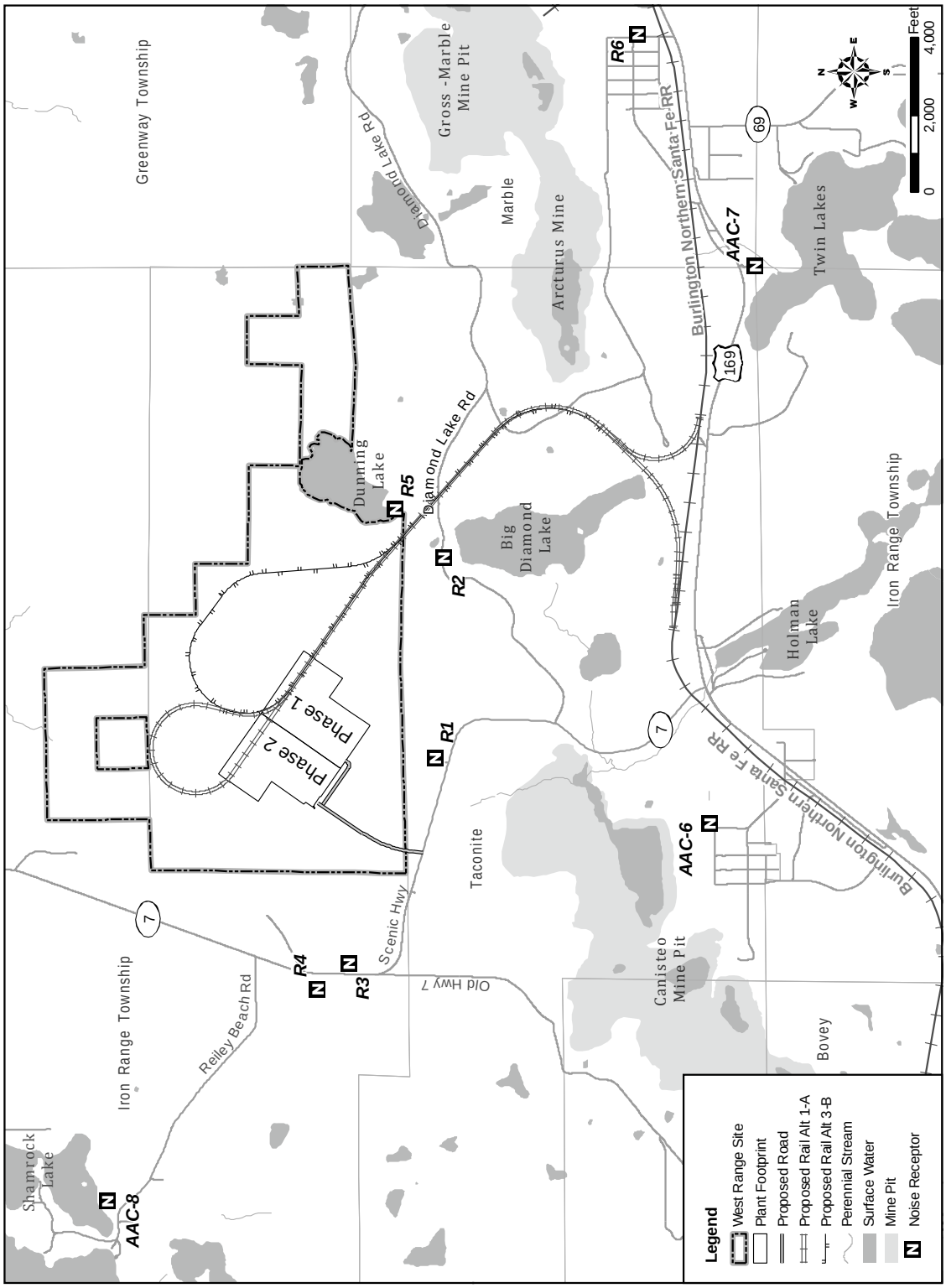

Figure 3.18-1. Noise Receptors at West Range

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 **(Diamond Lake Road)** 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 CR 7 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 exceeded MPCA noise thresholds **by up to 3 dB,** 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 **by up to 3 dB,** presumably due to their proximity to CR 7.

Receptor Location 5, Dunning Lake

Receptor 5 was located along the southern end on 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.

Receptor Location 6 (Lutheran Church) and Receptor Location 7 (Catholic Church)

For purposes of the noise modeling, R6, a Lutheran Church located 18,600 feet southeast in Marble, and R7, a Catholic Church located 9,940 feet northwest and along CR 7, were added as these locations could be classified as the closest sensitive receptors (churches) other than residential units. No measurement data for ambient conditions were taken for R6 and R7. Baseline conditions for these locations were estimated based on data at locations with similar characteristics.

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. **Locations of the noise receptors for the East Range are shown in Figure 3.18-2 (added in Final EIS).** Results of the ambient noise monitoring during the daytime and nighttime for the East Range Site are provided in Table 3.18-4 **(updated for the Final EIS)**.

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.

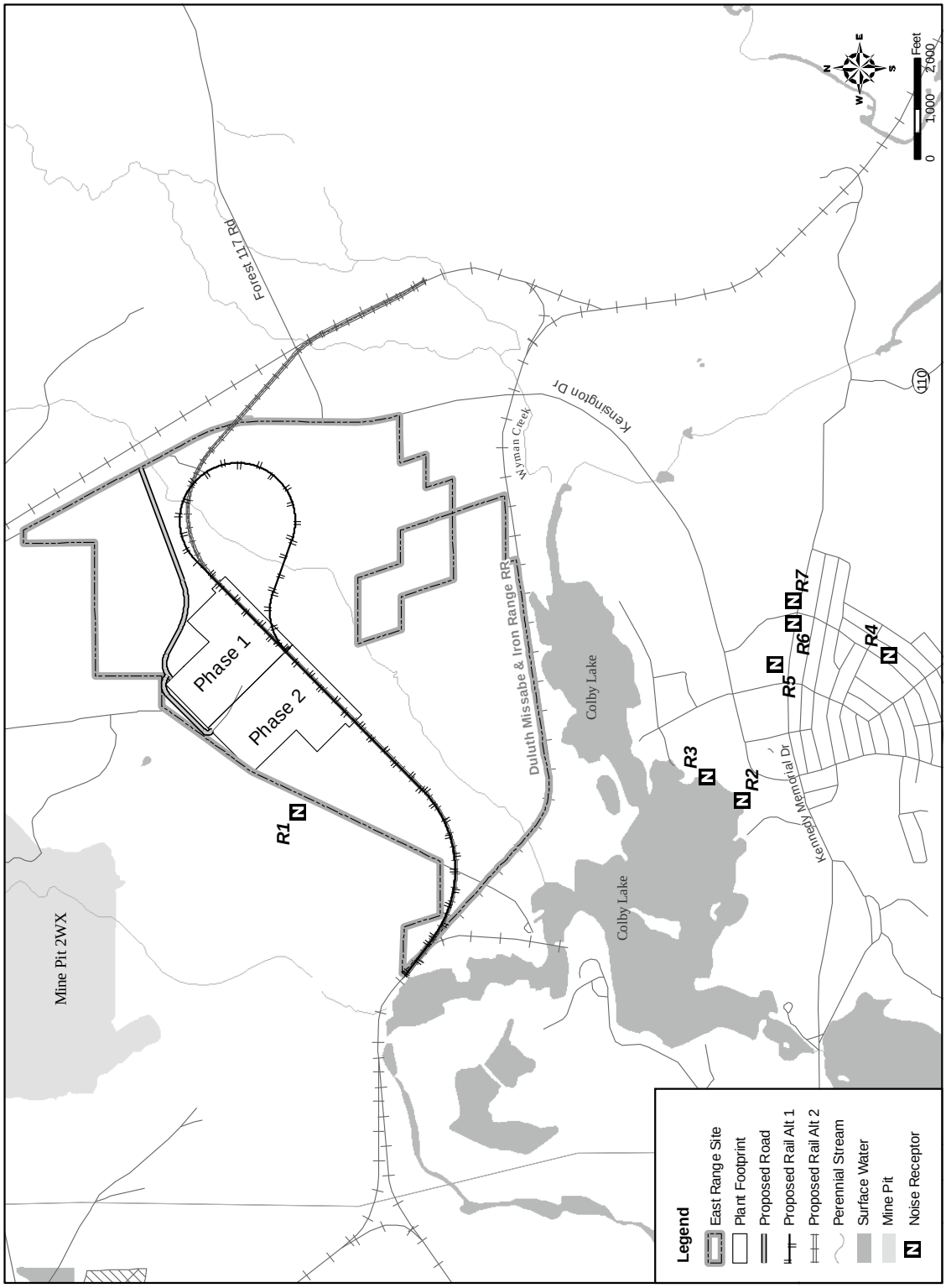

Figure 3.18-2. Noise Receptors at East Range

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
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
Receptor 5. Faith Lutheran Church	**8,400 ft south**	**Daytime – correlated with nearby receptors**	**53 dBA**	**50 dBA**	**0 dB**	**0 dB**
		Nighttime – correlated with nearby receptors	**50 dBA**	**49 dBA**	**0 dB**	**0 dB**
Receptor 6. Queen of Peace Catholic Church	**8,800 ft south**	**Daytime – correlated with nearby receptors**	**53 dBA**	**50 dBA**	**0 dB**	**0 dB**
		Nighttime – correlated with nearby receptors	**50 dBA**	**49 dBA**	**0 dB**	**0 dB**
Receptor 7. Trinity Methodist Church	**8,800 ft south**	**Daytime – correlated with nearby receptors**	**53 dBA**	**50 dBA**	**0 dB**	**0 dB**
		Nighttime – correlated with nearby receptors	**50 dBA**	**49 dBA**	**0 dB**	**0 dB**

Note: Bold typeface indicates values updated for Final EIS (distances have been updated to reflect adjustment of plant footprint). 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 **(Birch Cove Park) on the south shore of Colby Lake**. 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.

Receptor Locations 5, 6, and 7, Kennedy Memorial Drive, Hoyt Lakes

For purposes of the noise modeling, three other sensitive receptors (churches) were located within the Hoyt Lakes city limits. These included:

- **R5 - Faith Lutheran Church located at the northwest corner of Dorchester Drive and Kennedy Memorial Drive.**
- **R6 - Queen of Peace Catholic Church at the northwest corner of Hampshire Road and Kennedy Memorial Drive.**

- **R7 - Trinity Methodist Church located at the northeast corner of Hampshire Road and Kennedy Memorial Drive.**

No ambient noise measurements were taken for these locations. Baseline conditions for these locations were estimated based on data at locations with similar characteristics.

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4. ENVIRONMENTAL CONSEQUENCES

4.1 CHAPTER OVERVIEW

This chapter describes the potential impacts of the Proposed Action and alternatives. The chapter has been prepared to address the required elements of an EIS in accordance with NEPA (40 CFR 1502.16) and the Minnesota Power Plant Siting Act, including the analysis of relevant environmental issues identified through the scoping process. The chapter is organized in the following key sections:

4.2 Aesthetics

4.3 Air Quality and Climate

4.4 Geology and Soils

4.5 Water Resources

4.6 Floodplains

4.7 Wetlands

4.8 Biological Resources

4.9 Cultural Resources

4.10 Land Use

4.11 Socioeconomics

4.12 Environmental Justice

4.13 Community Services

4.14 Utility Systems

4.15 Traffic and Transportation

4.16 Materials and Waste Management

4.17 Safety and Health

4.18 Noise

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4.2 AESTHETICS

4.2.1 Approach to Impacts Analysis

4.2.1.1 Region of Influence

The region of influence for aesthetic resources includes the areas that would be impacted from construction and operation of the Mesaba Generating Station and its associated utility and transportation corridors under the Proposed Action. While the power plant stacks and HVTL structures would be the most visible structures, the variable topography and forest cover would screen them from most receptors. Therefore, the region of influence for the power plant and corridors would be 2 and 0.5 miles, respectively.

4.2.1.2 Method of Analysis

Impacts to the aesthetic resources in the region of influence were assessed based on the existing regional scenic qualities, the potential for negative aesthetic effects, and the local population concentration. The evaluation of potential impacts to aesthetic recourses considered whether the Proposed Action or an alternative would cause any of the following conditions:

- A blocked or degraded scenic vista or viewshed;
- A change in area visual resources; or
- Glare or illumination that would be obtrusive or incompatible with existing land uses.

Potential impacts could include the negative aesthetic effects from the elimination of open space, generation of high contrast colors or shapes, or the introduction of an incompatible visual element to the environment. Other adverse impacts could include blocking a scenic view or interfering with views or the setting of historic properties.

The impacts analysis for this section was based on a low, moderate, and high impact scale, which was determined on the duration, size, and contrast of the project in relation to the local resource quality. Structures with high visual contrast in relation to the surrounding environment would have a greater potential for aesthetic impacts. Low impacts to the aesthetic resources would occur from minor or temporary changes to the viewscape that would not dramatically alter the existing aesthetic quality, nor block views of significant receptors.

The analysis used to determine the impact levels is based on the BLM visual resource inventory process, which uses contrast ratings to determine potential impacts from construction and operation of a project. In addition, a model showing potential line-of-sight views of the IGCC power plant stacks was generated to assess potential impacts. The GIS-generated model incorporated the known heights and locations of the proposed power plant stacks, the expected heights/location of generator outlet HVTL structures, the surrounding topography and forest heights, and known locations of rural residential receptors and their topographic characteristics (see Section 3.2 for residential receptor locations). The results of the visibility analysis show the locations where at least one of the IGCC power plant stacks would be visible. These locations would have the greatest potential for impacts to the aesthetic resources in the surrounding area. Details regarding the methodology of the GIS visibility analysis are contained in the project's Environmental Supplement (Excelsior, 2006b).

The potential impacts to aesthetic resources were also related to air quality, water resources, biological resources, and noise, which are further discussed in Sections 4.3, 4.5, 4.8, and 4.18, respectively.

4.2.2 Common Impacts of the Proposed Action

4.2.2.1 Impacts of Construction

Within the Proposed Action, the power plant emission stacks and associated air emissions would have the greatest visibility to the surrounding area. Generally, the power plant structures tend to be either tall and narrow, or short and wide. The tank vent boiler would be the tallest structure at 210 feet, with an outside diameter of 5.5 feet. Buildings, such as the rod mill feed binds, are shorter (150 feet), but have larger outside widths (155 feet). The heights of the HVTL towers would range from 100 to 140 feet tall (Table 4.2-1). Depending upon an observer's location, views of the Mesaba Generating Station, the proposed HVTL structures, and the proposed HVTL/pipeline corridors could be blocked to varying degrees by trees or surrounding topographical features.

Seasonality would also affect the aesthetic impacts in the area. During the growing seasons, the Mesaba Generating Station buildings and emissions points would be screened from adjacent views. The increased foliage would also shield the rail corridor and mask the line-of-sight along pipeline corridors. In the wintertime, the visibility of the structures associated with the power plant would increase. The associated impacts would temporarily increase due to the loss of leaves on the trees and the cold-weather condensation of water vapor present in combustion gases and cooling tower exhaust.

The greatest impacts to aesthetic resources would occur closer to the structures, around local resident concentrations, and near quality viewscapes. The pipeline corridors would be the most visible where they cross other features, such as lakes, wetlands, and roads.

Table 4.2-1. IGCC Power Plant Structure Dimensions

Structure	Height of Emission Point (feet)	Outside Diameter of Emission Point/ Width (feet)	Total Number of Emission Points	
			Phase I	Phase II
CTG/HRSG	150	22	2	2
Tank Vent Boiler	210	5.5	1	1
Flare	185	7	1	1
CTG Building	90	170	1	1
Rod Mill Feed Bins	150	155	1	1
ASU Cooling Tower	48	54	5	5
Power Block Cooling Tower	48	100	12	12

Note: Structures higher than 60-80 feet would be above the tree line and could be visible by local residents. The cooling towers would generally be shorter than the surrounding trees, although water vapor plumes from these towers could rise hundreds of feet and be highly visible depending on weather conditions.
Source: Excelsior, 2006b

The power plant footprint size is site-independent and basic construction activities would not differ greatly between the West Range Site and East Range Site. The power plant construction would be conducted in two phases, as outlined in Section 2.4. Preconstruction activities would include tree and brush clearing on the site, dewatering the facility footprint, grading activities, road building, and upgrading of existing utilities. The construction activities for the Mesaba Generating Station would occur within the West Range or East Range Sites. Land between the plant footprint and the site boundary would generally extend at least 1,500 feet from the plant footprint and could extend as much as 5,000 feet in areas north and east of the proposed power plant footprint. By reserving a buffer of existing forest

between the local receptors and the construction site, the visual impacts from the missing vegetation would be minimized. After construction is complete, the disturbed area would be re-seeded and re-vegetated, minimizing the long-term visual impacts. During construction, a security fence would be built within the site boundary. The HVTL, pipeline, rail, and road construction activities would occur within variable-width corridors along the length of the alignments. The majority of corridor construction would occur during Phase I. Depending on which site and HVTL alternative is chosen, additional power line construction could also continue through Phase II.

Disturbed areas within utility ROWs would be re-seeded with grass, but large bushes and trees would be prevented from re-growing in these areas as part of routine maintenance activities. Subsequently, permanently cleared ROWs on such corridors would be visible wherever a line-of-sight between the observer and ROW in question occurs (e.g., where such routes follow or cross existing roadways or wetlands). Similarly, areas cleared for the construction of the access roads and railroad lines would be permanently cleared of large bushes and trees, but would be re-seeded with grass, where appropriate.

Construction would also require increased heavy-haul and rail traffic to the Mesaba Generating Station. During the construction period an estimated 15 to 20 semi-trailer trucks per day would bring materials to the facility. The rail alignment would be constructed in the early phases and material delivery would be supported by rail cars, thereby reducing the total number of required trucks.

During construction for Phase II, offsite staging and laydown areas would be used to stockpile materials and store equipment, and for a cement batch plant. Excelsior would establish these offsite construction staging and laydown areas on 85 acres of land selected from potential sites as described in Section 2.3. All the candidate sites are located on lands that have been disturbed or cleared during prior use, and all have access to local roadways. Sites used would be restored to prior existing conditions following completion of Phase II construction.

4.2.2.2 Impacts of Operation

The amount of land cleared of trees and other vegetation during the operational phase would not likely increase from the amount of land cleared during the construction phase. The primary visual impacts due to the plant operation would occur from the presence of structures, which would remain constant through the life of the power plant, and water vapor emissions from cooling tower, which would be dependent on the time of year and the coal-firing rate. The cooling towers, and to a lesser extent, the emission stacks, would exhaust substantial quantities of air laden with water vapor, generating large white plumes. Although the cooling tower structures may not be visible from a location, the plume would travel horizontally and vertically, with a greater range. The water vapor would be especially present during the winter, as condensation generates larger cloud cover.

Coal would be brought by rail and unloaded at the power plant. The coal, petroleum coke, and flux would be stored in facilities with built-in dust suppression systems to prevent coal dust fugitive emissions. During the winter months, the frozen cargo would be thawed in a shed, which would minimize the appearance of dust on snow. Section 4.3, Air Quality, addresses the potential impacts from fugitive emissions.

During the operational phase, road traffic approaching either site would be reduced from construction levels, although the frequency of rail movements for deliveries could be sustained or increase. Tree growth would be prevented along the pipeline and utility corridors and a primitive access road would be maintained to facilitate repairs. The impacts to the aesthetic environment along the HVTL corridors would not increase from the impacts associated with the construction impacts.

The Mesaba Generating Station would require security lighting, which would impact the closest residential receptors. In addition, warning lights may be required on tall structures near airports to meet Federal Aviation Administration (FAA) requirements. A lighting plan would be developed during the

front-end engineering and design and environmental review processes. The plan would receive input from the Taconite or Hoyt Lakes City council and seek to minimize the night aesthetic impacts.

4.2.3 Impacts on West Range Site and Corridors

4.2.3.1 Impacts of Construction

Construction of Phase I would first require clearing the wooded and shrub vegetation from the project site, dewatering the area, and constructing the proposed power plant access roads. During Phase I, approximately 74 acres of forest would be removed. During Phase II, an additional 81 acres of forest would be removed. Potential impacts associated with the Mesaba Generating Station construction would include visible dust and exhaust, landscape scars, visible equipment, decreased forest from thinning, views of the security fences around the disturbed area, and additional truck and rail traffic. These activities would occur below the tree line and would be primarily visible to locations immediately surrounding the Mesaba Generating Station.

During construction of Phase I, materials used for construction would initially be stored in the Phase II footprint. For Phase II, Excelsior would establish off site construction staging and laydown areas on 85 acres of land, from four potential sites described in Chapter 2 and shown in Figures 2.3-1 and 2.3-3. Most of the potential Phase II lay-down areas have been disturbed during prior use by mineral extraction companies. The one exception, directly northwest of the West Range Site, had previously been cleared and left as a field. Excelsior would select the appropriate sites for the necessary acreage prior to construction, taking into account the potential effects to nearby receptors. The lands would be cleaned and restored to their pre-existing condition at the end of Phase II construction.

Figures 3.2-6 and 3.2-7 show the locations of the residential receptors within the vicinity of the West Range Site, with the closest residences within 5,000 feet of the power plant footprint. Multiple residences are also located along CR 7, approximately 1 mile west of the proposed power plant footprint. The construction activities would be visible to residential receptors immediately surrounding the power plant site and would be visible to a lesser extent to the surrounding area. Impacts to the views by sensitive receptors would be mitigated by preserving a layer of forest along the boundary of the buffer zone and by constructing the power plant in two stages.

Security lighting would be required during the construction phase. The majority of the construction work would be performed during one shift during the day. Occasionally in the summer, a second shift may be added. During that time, more lights would be needed. The lights would be immediately apparent to the surrounding residential receptors and anyone driving along US 169 at night. These impacts would be temporary. A lighting plan would be developed to minimize lighting impacts to nearby sensitive receptors and to avoid interference with views of the northern lights.

HVTL Corridors

Because route selection and construction of new HVTLs would be required for the Mesaba Energy Project Phase I, the incremental impacts from construction of the Phase II plant would be negligible with respect to HVTLs. Therefore, the impacts on aesthetic resources described below would be essentially the same for Phase I as for both phases of the Mesaba Energy Project.

New corridors would be required between the Greenway Substation to the Blackberry Substation for the WRA-1 and WRA-1A HVTL Alternative Alignments. The construction activities to generate the new corridors would include grading, clearing vegetation, excavation for the tower foundations, and stringing of the new line. These activities would occur within the 150-foot temporary ROW along the length of the corridor. In areas along the HVTL corridors where the transmission line towers are upgrades, there would be an increase in traffic and construction equipment to access these areas and construct the HVTLs. The greatest impacts to the local population would occur within the corridor region of influence,

approximately 0.5 miles on either side of the ROW. There are approximately 66 residences within 0.5 miles of the WRA-1 Alternative Alignment; 62 residences within the region of influence of the WRA-1A Alternative Alignment; and, 214 residences within 0.5 miles of the WRB Alternative Alignments. The majority of the residences along all of these proposed corridors are within the 0.25- to 0.5-mile range.

The proposed double circuit 345-kV HVTL for the WRA-1 and WRA-1A Alternative Alignments would be carried on single-pole steel structures. The steel pole structures would be about 130 to 140 feet tall, with average spans of about 800 feet. Structures on the taller end of this range would be needed on the one-mile segment where the structures share a ROW with an existing line near the Blackberry Substation. H-frame or other structure types may be necessary near waterfowl areas or water crossings to minimize the likelihood of fatal collisions between birds and the HVTL structures and/or conductors. These structures would be shorter and therefore be less visible than the primary single-pole structures.

The single-pole structures would be visible to residents along the proposed route between the Mesaba Generating Station and the Blackberry Substation and to passengers of vehicles traveling along portions of Twin Lakes Road and Birch Road. The poles would be most visible between mileposts 3 and 6, where the corridor would parallel these two county roads.

The HVTL structures associated with the WRA-1 Alternative Alignment would be visible at numerous points along this route, which includes the Hill Annex Mine State Park, Dunning Lake, Big and Little Diamond Lake, the CMP, Holman Lake, and the Twin Lakes. The HVTL corridor would impact the aesthetic resources by introducing new visual elements when crossing extended flat areas, such as wetlands. In addition, the visual resources in an area would be changed if multiple structures were visible over the tops of the trees. Therefore, the locations with the greatest frequency of tower views would be the most affected.

The WRA-1A Alternative Alignment would have many of the impacts discussed above for the WRA-1 Alternative Alignment. The WRA-1A Alternative Alignment would cross the Swan River three times and travel directly alongside or overhead of the river for approximately 3,200 feet. For most of the year between these points, flow in the Swan River is not believed to be capable of supporting canoe traffic, but the stream could support limited fishing activity and the overhead HVTLs would negatively impact the aesthetic quality of that experience.

Near milepost 4 of the HVTL corridor, a long line-of-sight view of the HVTL corridor would exist just south of the bridge over the Swan River and looking toward the northwest. While the long line-of-sight view would be noticeable when looking in a southeasterly direction, part of that view is already open from a large wetland area and by active gravel pit mining. The HVTL corridor would be directly visible from a public access point located on Loon Lake between mileposts 4 and 5 where the HVTL route turns due south.

Visual impact modeling has not been conducted for alternate route WRB-2A. All but approximately one mile of this route would use existing HVTL ROWs resulting in existing long lines-of-sight views. The WRB-2A corridor would pass through rural areas where the visual impacts would be minimized. More residential locations would be impacted by WRB-2A than WRA-1 because overall length of the WRB-2A route is approximately 18.3 miles, almost twice the length; however, this would mostly be along an existing HVTL ROW.

The WRB-2A corridor would use taller structures along the existing ROWs, which would be more visible for long distances to travelers along US 169. The existing corridor also travels along a prominent ridge, which increases the visibility to the residents of Pengilly. Residents along the southern half of the HVTL route that live close to the existing route would be affected by the more imposing visual impact of the taller structures.

Pipeline Corridors

Because route selection and construction of pipelines would be required for the Mesaba Energy Project Phase I, additional impacts would not occur during Phase II plant construction. Therefore, the impacts on aesthetic resources described below would be essentially the same for Phase I as for both phases of the Mesaba Energy Project.

In the event that Excelsior were to reach terms for the use of the Nashwauk Natural Gas Pipeline, as described in Section 2.3.1.4, construction of a proposed pipeline for Mesaba would not be necessary. The Nashwauk pipeline would follow a route essentially the same as the Mesaba Natural Gas Pipeline Alternative 1. In which case, the impacts from construction of the pipeline described in the following paragraph would be attributable to the Nashwauk project approved by the PUC rather than to the Mesaba Energy Project.

The ROW construction requirements for the Mesaba Generating Station pipelines would be 60 to 120 feet width along the corridor. Approximately 11.5 miles of the Natural Gas Pipeline Alternative 1 route would be a new ROW, of which about 3.3 miles would be shared with the new Plan A Preferred HVTL Route WRA-1 Alternative Alignment and about 1.5 miles would follow the existing HVTL ROW corridor from the retired Greenway Substation to the southern boundary of the West Range Site. Significant clearing would be required between mileposts 0 to 8.3, where a new ROW segment would be constructed.

Approximately 8 miles of the Natural Gas Pipeline Alternative 2 route would travel along the existing natural gas pipeline ROW that is currently under control of NNG. Aesthetic impacts along the existing section of ROW would be temporary and occur across one or two growing seasons. The aesthetic impacts along the new segment of ROW between mileposts 8 and 12.5 would occur entirely along the new HVTL ROW described above.

The first 3.5 miles of the Natural Gas Pipeline Alternative 3 11.5-mile route would travel along the existing natural gas pipeline ROWs under control of NNG. A new pipeline ROW would follow the existing highway ROWs between Coleraine and the existing HVTL ROW connecting the Greenway Substation to the West Range Site.

Where natural gas or water pipelines would be constructed and impacts to roadways or all terrain vehicle trail-type surfaces are unavoidable, the original surface condition would be restored or improved. Clearing activities to remove vegetation would be reduced along the routes that follow existing county roads and highways. Where the pipeline segment would follow secondary or forest roads, such clearing would be increased.

The potential impacts from the process water supply pipelines construction activities would be similar to the natural gas pipeline alternatives. The temporary aesthetic impacts to the area visual resources would be associated with preconstruction land clearing and grading activities. Increased visibility of construction equipment, increased traffic, clearing vegetation, and exposed landscape scars would also temporarily change the visual resource.

Where the process water pipelines would travel along the existing highway ROW or forest roads, aesthetic impacts would be reduced because additional land clearing would not be necessary. The expected permanent aesthetic impacts would be associated with the supplemental clearing of additional land at the periphery of pipeline corridors. Soil piles from trenching and the exposed equipment would generate temporary visual impacts during construction.

Rail Alignments and Access Roads

Because route selection and construction of the rail line and access road would be required for the Mesaba Energy Project Phase I, additional impacts would not occur during Phase II plant construction. Therefore, the impacts on aesthetic resources described below would be essentially the same for Phase I as for both phases of the Mesaba Energy Project.

The rail line alternatives would vary in their impacts to the surrounding area for line construction and train operation. Noise impacts associated with rail line construction and train operations are presented in Sections 4.18.2.1 and 4.18.3.1, respectively. Track visibility from area roads would be reduced, as the construction activities would be focused on the side of the track furthest from US 169 and at an elevation significantly above the grade at which CR 7 is located. However, the centerline of Rail Line Alternative 1A **and 3-B** alignment**s** would pass within **470** feet of the closest resident on Big Diamond Lake and within about 850 feet of the closest resident on Dunning Lake. At these locations, aesthetic impacts related to construction would be visible by residents and others living north of Big Diamond Lake.

Construction activities would impact the present visual resources that exist in the vicinity of the residential areas on Big Diamond and Dunning Lakes. To accomplish the grade required to accommodate unit train deliveries, significant cuts would be required. Cuts up to 60 feet would occur within close proximity to residences nearest to the track. Such cuts would require blasting and would result in the rail line becoming more visible to surrounding areas. Once construction activities ceased, revegetation of the cut slopes would reduce the contrast. Some temporary aesthetic impacts would occur, including vibration, noise, dust, and heavy truck traffic associated with the alignment construction. During operation of the plant, aesthetic impacts associated with routine rail shipments, such as noise and vibration would still occur (see Section 4.18, Noise).

Rail Line Alternative 1B **(evaluated in the Draft EIS)** would move the centerline of the rail track about 2,500 feet from a Dunning Lake residence and about 2,900 feet from a residence on Big Diamond Lake. Rail Line Alternative 1B would require cuts through a mine tailings pile east of Big Diamond Lake and Dunning Lake, in addition to the standard construction activities described above. However, the distance from the proposed rail alignment to the residences would greatly reduce the visual and noise impacts when compared to Alternative**s** 1A **and 3B**.

As described in Section 2.3.1.2, the realignment of CR 7 (Access Road 1) has been deferred by Itasca County because of reduced state funding priority. Access Road 1 would be an extension of CR 7 by Itasca County that would require cuts through previously disturbed and undisturbed areas. Such cuts could be significant and the scenic view would be compromised if the road passed too closely to existing residential properties causing numerous driveways to be visible from the highway.

As described in Section 2.3.1.2, Access Road 2 would be contingent on the realignment of CR 7, which has been deferred by Itasca County since publication of the Draft EIS. Access Road 2 would require clearing of wooded areas in the southern part of the property.

Access Road 3 would directly connect CR 7 to the West Range plant site. The road corridor would require clearing of wooded areas in the southwestern part of the property that would be wide enough to contain the revised Process Water Pipelines and the Water and Sewer Pipeline. The road would curve to the northeast to prevent direct line-of-sight views of the plant.

4.2.3.2 Impacts of Operation

The combined two-phased Mesaba Generating Station would be twice the size of Phase I, which would double the number of tall structures that may be visible to residents and travelers in the surrounding area. Other than the potential for increased visibility due to size, the aesthetic impacts from operation of both phases would be essentially comparable to those for Phase I alone.

The Mesaba Generating Station emission points and its generator outlet HVTL structures would affect views in the vicinity of the West Range Site. The taller power plant buildings and stack emission points would be visible from nearby residential areas, high vantage points, CR 7, and other points where clear lines of sight between an observer and the power plant would occur. For example, **numerous locations along the south shore of the CMP** would have views of all eight stacks **(both phases)**.

During the growing seasons, the West Range Site Mesaba Generating Station, buildings, and emission points would be screened but still visible from some nearby homes, businesses, and CR 7. In the wintertime, the visibility of the structures associated with the power plant would increase. In addition to the loss of leaves, the cold weather condenses the water vapor present in combustion gases and the cooling tower exhaust. During **damp weather, the effects of plant emissions may** cause the appearance of a **water vapor** haze **in the vicinity of** the plant site.

Figure 4.2-1 shows the results of the GIS visibility analysis of the IGCC power plant stacks for the area surrounding the West Range Site. This figure shows those locations where a person could see least one IGCC power plant stack. These areas are shown as a black overlay on a shaded relief map.

There are relatively few vantage points from which all eight stacks would be visible due to visual barriers (e.g., tree line or hills) that would block a direct line-of-sight to the power plant. High elevation points and lake borders would have the highest concentration of views. The tailings pile at the Hill Annex Mine State Park, the western shores of Reiley Lake, and the southern border of CMP would have the best views of the stacks. However, mine tailings piles and mine pits are areas with existing disturbed aesthetic properties which would reduce the visual impact of the Mesaba Generating Station stacks.

The stacks and vapor plume would be potentially visible to an area with a radius of 20 miles. The closest public lands in the areas are the Hill Annex Mine State Park (5 miles), the Forest History Center (15 miles) and the eastern edge of the Chippewa National Forest (20 miles). The Hill Annex Mine State Park would have the greatest impacts from the operation of the power plant; the stacks would also be seen from areas adjacent to exposed mine pits and tailing piles. Leech Lake Indian Reservation and the George Washington State Park are more than 20 miles from the plant site and would not likely be affected by the Proposed Action.

Lighting

The combined two-phased Mesaba Generating Station would be twice the size of Phase I, which would nearly double the amount of security lighting that may be visible to residents and travelers in the surrounding area. Other than the potential for increased illumination due to increased lighting structures, the aesthetic impacts from operation of both phases described in the following paragraphs would be essentially comparable to those for Phase I alone.

Lighting would increase the visibility of the power plant at night. However, the tank vent boiler emission point would be positioned at a height greater than 200 feet above ground level, resulting in the requirement for a determination of no hazard to aviation from the FAA. According to FAA Advisory Circular AC 70/7460-1K (“Obstruction Marking and Lighting”) Paragraph 20:

> *Any temporary or permanent structure, including all appurtenances, that exceeds an overall height of 200 feet above ground level or exceeds any obstruction standard contained in 14 CFR Part 77, should normally be marked and/or lighted. However, an FAA aeronautical study may reveal that the absence of marking and/or lighting will not impair aviation safety.*

Additionally, the FAA may “recommend marking and/or lighting a structure that does not exceed 200 feet (61 meters) above ground level or 14 CFR 77 standards because of its particular location” (U.S. DOT, 2000). If required to install obstruction lighting, such lighting would increase visibility of the structures during evening hours (and daylight hours, if the lighting were required to be operated 24 hours per day).

Phase I and Phase II would be equipped with security lighting that would enhance visibility of the power plant during evening hours. This would negatively affect aesthetics for residents that live close to the power plant and those driving within visual range. A power plant lighting plan would be developed during the FEED and environmental review processes and would seek to minimize such aesthetic impacts as well as to consider any affects to viewing the northern lights. A lighting plan could include reduced

lighting at night to make the plant less visible at night. The lighting plan would be developed in coordination with the Taconite City Council's input and ultimate approval.

HVTL Corridors

Once completed for the Phase I plant, the HVTL structures required for both phases of the Mesaba Energy Project would be in place. Hence, the incremental aesthetic impacts from operation of the Phase II generating station would be negligible. The visual impacts from the operation of the proposed HVTL corridors would be similar to the construction impacts described above. In addition to the changed visual viewscape, some of the HVTL structures may require obstruction lighting to comply with the FAA regulations. Although none of the HVTL towers would be taller than 200 feet high, their position in relation to local airports **and/or seaplane bases** may require additional lighting. The WRA-1 and WRA-1A Alternative Alignments would be located more than 8 miles from the Grand Rapids Airport and would parallel the existing 5,755-foot runway. Therefore, it is unlikely these structures would require obstruction lighting.

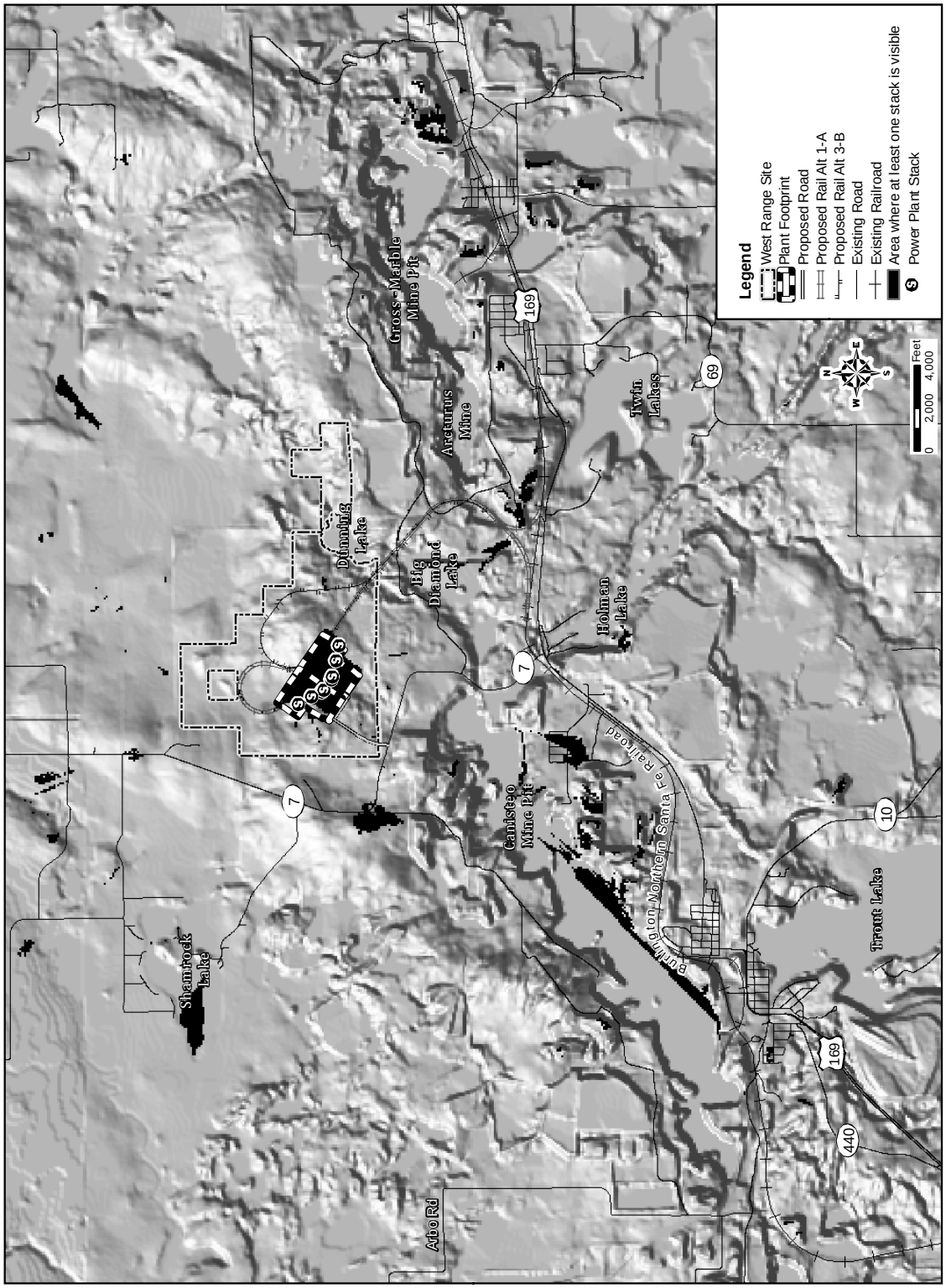

Figure 4.2-1. Predicted Locations where Mesaba Plant at West Range Site would be Visible

The WRB-2A corridor would travel along a prominent ridge, which would increase the overall height of the structures. Although there are no airports near this route, DOE consultation with the FAA would determine if obstruction lighting are required for the taller poles along the ridge.

Pipeline Corridors

Once completed for the Phase I plant, the pipelines required for both phases of the Mesaba Energy Project would be in place. Hence, the incremental aesthetic impacts from operation of the Phase II generating station would be negligible.

A 40- to 80-foot wide permanent easement along the natural gas, process water, potable water, industrial wastewater, and sanitary sewer pipelines would be maintained under the Proposed Action. Although some re-growth of vegetation would be allowed after construction is completed, trees and large bushes would be prevented from growing. Most of the visual impacts would be shielded by forest borders along these corridors. Views would occur at the edge of mining pits or when the corridor crosses a road or all terrain vehicle trail.

The majority of Process Water Supply Pipeline Segment 1 would travel over previously disturbed mining areas and along current road ROWs. **The pipeline would enter the Mesaba Generating Station property along proposed Access Road 3.** The segment 2 pipeline would have **one** line-of-sight view along a relatively short stretch of CR 7. Process Water Supply Pipeline Segment 3 would primarily travel over existing corridors and the permanent aesthetic impacts would be associated with the open space to accommodate the new pipeline. **The use of an enhanced ZLD system at the West Range Site would eliminate the need for the blowdown discharge pipeline that was described in the Draft EIS.**

Rail Alignments

Once the selected rail alignment would be completed for Mesaba Energy Project Phase I, the principal aesthetic impacts from operations would be related to the number of trains servicing the plant, which would be essentially double for the combined two-phased generating station. Increased rail traffic between the Mesaba Generating Station and coal/petroleum coke suppliers could occur. Noise impacts associated with rail line construction and train operations are presented in Sections 4.18.3.1 and 4.18.3.2, respectively.

Permanent aesthetic impacts from the Rail Alignment Alternative 1A would not be evident from either US 169 or from CR 7. However, Rail Line Alternative 1A tracks and/or embankments would be visible from Big Diamond Lake and Dunning Lake. The corridor would cross an unpaved all terrain vehicle road twice, a proposed access road, and a private driveway before approaching the Mesaba Generating Station. Several residences are located within the immediate vicinity of the rail alignment alternative. The centerline of Rail Line Alternative 1A would pass within 400 feet of a residence on Big Diamond Lake and within about 850 feet of a residence on Dunning Lake. At these locations, permanent aesthetic impacts would occur to these residents and others living north of Big Diamond Lake. Aesthetic impacts include the noise and vibration associated with such deliveries and unloading activities as well as the recurring visual appearance of the trains and permanent visibility of a **rail bridge** crossing.

The aesthetic impacts for Big Diamond Lake and Dunning Lake residents would be reduced with Rail Line Alternative 1B **(which was evaluated in the Draft EIS)**. Alternative 1B would initially follow the same path as Rail Line Alternative 1A, but continue to travel north around the eastern portion of the West Range Site. The Alternative 1B rail track centerline would be located about 2,500 feet from the Dunning Lake residence and about 2,900 feet from the residence on Big Diamond Lake. Such movement away from these residences would reduce temporary and permanent aesthetics impacts identified for Rail Line Alternative 1A. There are no other residences that would be affected by Alternative 1B.

The Rail Alignment Alternative 3B approach to the West Range site would be similar to Rail Line Alternative 1A. The center line would still pass within 470 feet of the residence on Big

Diamond Lake, and within 850 feet of the residence on Dunning Lake. Rail Line alternative 3B would have a larger loop next to the plant site, though it would not be visible from CR 7. The train, however, would be stationary near the residents during unloading. Because the track approaching the coal dumper cannot accommodate the full 8,000-foot train, approximately 2,000 feet of the train would extend along the approach track, and within 1,000 feet of the residence on Dunning Lake. This would mean that the train would be located near residents for an hour longer than on the Rail Alternative 1A.

Access Roads

Once the access road would be completed for Mesaba Energy Project Phase I, the principal aesthetic impacts from operations would be related to the amount of traffic entering and leaving the plant, which would be approximately **doubled for the combined two-phased generating station.**

For Access Road 1 **and Access Road 2,** the increase in the level of traffic past Big Diamond Lake and Dunning Lake residences would compound the negative aesthetic impact associated with construction of the Mesaba Generating Station. The county has indicated its intention to leave in place the existing segment of CR 7 between US 169 and the power plant, which would allow travel on alternate routes; heavy truck traffic would be required to travel via the new segment of highway. **However, as described in Section 2.3.1.2, the realignment of CR 7 (Access Road 1) has been deferred by Itasca County because of reduced state funding priority. Without the realignment of CR 7 for Access Road 1, construction of Access Road 2 would not be practicable.**

Access Road 3 would directly connect CR 7 to the West Range Site at the southwestern corner of the property. Vehicles entering and leaving the plant would increase traffic along CR 7 between US 169 and the entrance to the Mesaba Generating Station as described in Section 4.15, with impacts on noise as described in Section 4.18. Because Access Roads 1 and 2 would not be constructed, trucks would be restricted to one section of CR 7 and not pass residences along Diamond Lake Road.

4.2.4 Impacts on East Range Site and Corridors

4.2.4.1 Impacts of Construction

Construction activities on the East Range Site would be similar to the West Range Site. Trees and other vegetative growth would be cleared for the Mesaba Generating Station footprint and along new and existing corridors for purposes of constructing Phase I and Phase II, the natural gas pipelines, process water pipelines, sewer pipelines, HVTLs, new access roadways, and rail lines. During Phase I and II, approximately 83 and 85 acres of forest would be removed, respectively.

Construction activities would also increase visible dust, equipment visibility, generate visible landscape scars, and increase traffic in the surrounding area. Security fencing and lighting would also increase the overall visibility of the construction site.

The Mesaba Generating Station would be located between the **residential areas in** Hoyt Lakes and the CE mining operation in a previously disturbed area. The Mesaba Generating Station site property is partially cleared of vegetation, which means the temporary impacts would not drastically change the visual resources. The closest residences would be located approximately 1.2 to 1.4 miles from the power plant footprint. Because the majority of the impacts related to construction would be located below the tree line, most views from residences would be shielded. Figures 3.2-9 and 3.2-10 show the locations of the residential receptors within the vicinity of the East Range Site Mesaba Generating Station and associated corridors.

During construction of Phase I, materials used for construction would initially be stored in the Phase II footprint. For Phase II, Excelsior would establish offsite construction staging and laydown areas on 85 acres of land at potential sites described in Chapter 2 and shown in Figure 2.3-5. The

potential Phase II laydown areas have all been disturbed during prior uses by mineral extraction companies. Excelsior would select the appropriate sites for the necessary acreage prior to construction, taking into account the potential effects to nearby receptors. The lands would be cleaned and restored to their pre-existing condition at the end of Phase II construction.

HVTL Corridors

Because route selection and construction of new HVTLs would be required for the Mesaba Energy Project Phase I, the incremental impacts from construction of the Phase II plant would be negligible with respect to HVTLs. Therefore, the impacts on aesthetic resources described below would be essentially the same for Phase I as for both phases of the Mesaba Energy Project.

The two East Range Site HVTL alternative corridors would upgrade existing transmission lines from the Mesaba Generating Station to the Forbes Substation. For both alternatives, a new ROW would be constructed along the 43L HVTL Route to the Syl Laskin power plant. To accommodate the larger HVTL towers, construction activities would clear an additional 30 feet to the existing ROW along the 39L/37L HVTL Route. The existing 115-kV lines would need to be transferred to the new HVTL towers, which would require an increase in construction vehicles along the corridor. Approximately 962 residences would be located within 0.5 miles of 39L/37L HVTL Route, and 271 residences would be located within 0.5 miles of the 38L HVTL Route. The majority of these residences would be located over 500 feet away from the construction. Construction-specific impacts, such as construction noise and visible equipment along the HVTL alternatives would be temporary. The construction activities would also shift along the corridor as towers were completed, and when finished, the area would be re-vegetated with native plants.

Single pole steel structures are proposed for both East Range Site HVTL alternatives, as required to accommodate the new transmission lines. The heightened visibility of the taller structures would affect the aesthetic character of the existing viewshed from Hoyt Lakes through Eveleth. Shorter, yet wider, H-frame or other structure types may be necessary near waterfowl areas or water crossings.

The 39L/37 HVTL Route would require vertically configured 140-foot single-pole steel structures to carry one new 345 kV circuit and the existing 115-kV circuit across most of the route's length. The new corridors along the 43L HVTL Route and around the Thunderbird Mine Substation would not need to accommodate any existing circuits. The HVTL route would cross long stretches of relatively flat terrain, which would increase the number of visible towers. In addition, the 39L/37L HVTL Route would pass nearby relatively populated areas that would increase the number of residents having a direct line-of-sight to one or more of the HVTL structures. A greater concentration of tower views would occur around Hoyt Lakes, Gilbert, and Eveleth. Other views of the 39L/37L HVTL Route would occur around relatively flat terrain and along the shores of area lakes, including Whitewater Lake, Ely Lake, and Embarrass Lake. The increased height of the upgraded towers would be more prominent and would cause a moderate change in the area visual resources.

The 38L HVTL Route would travel south and away from major population centers. The single pole double circuit HVTL towers along the 38L HVTL Route would be shorter (125 feet) than the towers along the 39L/37L HVTL Route (140 feet). The shorter structures and alternative route would generate fewer visual impacts across around the corridor. The 38L HVTL Route would still be visible from Colby and Whitewater Lake, in areas with relatively flat terrain, and along long line-of-sight views. The views of the structures would still cause a moderate change to the area visual resources surrounding the HVTL corridor.

Pipeline Corridors

Because construction of pipelines would be required for the Mesaba Energy Project Phase I, additional impacts would not occur during Phase II plant construction. Therefore, the impacts on aesthetic resources described below would be essentially the same for Phase I as for both phases of the Mesaba Energy Project.

Construction of the natural gas pipeline to serve the Mesaba Generating Station would be located in a pre-existing gas pipeline ROW. The temporary aesthetic impacts associated with construction would include visible equipment operations, traffic disruptions, cleared vegetation, and trenching activities that leave piles of soil exposed for indefinite time periods. Approximately 856 residential receptors would be located within 0.5 miles of the natural gas pipeline. Construction of the natural gas pipeline corridor would generally result in a moderate impact to these residences. Once the construction phase is completed, excess soil piles would be regraded and areas would be re-seeded with grass.

Most of the process water supply pipeline corridors would be constructed on land **previously mined by** CE. The construction of the process water pipelines would be largely confined to areas of property with restricted access or have been disturbed from past mining practices. The aesthetic impacts level would be considered low because the construction disturbance would not differ greatly from the existing visual resources. For the East Range Site Alternative, an enhanced ZLD system would be used to eliminate wastewater discharges. Therefore, there would be no aesthetic impacts associated with constructing a pipeline to an outfall or discharge structure.

Potable water and sewer pipelines would be buried along existing utility corridors so that installation would generally create low and temporary aesthetic impacts. The primary construction impacts would occur from clearing vegetation, trenching, and increased visibility of equipment. Directional drilling under Colby Lake would alleviate aesthetic impacts. After construction, temporary soil stockpiles would be graded and re-seeded to minimize the permanent impacts.

Rail Alignments and Access Roads

Because route selection and construction of the rail line and access road would be required for the Mesaba Energy Project Phase I, additional impacts would not occur during Phase II plant construction. Therefore, the impacts on aesthetic resources described below would be essentially the same for Phase I as for both phases of the Mesaba Energy Project.

The two East Range Site rail alignment alternatives would be constructed on land immediately adjacent to the Mesaba Generating Station. Construction activities that would result in impacts would include clearing vegetation, landscape scaring, additional equipment visibility, and cuts and fills. Once the rail alignment is completed, trains would bring construction supplies, generating additional noise and visual impacts along the rail alignment. There are no residential receptors within 0.5 miles of the rail alignments. Construction of the rail lines would mostly be shielded from residents' views by existing tree cover and/or topographic obstructions.

Construction of the access road would occur between the Mesaba Generating Station and the mining operation. During construction, the area would be cleared, graded, and dewatered. Because the Mesaba Generating Station footprint would be located between the closest residences and the access road, any additional temporary impacts would be low.

4.2.4.2 Impacts of Operation

The combined two-phased Mesaba Generating Station would be twice the size of Phase I, which would double the number of tall structures that may be visible to residents and travelers in the surrounding area. Other than the potential for increased visibility due to size, the aesthetic impacts from operation of both phases would be essentially comparable to those for Phase I alone.

As with the West Range Site, the Mesaba Generating Station emission points and its HVTL structures would affect views near the East Range Site. The taller Mesaba Generating Station buildings and stack emission points would be visible from nearby residential areas, high vantage points, CR 666, and other points where clear line-of-sights between an observer and the power plant are available. The proposed HVTL structures would be taller than existing structures and would be visible from further distances than the existing 115-kV structures. The East Range Site is on private land **within** the Superior National

Forest, which could affect views from within the forest. Other public lands, Bear Lake Park and Soudan Underground Mine State Park are located 16 and 20 miles to the north-northwest of the proposed site, and are unlikely to be affected.

Building and stack heights for the East Range Site Mesaba Generating Station would be similar to those specified for the West Range Site. Figure 4.2-2 shows the results of the GIS visibility analysis for the area surrounding the East Range Site that would contain views of the Mesaba Generating Station emission stacks. The areas where a person could see at least one emission stack are colored black. The topography of the area is also shown as a shaded relief map.

The Mesaba Generating Station stack emission points would be visible from most vantage points along the south shore of Colby Lake, line-of-sight views from the southwest section of Hoyt Lakes, the southwest end of Whitefish Reservoir, and locations mostly to the north of the power plant footprint and East Range Site. Some locations within the region of influence would be shielded from view of the power plant by visual barriers. Residents living within the farthest southeast portions of Hoyt Lakes would not likely see the power plant or its stacks because of terrain obstacles. The power plant would be visible from residential areas in Hoyt Lakes.

During the growing season, the East Range Mesaba Generating Station buildings and stacks would be partially screened from homes located on the south shore of Colby Lake. In general, Colby Ridge residents and other homes on the south shore of the lake would be able to see the power plant buildings and stacks year round. During the winter months, the visibility of the Mesaba Generating Station and associated structures would increase due to the condensed water vapor and loss of leaves. During **damp weather**, **the effects of plant emissions may** cause the appearance of a **water vapor** haze **in the vicinity of** the plant site.

The surrounding area of the East Range Site would be most impacted by the plant's stack location by Hoyt Lakes. However, the Syl Laskin plant is also visible from the south side of Colby Lake, which decreases the visual sensitivity of the area. Compared to the West Range Site, more residents would be able to see the plant, but their view would be from slightly further away.

Lighting

The combined two-phased Mesaba Generating Station would be twice the size of Phase I, which would nearly double the amount of security lighting that may be visible to residents and travelers in the surrounding area. Other than the potential for increased illumination due to increased lighting structures, the aesthetic impacts from operation of both phases described in the following paragraphs would be essentially comparable to those for Phase I alone.

The tank boiler stack would reach 200 feet above ground level. Therefore, an FAA request for a determination of no hazard to aviation would be required. The other stack emission points would not be close enough to any public airport to be likely deemed an obstruction to air navigation. If required by the FAA to install obstruction lighting, such lighting would increase visibility of the structures during evening hours.

The Mesaba Generating Station would have security lighting in place. Plant lighting impacts would be more visible to Colby Ridge residents than to residents living nearby the West Range Site Mesaba Generating Station. Otherwise, the same concerns at the West Range Site would apply to the East Range Site. A lighting plan would be developed in coordination with the Hoyt Lakes City Council to develop a mutually acceptable power plant lighting plan that minimizes aesthetic impacts, including reduced lighting at night. The potential to impact views of the northern lights would also be considered as part of the lighting plan.

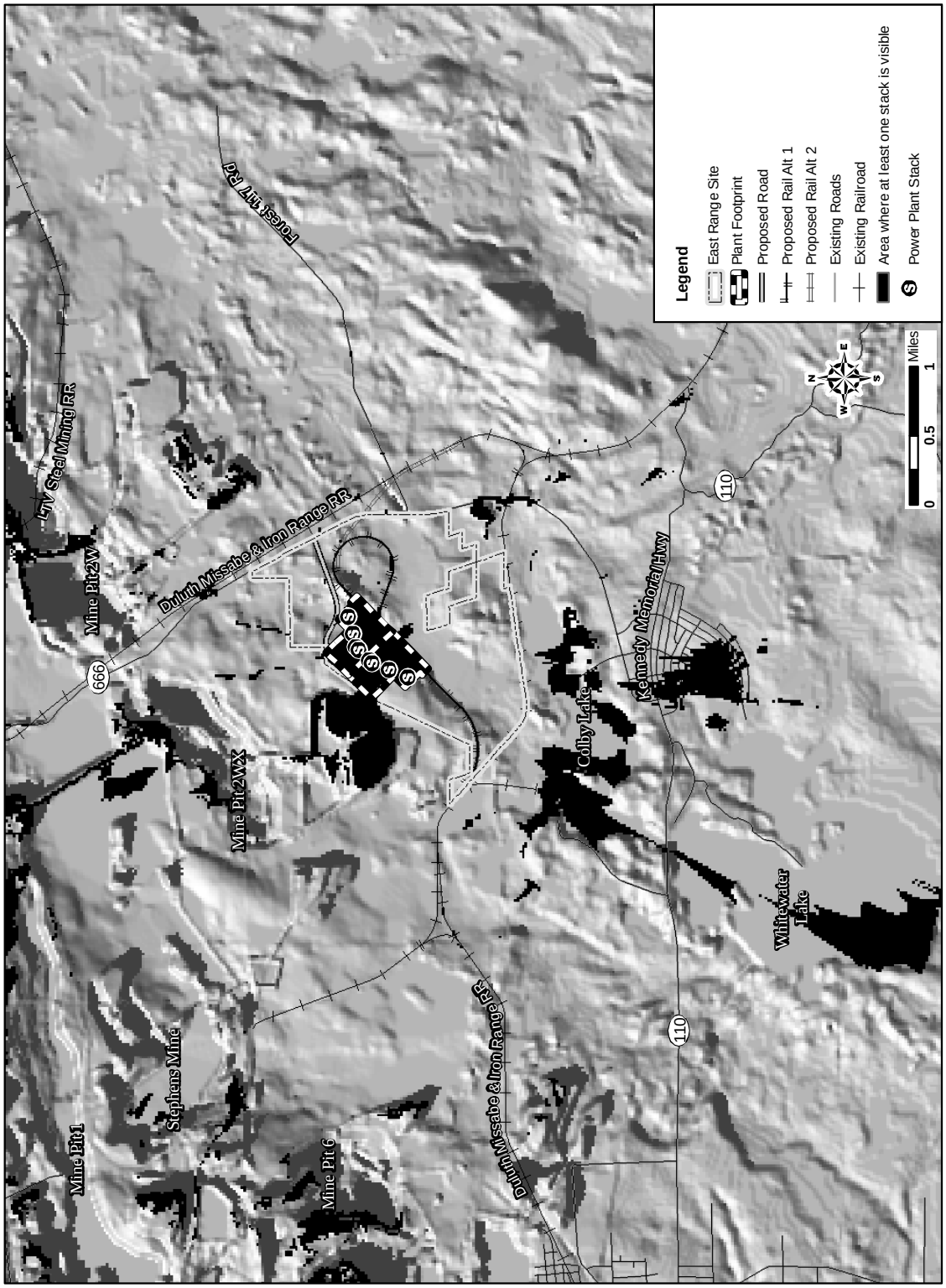

Figure 4.2-2. Predicted Locations where Mesaba Plant at East Range would be Visible

HVTL Corridors

Once completed for the Phase I plant, the HVTL structures required for both phases of the Mesaba Energy Project would be in place. Hence, the incremental aesthetic impacts from operation of the Phase II generating station would be negligible.

The 39L/37L HVTL Route would be located about 3,300 feet from Sky Harbor Airport, a seaplane base (Figure 3.2-9). The route would require an FAA determination on whether or not the HVTL structures and conductors pose an obstruction to aviation. Given its proximity to the Seaplane Base, it is likely that obstruction lighting would be required on portions of this HVTL. Adding lights to the towers would generate a moderate change in the area's visual resources and be noticeable over significant distances. The 39L/37L HVTL Route would also be located relatively close to the Eveleth-Virginia Municipal (EVM) Airport (Figure 3.2-9). The filing to the FAA would include a request for determination as to whether the structures on the segment of the 39L/37L HVTL Route near the EVM Airport would pose a hazard to air navigation and require special lighting.

The 38L HVTL Route would be located within 20,000 feet of the EVM Airport, which would require filing a lighting request to the FAA. If obstruction lighting were required, the aesthetic impact would be new and noticeable over significant distances. The impacts would be similar as for the 39L/37L HVTL Route.

Pipeline Corridors

Once completed for the Phase I plant, the pipelines required for both phases of the Mesaba Energy Project would be in place. Hence, the incremental aesthetic impacts from operation of the Phase II generating station would be negligible.

The natural gas pipeline corridor would be co-located primarily with existing natural gas lines and within an existing ROW. Subsequently, little or no aesthetic impacts associated with natural gas lines would be expected to occur.

The process water supply pipelines for the East Range Site would be located on **former** CE property and along disturbed mining areas. Because access to the property is restricted, it is unlikely that the water supply corridors would be visible.

Aesthetic impacts related to the use of the ZLD system would include increased truck traffic required to transport solids produced to a solid waste landfill. Storage would most likely occur at the demolition landfill located about 3.5 miles away (Gerlach, 2005). If storage is physically and economically feasible, impacts to the aesthetics would be low as traffic associated with transporting the solids would occur outside the general public's domain. Additional discussion of the impacts and mitigation measures related to transportation are discussed further in Section 5.3.

Outside of the East Range Site, the potable water and sewer pipelines would follow along existing utility corridors. The area along the utility corridors is already disturbed and operation of the pipelines would generate no additional impact to the aesthetic resources.

Rail Alignments and Access Roads

Once the selected rail alignment and access road would be completed for Mesaba Energy Project Phase I, the principal aesthetic impacts from operations would be related to the number of trains servicing the plant and vehicles entering and leaving the plant, which would be essentially double for the combined two-phased generating station. Impacts from traffic and noise are addressed in Sections 4.15 and 4.18.

The existing rail alignment and proposed rail line alternatives would be located north of Colby Lake and shielded from local residential receptors and road traffic. No grade crossings occur in Hoyt Lakes

and the nearest crossing occurs in Aurora in two places. Although there would be an increase in rail traffic, it would not be expected to impact visual resources in Hoyt Lakes.

Rail Line Alternatives 1 and 2 would share the initial rail spur west of the IGCC power plant. The closest residence to the spur would be located about 5,000 feet away. Although the rail loop and trains would be visible from CR 666, traffic along the road would be mostly limited to personnel going to work at the IGCC power plant. Therefore, aesthetic impacts related to visual changes related to the rail spur would be low.

Rail Line Alternative 2 would cross the Mesaba Generating Station and connect to the CN north-south track north of Wyman Junction. The rail line would cross CR 666 where it would be more visible to traffic traveling to the power plant and CE. The profile grades would also be more visible than Rail Line Alternative 1 and the total coal train aesthetic impacts would be spread over a longer distance. In addition, the longer distance would expose the coal cargo to more winds, increasing the potential for dust along CR 666. The permanent visual impacts would be moderate around the CR 666; however, it is likely this would be visible only to people employed within the area.

As explained in Section 2.3.2.2, following publication of the Draft EIS, Excelsior eliminated the proposed northernmost access road in favor of a single access road connecting the generating station with CR 666. The access road would have very low impacts on the aesthetic resources because it would be located at the northern end of CR 666 and shielded by forest. **The majority of people travelling on CR 666 nearby would be employees of the mining plant or of the generating station.**

4.2.5 Impacts of the No Action Alternative

For purposes of this EIS, as explained in Section 2.1.1.2, the DOE No Action Alternative is assumed to be equivalent to a "No Build" Alternative. Therefore, the power plant would not be built, and none of the impacts would occur. The existing HVTL corridors would not be updated, pipelines would not be built and the transportation corridors would remain unchanged. Because the site is zoned industrial, another facility could develop the site for industrial use purposes in the future.

4.2.6 Summary of Impacts

Basis for Impact	No Action	West Range	East Range
Block or degrade a scenic vista or viewshed.	No changes to scenic vistas or viewsheds.	Visual changes from power plant and HVTL structures.	Visual changes from power plant and HVTL structures.
Cause a change in area visual resources.	No changes to area visual resources.	Three public lands within 20 miles. **Combined 2-phased plant would be twice the size of Phase I only and have 8 emission stacks instead of 4. No substantial differences in corridors for 2-phased plant compared to Phase I only.**	**Within** Superior National Forest Land, and two other public lands within 20 miles. **Combined 2-phased plant would be twice the size of Phase I only and have 8 emission stacks instead of 4. No substantial differences in corridors for 2-phased plant compared to Phase I only.**
Create glare or illumination that would be obtrusive or incompatible with existing land uses.	No additional glare or light sources from area.	Security lighting around plant, aviation warning lights on tank boiler stack and some HVTL structures. **Combined 2-phased plant would have nearly twice the security lighting compared to Phase I only.**	Security lighting around plant, aviation warning lights on tank boiler stack and some HVTL structures. **Combined 2-phased plant would have nearly twice the security lighting compared to Phase I only.**

4.3 AIR QUALITY

This section describes the potential impacts that may occur to local and regional air quality from implementing the Proposed Action and No Action Alternative. Potential visibility impacts that could occur from increases in regional haze and localized vapor plumes are also discussed. Potential impacts related to human health due to changes in air quality are discussed in Section 4.17. **Text discussing greenhouse gases has been deleted from this section. Instead, discussion on the emissions of greenhouse gases, including carbon dioxide (CO_2), has been revised and is now provided in Section 2.2.3.1; cumulative impacts and climate change are discussed in Section 5.2.8.**

4.3.1 Approach to Impacts Analysis

Various state and Federal air quality standards and emissions limits have been established to minimize degradation of air quality as described in Section 3.3. The evaluation of potential impacts on air quality considered whether the Proposed Action or an alternative would cause any of the following conditions:

- Result in emissions of criteria pollutants and HAPs;
- Result in mercury (Hg) emissions and conflict with the regulations related to coal-fired electric utilities;
- Change in air quality related to the NAAQS and Minnesota Ambient Air Quality Standards (MAAQS);
- Result in consumption of PSD increments as defined by the CAA, Title I, PSD rule;
- Affect visibility and cause regional haze in Class I areas;
- Result in nitrogen and sulfur deposition in Class I areas;
- Conflict with local or regional air quality management plans;
- **Result in increased criteria pollutant emissions from the transport of materials and use of personally owned vehicles (POVs)**;
- Cause solar loss, fogging, icing, or salt deposition on nearby residents; and
- Discharge odors into the air.

Detailed air dispersion modeling was conducted as part of the application for a Part 70/New Source Review Construction Authorization Permit for the West Range Site to evaluate compliance with NAAQS and MAAQS, to conduct PSD increment analysis, and to review potential impacts to Class I areas. The permit application was submitted to the MPCA in June 2006 pursuant to the PSD regulations. The methods used for modeling are summarized below. The results of the modeling and potential impacts of the Mesaba Energy Project are used to represent an upper bound for assessing potential impacts, and are discussed in Section 4.3.2.5.

4.3.1.1 Changes to the Air Modeling Protocol

Since publication of the Draft EIS, several major changes have developed that resulted in a revised air modeling protocol, including: the promulgation and availability of a corrected and EPA-approved version of the CALPUFF modeling system; use of more recent meteorology data; an enhancement and/or update of the overall modeling parameters and project design information; incorporation of updated land use data across the entire modeling domain; use of a finer CALPUFF grid resolution of 1 kilometer to match the resolution of available land use data; and the development of a revised draft Federal Land Manager's Air Quality Related Values Working Group (FLAG) Phase I Report, which identifies significant changes to the manner in which future visibility assessments should be conducted.

On November 4, 2008, Excelsior submitted a revised modeling protocol ("Mesaba Energy Project, Mesaba One and Mesaba Two, Class I Area Modeling Protocol," October 2008; TRC et. al.,

2008) to the MPCA and FLMs for consideration in determining the project's potential impacts on air quality and Air Quality Related Values (AQRVs) at appropriate Class I areas of interest. By a letter dated December 1, 2008, the FLMs submitted their technical comments on the revised protocol and, after further discussions with regulatory personnel from the MPCA, EPA, and FLMs, Excelsior submitted on January 15, 2009 a supplemental protocol ("Mesaba Energy Project, Mesaba One and Mesaba Two, Class I Area Modeling Supplemental Protocol," January 2009; TRC et. al., 2009). The supplemental protocol detailed the proposed resolution of the FLMs' technical comments and provided, as necessary, documentation for the selection and use of appropriate modeling inputs and parameters for the final modeling analyses.

On March 5, 2009, the FLMs sent a letter (Bunyak, 2009) to the MPCA which summarized their review of the supplemental protocol and identified the model input and settings that they would accept for the Mesaba Energy Project modeling protocol and on which Excelsior based its modeling analyses, as presented in the Final EIS. Furthermore, as stated in the letter, the FLMs provided the option for Excelsior to submit additional modeling results as supplemental information, also included in the Final EIS. Follow-up correspondence from representatives of the FLMs confirmed their acceptance of the revised protocol on the condition that it met the requests made in their March 5, 2009 letter (Wickman, 2009 and Stacy, 2009). Discussions on the PSD increment impacts analysis and potential AQRVs impacts on Class I areas have been updated in this section to reflect the latest analyses, including additional analysis of East Range Site impacts and supplemental visibility analysis, based on the air modeling protocol identified above. The results on which such discussions are based are reported in "Mesaba Energy Project, Mesaba One and Mesaba Two, Class I Area Interim Modeling Protocol in Support of NEPA Review Process, April 2009" (TRC, 2009).

Subsequent to the discussions and agreements reached with the FLMs regarding supplemental modeling, EPA issued a memo on the use of CALMET/CALPUFF (see EPA memo in Appendix E). This memo states that use of a finer resolution is not adequately justified given the geographical characteristics of the domain of interest. The Forest Service considers this memo to be guidance in determining modeling parameters applicable to the Mesaba Energy Project (see July 31, 2009 letter from Forest Service in Appendix E). The results of a supplemental visibility analysis conducted by Excelsior are included in this EIS (see Section 4.3.1.4) since this supplemental modeling had been agreed to by the FLMs prior to the release of the EPA memo and since the supplemental modeling provides a better understanding of the effects of modeling parameters on predicted visibility impacts. However, DOE understands that the Forest Service now considers the results to be of "little value."

4.3.1.2 Air Permitting and the BACT Analysis

All compounds regulated under the CAA (i.e., regulated NSR pollutants) that are emitted by new major stationary sources in significant amounts would be subject to a BACT analysis in accordance with 40 CFR 51.166(j)(2). Based on the project's potential annual emissions as shown in Table 2.1-1, a BACT analysis was conducted for the criteria pollutants, except for lead.

For traditional pollutants such as nitrogen oxides (NO_x), sulfur dioxide (SO_2), particulate matter (PM) and mercury (Hg), an IGCC facility is inherently lower polluting than the current generation of traditional coal-fired power plants (EPA, 2006f). In its study of IGCC technology (EPA, 2006e), the EPA analyzed only methyldiethanolamine (MDEA) type acid gas cleaning systems and did not include selective catalytic reduction (SCR) equipment for the syngas turbines (i.e., to reduce NO_X in the CTGs). The EPA noted that the "reference" IGCC plant being engineered by GE Energy and Bechtel Corporation (GE's gasifier is only designed to accommodate bituminous coal) includes SCR, but indicated that it is difficult to compare the gasification technology development with low rank coals (i.e., subbituminous coal and lignite) to that of bituminous coal.

Although Excelsior's decisions regarding BACT for the IGCC process were made prior to the EPA's study of IGCC systems was published, the decisions were generally consistent with the EPA's analysis.

As described above in Section 4.3.1.1, Excelsior developed a new air modeling protocol since publication of the Draft EIS. Based on this protocol, a combination of emission controls that would be implemented for Phase I and Phase II of the Mesaba Energy Project were modeled, which were based on Excelsior's proposals to the MPCA regarding controls. The modeled scenarios include: the "proposed" level of emission controls (referred to by Excelsior as "BACT"); the "enhanced" level of emission controls (referred by Excelsior as "Beyond BACT"); and scenarios for short-term startup and shutdown conditions. The "proposed" rates reflect control of sulfur in product syngas via MDEA and control of nitrogen oxides via nitrogen dilution; the "enhanced" rates reflect control of sulfur in syngas via Selexol™ (a physical solvent) and control of nitrogen oxides via selective catalytic reduction.

MPCA is the state's permitting authority on the BACT determination process. Excelsior prepared a BACT analysis as part of the Mesaba Energy Project PSD permit application, which was submitted to MPCA on June 28, 2006. On October 19, 2007, the MPCA provided Excelsior a formal response disagreeing with Excelsior's BACT analysis. In response, Excelsior met with the MPCA and requested that the MPCA involve the EPA in reviewing the MPCA's analysis. On November 20, 2007, MPCA confirmed with Excelsior that the EPA had agreed to review MPCA's analysis and, on December 13, 2007, provided a package of relevant material to EPA as a basis for their input.

In correspondence since publication of the Draft EIS, MPCA stated in an August 12, 2008 letter to the Minnesota Department of Commerce that "We have since learned that the U.S. Environmental Protection Agency may disagree with our BACT analysis" and, therefore, has decided to address the BACT determination as part of the MPCA's permitting process. Furthermore, the MPCA agrees that the air permit for Phase I and Phase II of the Mesaba Energy Project must ensure the protection of Class I areas as required by 40 CFR 52.21(p). Currently, MPCA continues to review and analyze BACT and will make its final determination during the permitting process for the Mesaba Energy Project. Since the MPCA will make a final BACT determination based on subsequent negotiations between Excelsior and MPCA, DOE based the impacts analysis on the emission profiles proposed by Excelsior to the MPCA. Once MPCA makes a final BACT determination, the need for additional mitigation would be addressed by MPCA, in consultation with FLMs, through the PSD permitting process. DOE would also consider mitigation as a condition of the Record of Decision, pending progress in negotiations between Excelsior and MPCA regarding the BACT decision. If the final BACT determination by MPCA constitutes more stringent requirements than those on which the impact analysis in this Final EIS is based, then actual air quality impacts would be less than those presented in this Final EIS.

At the request of the Forest Service (see Forest Service letter dated July 31, 2009 in Appendix E), Table 4.3-1 – which summarizes BACT emission limits from operating and permitted IGCC plants – has been included for the Final EIS (proposed IGCC projects that have not been permitted or have been formally abandoned are not included in the table). The emission rates listed in the table were estimated based on permit documents and converted to units of pounds per million Btu (lbs/MMBtu) heat input to the gasifier and/or combustion turbine, for the purposes of general comparison.

Table 4.3-1. Permitted Emission Rates[1] for Existing and Permitted IGCC Plants

Facility	Status	Plant Output (MWnet)	Gasifier Fuel	SO_2		NO_x		PM_{10}		CO		VOC [5]
				BACT Limit [1] {lb/MMBtu gasifier} and/or [lb/MMBtu CT]	Acid Gas Removal Solvent	BACT Limit [1] {lb/MMBtu gasifier} and/or [lb/MMBtu CT]	Control Method	BACT Limit [1] {lb/MMBtu gasifier} and/or [lb/MMBtu CT]	Limit Basis[2]	BACT Limit [1] {lb/MMBtu gasifier} and/or [lb/MMBtu CT]	Control Method	BACT Limit [1] {lb/MMBtu gasifier} and/or [lb/MMBtu CT]
Tampa Electric PPS (FL)	In operation	250	petcoke/ bituminous	{0.163}	Clean Fuel	{0.101}	Nitrogen dilution	{0.008} [0.013]	F	{0.045}	GCP	[0.0017]
Wabash River (IN)	In operation	262	IL bituminous	{0.126}	MDEA	{0.087}	Steam injection	{0.005}[3]	See note (3)	{0.036}	GCP	{0.001} [0.0021]
Taylorville Energy Center (IL)	Final permit (to be amended for hybrid IGCC)	677	IL bituminous	[0.016]	Selexol	[0.034]	SCR	[0.022]	F/B	[0.049]	GCP	[0.006]
Lima Energy IGCC (OH)	Final permit (to be amended for hybrid IGCC)	541	petcoke/ coal	{0.017} [0.018]	Unspecified solvent-based absorption technology and minimum control efficiency of 99%	{0.067} [0.070]	Diluent (steam) injection into combustion zone	{0.008} [0.009]	F/B	{0.035} [0.037]	GCP	{0.007} [0.007]

Table 4.3-1. Permitted Emission Rates[1] for Existing and Permitted IGCC Plants

Facility	Status	Plant Output (MWnet)	Gasifier Fuel	SO_2		NO_x		PM_{10}		CO		VOC [5]
				BACT Limit [1] {lb/MMBtu gasifier} and/or [lb/MMBtu CT]	Acid Gas Removal Solvent	BACT Limit [1] {lb/MMBtu gasifier} and/or [lb/MMBtu CT]	Control Method	BACT Limit [1] {lb/MMBtu gasifier} and/or [lb/MMBtu CT]	Limit Basis[2]	BACT Limit [1] {lb/MMBtu gasifier} and/or [lb/MMBtu CT]	Control Method	BACT Limit [1] {lb/MMBtu gasifier} and/or [lb/MMBtu CT]
Cash Creek Generation Station (KY)	Final permit (to be amended for hybrid IGCC)	630	coal	[0.016]	Selexol	[0.033]	SCR	[0.022]	F/B	[0.049]	GCP	[0.006]
Edwardsport Generating Station (IN)	Final Permit	630	coal	[0.014]	Selexol	[0.08] [4]	Nitrogen dilution	[0.017]	F/B	{0.037} [0.046]	GCP	[0.002]
Mesaba Energy Project (MN)	Application	600	petcoke/ coal	{0.025} [0.035]	MDEA	{0.058} [0.074]	Nitrogen dilution	{0.01} [0.012]	F/B	{0.033} [0.045]	GCP	{0.003} [0.004]

(1) BACT limits based on lbs/MMBtu heat input to gasifier (values shown in "{ }") and/or heat input to combustion turbine (values shown in "[ ]")
(2) F = limit based on filterable (front half) PM testing; F/B = limit based on filterable (front half) and condensable (back half) PM testing.
(3) Emission limit not met, highest tested emissions reported at 0.012 lb/MMBtu. Based on filterable PM only.
(4) Although Duke Energy is installing SCR on its heat recovery steam generator, it is not necessary for the company to operate it to comply with the annual NO_X emissions limit (i.e., 2121.5 tons per year) specified in the air permit. Therefore, the NO_X emission rate from the facility is expected to be indicative of the SCR being out of service.
(5) Control methods for VOC are unspecified.
Acronyms: CT – combustion turbine; GCP – good combustion practices; MDEA - methyldiethanolamine; lbs/MMBtu – pounds per Million British thermal units; MWnet – net megawatt; SCR – selective catalytic reduction

Excelsior submitted similar information as shown in Table 4.3-1 to the MPCA and FLMs on January 12, 2007, in a response addressing the FLMs' concerns about BACT (Table 4.3-1, however, reflects more current information based on recent project/permitting status). On June 11, 2007, Excelsior submitted additional information to the MPCA and FLMs in support of its own emission rate decision-making. DOE recognizes that the MPCA would serve as the ultimate decision-maker regarding BACT determinations and expects that the MPCA would review the differences between individual innovative projects, such as those shown in Table 4.3-1, and traditional coal-fired power plants, such as those shown in Table 2.2-5. DOE is aware of the ongoing BACT negotiations between the MPCA and Excelsior and, as previously noted, understands that such decisions would be finalized during the permitting process.

4.3.1.3 Predictive (Near-Field) Modeling Approach

The latest available version of AERMOD (version 07026) – the EPA regulatory default model for near-field analysis – was utilized to assess air quality impacts from the Mesaba Generating Station. Model inputs and control parameter options were selected in accordance with the protocol established in *Guideline on Air Quality Models, Revised* and *User's Guide for the AMS/EPA Regulatory Model - AERMOD*, both EPA documents, as well as MPCA's guidance document *MPCA Air Dispersion Modeling Guidance for Title V Modeling Requirements and Federal Prevention of Significant Deterioration Requirements (Version 2.2)*. Dry or wet plume depletion was not utilized for any pollutant. A receptor grid was generated per MPCA guidance (provided in Appendix B). The model assumed a rural location because the terrain/land use within 3 kilometers (1.9 miles) of the sites are almost completely rural. The MPCA processed meteorological data suitable for input to AERMOD specifically for the West Range Site and East Range Site.

The air quality modeling addressed the individual point sources of the Mesaba Energy Project for both the Phase I-only and Phases I and II combined. Point sources included four CTG stacks, two TVB stacks, two auxiliary boilers, and two flare stacks, as well as all fugitive PM_{10} sources. The maximum expected point source criteria pollutant emission rates from each phase (and for different averaging times and operating scenarios) that were used as model input for the air modeling analyses are listed in Appendix B (Tables B.1-3 and B.1-4). In response to comments from the FLMs, Excelsior identified the worst-case emission scenarios that were possible in various operating scenarios, including flaring. To address emission rates and stack gas conditions for these worst-case, short-term scenarios, air modeling was also carried out for applicable averaging times (24 hours and less).

Other sources at the Mesaba IGCC Power Plant would consist of two emergency fire pumps and two emergency diesel generators per phase. Because these sources would operate for only short time periods – when the primary emission sources would not be in operation – these sources were not included in the air modeling analyses. Hours of operation for these other sources would likely be limited by permit conditions. The emissions from periodic testing of these emergency resources are considered negligible in comparison to the sources used in the analyses. Fugitive emissions of PM_{10} would result from the storage and handling of coal and other materials and have been modeled under normal operations.

The criteria air pollutants – SO_2, CO, NO_2, and PM_{10} – were modeled for each applicable averaging time and for the operating scenarios (i.e., normal operations and an alternative worst-case flaring scenario). Based on the modeling results, pollutants that would have significant ambient air impacts were determined and the significant impact area for each pollutant was identified. The significant impact area was defined for each pollutant as a circle, centered on the plant site, with a radius equal to the greatest distance to a significant impact for any applicable averaging time or emission scenario.

For criteria pollutants that were shown to have a significant impact in ambient air at any point, more refined modeling was carried out to evaluate compliance with PSD increments and NAAQS **or MAAQS, whichever was the more stringent standard**. **Table 4.3-2 lists the applicable significant impact levels (SILs), PSD increments for Class II regions, and the stricter NAAQS and MAAQS limit.**

Table 4.3-2. Applicable Air Quality Standards, Maximum Allowable PSD Class II Increments, and Significant Impact Levels

Pollutant	Averaging Time	NAAQS / MAAQS[1] ($\mu g/m^3$)	PSD Class II Increment ($\mu g/m^3$)	Significant Impact Level ($\mu g/m^3$)
SO_2	1-Hour	1,300	512	25
	3-Hour	915	512	25
	24-Hour	365	91	5
	Annual	60	20	1
NO_2	Annual	100	25	1
PM_{10}	24-Hour	150	30	5
	Annual	50	17	1
CO	1-Hour	40,000	NA	2,000
	8-Hour	10,000	NA	500

[1] Values in this column represent the more stringent NAAQS or MAAQS limit.

All point sources associated with Phase I and Phase II were included in the source input for PSD increment modeling. Additionally, **to account for distant and regional sources,** data on nearby major increment-consuming (or -expanding) sources were also included as source input**. This data was accumulated from MPCA and recent permit applications. For the Final EIS, a more refined regional source inventory, applicable to modeling for the Mesaba Generating Station at both the West Range and East Range sites, was developed and used in all PSD increment and NAAQS modeling analyses. For NAAQS modeling, total allowable emissions from significant nearby sources were included in the input file (see Appendix B for a list of regional sources and the modeled emissions).**

Regional source impacts were included (for worst-case modeled impact times and receptors) by modeling the First-Approximation Run Data emission inventory appropriate to the West Range Site and East Range Site, as provided by MPCA modeling staff. For comparison to the NAAQS, a background concentration representing natural background was added to all model-predicted concentrations.

4.3.1.4 Class I Area-Related (Far-Field) Modeling Approach

Air quality modeling analyses were conducted to estimate impacts of the Phase I and Phase II Mesaba Generating Station on air quality in Class I areas. Separate sets of Class I modeling analyses addressed PSD Class I increments (for SO_2, PM_{10}, and NO_x), the AQRVs of sulfur and nitrogen deposition, and visibility impairment (regional haze). The dispersion modeling analysis used standard EPA long-range transport modeling methodologies, and followed guidance as presented in EPA's Guideline on Air Quality Models, the IWAQM Phase 2 report, and the FLAG Phase I report. The analyses also incorporated suggestions and guidance received in pre-application meetings with the Forest Service and the National Park Service (Excelsior, 2006d), **and a series of ongoing conference calls and written correspondence as previously described in Section 4.3.1.1**. **The Class I analyses address impacts to the BWCAW, VNP, RLW, and IRNP (for East Range Site only). Of the two proposed sites, the East Range Site is located in closer proximity to Class I areas – the East Range Site is located within 100 kilometers of the BWCAW (40 kilometers) and the VNP (90 kilometers). The closest Class I area to the West**

Range Site is the BWCAW (100 kilometers). For a listing of distances to the closest Class I areas, see Table 3.3-4.

The CALPUFF air quality model was used for all Class I area analyses. CALPUFF is the approved EPA long-range transport model referenced in the *Guideline on Air Quality Models* and consists of the following three components:

- The CALMET model for processing of meteorological data;
- The CALPUFF model for the transport and dispersion calculations; and
- The CALPOST model for analysis and post-processing of model results.

A visibility/regional haze impact analysis was carried out for BWCAW and VNP **for both sites and for IRNP for the East Range Site (the West Range Site is more than 300 kilometers from the IRNP and visibility is not a designated AQRV for RLW)**. The recommended methodology for assessing visibility impacts according to the FLMs' FLAG guidance involves the use of CALPOST to process the data on concentrations of pollutants from the CALPUFF modeling of 24-hour emissions. In CALPOST, a daily value of light extinction is defined by the concentrations of each pollutant that can affect visibility, taking into account the efficiency of each particulate type in scattering light, and the relative humidity, which influences the size of sulfates and nitrates. The FLM has established threshold changes in light extinction (Δb_{ext}) as a percentage of natural background that are believed to represent potential adverse impacts on visibility. **Thus, the potential visibility impacts are expressed as changes in light extinction and the number of days resulting in a change greater than** 5 percent (a potentially detectable change) and 10 percent (a level that may represent an unacceptable degradation).

DOE understands that the FLMs have the authority to determine the appropriate methodology for determining visibility impacts and that Method 2 is the currently applicable method accepted by the FLMs. The FLAG 2000 Report established the default methodology (i.e., Method 2) for calculating the impact of an emission source on visibility at a Class I Area. In the FLAG 2000, the FLMs provided guidance on the threshold levels of light extinction change caused within a Class I area that may be considered significant or of concern. When using FLAG 2000 guidance background extinction values and a maximum hourly relative humidity factor of 95 percent, predicted impacts of greater than 5 percent maximum daily (i.e., 24-hour) change in light extinction may require additional consideration.

Since 2000, alternative methods to Method 2 have been developed and incorporated into the CALPUFF modeling system. In April 2006, a draft guidance was presented by the NPS staff at the specialty modeling conference in Denver, Colorado. The guidance suggested that for determining the potential for uniform haze visibility impacts of concern, the appropriate 24-hour extinction change modeled impact for comparison to the threshold value of concern (5 percent) should be based on Method 6 and the 98th percentile value (i.e., the 8th highest modeled value [H8H]) for any 1-year period. Additionally, the CALPOST program was recently updated to include the latest methods recommended by the Interagency Monitoring of Protected Visual Environments (IMPROVE) Steering Committee on calculating light extinction.

After considering developments and enhancements as described above, the FLMs have developed revisions to the FLAG 2000 guidance and these were proposed in the Federal Register on July 8, 2008 (73 FR 39039). Although the new proposed guidance, FLAG 2008 (referred to as Method 8), has not yet been finalized, in correspondence regarding the supplemental protocol (as discussed in Section 4.3.1.1) the FLMs indicated that supplemental visibility calculations for the Mesaba Energy Project could be submitted using Method 8. Under Method 8, a proposed source with a modeled 98th percentile daily change in light extinction of less than 5 percent (when using monthly, particle-size-dependent relative humidity factors and a more refined natural background provided in the FLAG 2008 methodology [FLAG, 2008]) is considered to have insignificant impacts

and are of limited concern. Predicted maximum daily impacts greater than 5 percent change in light extinction relative to the annual average background may require additional consideration. The visibility modeling presented in this section includes findings from both Method 2 and Method 8.

Class I Areas Modeling Domain

As previously discussed, the FLMs provided technical comments on the revised modeling protocol (TRC et. al., 2008) and, after further consultation, the FLMs identified the model settings that they would accept for the Mesaba Energy Project (Bunyak, 2009) . The letter also noted that Excelsior could submit supplemental model runs. The FLMs recommended that the air quality impact analysis be performed using 2 years of 36-kilometer MM5 data, which are included in Section 4.3.1.2, and a CALMET grid resolution of 4 kilometers in addition to another 1 or 2 years of 12-kilometer MM5 data and a CALMET grid resolution of 1 kilometer. Because 2002 was the only year for which 12-kilometer MM5 data was available in the public domain, the higher-resolution modeling was performed for that year. For 2003 and 2004, only 36-kilometer MM5 data was available, so the 4-kilometer CALMET grid resolution was used for those 2 years.

Supplemental modeling was conducted for 2002 at 4-kilometer resolution and for 2003 and 2004 at 1-kilometer resolution. Due to the much larger domain required for multi-source modeling and the increased computational time that would be incurred, the 4-kilometer grid resolution was used for multi-source modeling for all 3 years. Details on the model settings and input parameters used for the CALMET and CALPUFF modeling and supplemental modeling results are provided in Appendix B (Table B.2-1) and are summarized later in this section.

After acceptance of the latest modeling protocol from the FLMs, the Forest Service submitted a letter to DOE (dated July 31, 2009; see Appendix E) that referenced a memo issued by the EPA Model Clearinghouse in May 2009 (EPA, 2009b; see Appendix E). This memo provides EPA's comments on an air modeling protocol for an electric generating unit in eastern South Dakota and indicates EPA's concurrence with Region 8's position on the proposed grid resolution (EPA, 2009c). The memo states that use of a finer resolution in CALMET/CALPUFF (i.e., 1-kilometer grid resolution) is not adequately justified given the geographical characteristics of the domain of interest (i.e., South Dakota and Minnesota). The results of the supplemental visibility analysis are included in this EIS since this supplemental modeling had been agreed to by the FLMs prior to the release of the EPA memo and since the supplemental modeling provides a better understanding of the effects of modeling parameters on predicted visibility impacts. However, DOE understands that the Forest Service now considers the results to be of "little value" (see Appendix E).

Modeled Emission Rates and Scenarios

In response to comments on the Draft EIS, a range of emission rates and scenarios for Phases I and II were modeled, as discussed in Section 4.3.1.2. The scenarios include: the "proposed" level of emission controls; an "enhanced" level of emission controls; and reasonably worst-case sensitivity scenarios for short-term startup and shutdown conditions. The "proposed" rates reflect control of sulfur in product syngas via an amine-based solvent –MDEA – and control of nitrogen oxides via nitrogen dilution; the "enhanced" rates reflect control of sulfur in syngas via Selexol™ (a physical solvent) and control of nitrogen oxides via selective catalytic reduction. The pollutant emission rates used represent the maximum expected emissions and the appropriate averaging times from the Mesaba IGCC Power Station for each phase and are used for all CALPUFF modeling (see Appendix B, Tables B.2-2 to B.2-4, for modeling parameters used). For the AQRV modeling analyses, PM speciation was calculated using FLM guidance for gas-fired combustion turbines. In some cases, modeled scenarios for the East Range Site included Phase I at one level of emission controls and Phase II at a different level of emission controls.

Cumulative modeling was also conducted for the purpose of determining the amounts of Class I increment consumption for the pollutants, averaging periods, and Class I areas for which the Phase I and Phase II impacts were predicted to exceed the applicable SIL. For the Final EIS, a more comprehensive emission inventory of increment-consuming and -expanding sources within 300 kilometers of the applicable Class I areas was developed and is presented in Appendix B (Table B.2-5). The inventory is based on data supplied by the MPCA, the Wisconsin Department of Natural Resources, the Michigan Department of Environmental Quality, accumulated data from recent air permit applications for other facilities in the region, and data from actual air permits. The discussion on the updated cumulative air quality impacts is presented in Section 5.2.2 and Appendix D1.

4.3.2 Impacts of the Proposed Action

Common air quality impacts associated with the Mesaba Energy Project are from emissions from construction of the Mesaba Generating Station and associated facilities, operation of the Mesaba Generating Station, vehicle traffic, and cooling towers. In addition, **feedstock and slag** delivery **and slag transport to and from the power plant by** trains **and trucks** would **result in emissions** of criteria pollutants **at both the West Range and the East Range Sites (new text in Section 4.3.2.2 on vehicle emissions has been added for the Final EIS)**. However, these emissions are not expected to change air quality appreciably, because the emissions would be reduced by minimizing points of transfer of the material, enclosing conveyors and loading areas, and installing control devices such as baghouses and wetting systems. Trains would be advanced hydraulically to minimize exhaust emissions. These common impacts are discussed in more detail in the following sections. **Potential impacts from the emissions of criteria pollutants from individual point sources are also considered common impacts shared by both the West Range and East Range Sites; however, the extent and implications would differ as modeling input parameters, such as existing background concentrations, proximity to Class I areas, and levels of control, would not be the same for each site.**

4.3.2.1 Construction Emissions

During construction, air quality impacts could occur as a result of NO_X, VOCs, CO, and SO_2, and fugitive dust emissions from material handling and storage, site grading and movement of soil, and emissions from combustion of fuels in construction equipment and vehicles. Construction vehicles would include trucks, dozers, excavators, backhoes, loaders, cranes, forklifts, and other equipment. Power equipment would also be used including pumps, generators, and light towers. Internal combustion engines would be used for activities such as excavation, concrete placement, and structural steel installation. Construction vehicles and machinery would be equipped with standard pollution-control devices to minimize emissions. These emissions would be very small compared to regulatory thresholds typically used to determine whether further air quality impact analysis is necessary [such as 40 CFR Part 93.153(b)]. Air toxic emissions from construction activities would be associated primarily with VOC emissions from diesel equipment. Given the size of the West and East Range properties, these emissions are not expected to result in ambient concentrations of air toxics that would exceed any reference concentration associated with acute or chronic effects.

Potential impacts would be temporary in nature and would be minimized through use of BMPs such as wetting the soil surfaces, covering trucks and stored materials with tarp to reduce windborne dust, and using of properly maintained equipment. Given the size of the West and East Range properties, construction dust would be localized (Excelsior, 2006b).

4.3.2.2 Transportation-Related Emissions

Emissions from Personally Owned Vehicles (POVs)

During construction and operation of the Mesaba Generating Station and its associated facilities, emissions would be generated from vehicles, as by-products of combustion from vehicle engines and

fugitive dust generated from traffic on the roadways near and on the power plant footprint and buffer land. During peak construction activities, when Phase I and Phase II overlap, on-site personnel are expected to reach about 1,500 persons. Based on similar analyses conducted in the past, it can be assumed that there would be a 20 percent reduction in vehicle trips from carpooling, peak vehicle trips during this time are estimated to be about 1,200 trips per day of POVs, and 20 to 30 delivery vehicles per day. During operation of Phases I and II, employees, on-site contractors, and visitors are expected to total between 107 and 182 persons (Excelsior, 2006b).

When compared with emissions from the facility, vehicular emissions are small (Excelsior, 2006b). Table 4.3-3 **(new table for the Final EIS)** shows estimated peak daily emission rates from personal vehicles during peak construction activities. The estimated emission rate of carbon monoxide, the pollutant emitted at the greatest rate, is 11 pounds per day.

Table 4.3-3. Daily Emission Rates from Vehicle Traffic – Peak Construction

Pollutant	Emission Factor[1] gram/mile	Number of Vehicle Trips/day	Distance Per Trip mile/trip	Emission Rate[3] lb/day
NO_X	0.3	1,200	1	0.8
CO	4.2	1,200	1	11
NMOC[2]	0.18	1,200	1	0.48
PM	0.06	1,200	1	0.2

Note, this is a new table for the Final EIS.
[1]Emission Factors taken from EPA Green Vehicle Guide using EPA's assumed average engine performance (http://www.epa.gov/greenvehicles/rating.htm).
[2] NMOC = non-methane organic compounds, which is equivalent to volatile organic compounds.
[3] Emission rates are for peak construction activities when Phase I and Phase II construction overlap.

Roadways and parking lots where emissions from mobile sources would occur are referred to as indirect sources. According to Minnesota Department of Transportation *Highway Project Development Process Handbook* (Mn/DOT, 2006a), a detailed air quality analysis is required if anticipated traffic volumes exceed a threshold of traffic volumes at the top 10 intersections in Minnesota. If the project has better conditions and does not meet the levels at one of these intersections, then it is presumed it would not cause any violations. The smallest traffic volume of the top ten intersections is 35,800 AADT (Mn/DOT, 2006b). As previously stated, peak traffic counts associated with the construction and operation of Mesaba Generating Station would be a small fraction of the AADT threshold; therefore, the impact from the indirect mobile sources associated with the Mesaba Energy Project is likely to be negligible.

Emissions from Trains and Trucks

Train traffic emissions associated with the Mesaba Energy Project would predominantly result from the delivery of feedstock during operations (see Table 4.3-4, a new table for Final EIS). These emissions represent the combined Phases I and II emissions and are calculated based on the worst-case scenarios of the maximum annual tonnage of feedstock delivery (i.e., partial slurry quench on 100 percent subbitumimous coal) from the farthest distance source from the Mesaba Generating Station (i.e., Powder River Basin) as described in Table 2.1-1. Phase I-only emissions would be halved in comparison of the values presented in Table 4.3-4.

For the West Range Site, a mileage of 1,073 miles is estimated based on an origin of Gillette, WY and the destination of Canisteo, MN (BNSF, 2008). It is expected that coal delivered to the East Range Site would be trans-loaded to CN rail in Superior, WI; therefore, the distance of 1,201 miles is estimated from the East Range Site based on an origin of Gillette, WY and the destination of Superior, WI, plus an estimated 90 miles of rail shipment from Superior, WI to Hoyt Lakes, MN (BNSF, 2009). Train fuel efficiency used to calculate the emissions from the trains reflects the

BNSF's average fuel required to move freight, accounting for the movement of both loaded and empty trains (STB, 2008).

While sulfur produced by Mesaba Phases I and II would be transported by rail, the quantity and distances associated with sulfur transport would be negligible compared to those of the worst-case feedstock delivery, because the use of 100 percent subbituminous coal would correspond to the lowest sulfur production. Additionally, although slag produced by the Mesaba Generating Station would be transported by rail, slag transport by truck is determined to be the worst-case scenario for truck emissions.

Table 4.3-4. Emissions from Trains
Phases I and II of the Mesaba Energy Project (tpy)

	CO_2[1]	SO_2[2]	NO_X[3]	PM[3]	CO[3]
West Range	150,000	1.5	2,300	80	410
East Range	170,000	1.7	2,600	90	460

Note, this is a new table for the Final EIS.
[1]Based on EPA emissions factor of 22.2 pounds CO_2 per gallon of diesel fuel. See http://www.epa.gov/otaq/climate/420f05001.htm.
[2]Based on 15 ppmw ultra low sulfur diesel, fuel weight of 7.3 lb/gal, and 2 lb SO_2 emitted per lb S in fuel.
[3]Based on EPA estimated emission rates for locomotives in 2013. See Table 9 of EPA420-F-97-051. Available at http://www.epa.gov/oms/regs/nonroad/locomotv/frm/42097051.pdf. Note that EPA finalized more stringent standards in 2008 that require emission reductions of 80% for NO_X and 90% for PM for model years 2015 and later (i.e., Tier IV standards), so train emissions over the project's lifetime are likely to be much lower than estimated here.

The truck emissions from the Mesaba Generating Station, as presented in Table 4.3-5 (new table for the Final EIS), would predominantly be as a result of transporting slag and ZLD salt at the greatest distance of truck transportation. Although Phase I-only emissions are not shown in the table, it should be noted that emissions for Phase I would generally be halved in comparison to the levels that would occur during the combined phase. It is assumed that slag and ZLD salts are hauled using 25-ton capacity trucks. The worst-case (i.e., most distant) disposal site for ZLD salts would be the landfill in Canyon, MN, which is 70 miles from the West Range Site and 60 miles from the East Range Site. The distance that slag could be transported to market would be limited by economics. Taking the above into consideration, a one-way distance of 100 miles is a conservative estimate for truck transport of slag and ZLD salts. Actual distances and emissions are likely to be much lower.

Table 4.3-5. Emissions from Trucks
Phases I and II of the Mesaba Energy Project (tpy)

	CO_2[1]	SO_2[2]	NO_X[3]	PM[3]	CO[3]
West Range	7,700	0.1	60	0.8	7
East Range	8,100	0.1	61	0.8	7

Note, this is a new table for the Final EIS.
[1]Based on EPA emissions factor of 22.2 pounds CO_2 per gallon of diesel fuel. See http://www.epa.gov/otaq/climate/420f05001.htm.
[2] Based on 15 ppmw ultra low sulfur diesel, fuel weight of 7.3 lb/gal, and 2 lb SO_2 emitted per lb S in fuel.
[3] Based on DOT estimated emission rates for rural freeway combination diesel trucks in 2010. See Table B-5 of http://www.fhwa.dot.gov/environment/freightaq/appendixb.htm.

Slag production at the Mesaba Generating Station would depend on the amount of feedstock used and would range from 1,000 to 1,600 tons per day. Total ZLD salt production would depend on the water quality of the water source, which is lower at the East Range Site. There are 9,000

tons per year of ZLD salt expected to be produced at the West Range Site and 29,000 tons per year from the East Range Site.

Except for NO_X, emissions from the trains and trucks would be much smaller than those from operation of the proposed plant; therefore, impacts would be considered negligible. Although quantity of NO_X emission rates would be comparable to those from proposed plant operations, the impacts from the train and truck emissions would be far less than those of the power plant, because the trains and trucks are mobile. Unlike a stationary source in which the emissions are localized, the emissions from trains and trucks would be dispersed over a large area and distance; thus, depending on the speed of the train or truck, wind and other meteorological factors, localized impacts would be negligible for Phase I-only and the combined phase. Additional measures would be used during material handling to reduce the fugitive dust emissions that would include minimizing points of transfer of the material, enclosing conveyors and loading areas, and installing control devices such as baghouses and wetting systems. Trains would be advanced hydraulically to minimize exhaust emissions.

4.3.2.3 Cooling Towers Emissions

The evaporative cooling towers at the Mesaba Generating Station would discharge warm saturated air and small quantities of liquid water droplets to the atmosphere. The wet plumes would be emitted vertically from 33-foot diameter fan stacks at an elevation of 48 feet above grade. Due to the buoyancy of the warm moist air and the vertical velocity imparted by the fans, the wet plumes would rise to significant heights above the ground. The potential environmental impacts of cooling tower emissions may include fogging or icing at nearby locations, deposition of water droplets or snow crystals and solids from the circulating water, and visible condensed water plumes.

The most obvious impact of the Mesaba Generating Station cooling towers would be visible, condensed water plumes, which would occur during periods of low air temperature and light winds. The plumes, which would be similar to small natural cumulus clouds, can rise to heights of several thousand feet above the ground in extremely cold weather, and can persist for several miles downwind. Liquid water droplets emitted by cooling towers (referred to as “drift”) constitute a very small fraction of the total emitted water. Drift droplets represent circulating cooling water from the tower and contain dissolved solids (such as particulate matter) from the circulating water. Deposition of drift solids has been identified as a potential cooling tower impact where towers use saline water or water with high solids content. Particulate matter emissions from the Mesaba Generating Station on the West Range Site would be lower than on the East Range Site because of the high concentration of total dissolved solids found in pit waters near the East Range Site. **Due to the implementation of the ZLD system at the West Range Site, the cycles of concentration at which the cooling towers would likely increase to 10 COCs. Thus, at 10 COCs, the PM emissions due to drift would increase from 39 tons per year to 78 tons per year at the West Range Site**. **At the East Range Site, the PM emissions from drift would be 256 tons per year.** Deposition of these particles on surrounding ground surfaces would be negligible. Since the steam plumes consist almost entirely of condensed water, they would have no adverse effects other than their visual impact.

Experience with large cooling towers at power plants similar to the Mesaba Generating Station has shown that fogging and icing impacts of mechanical draft towers in cold climates are minimal. Extensive research occurred during the 1970s, when many large cooling tower installations were constructed or proposed at power generating facilities. These studies led to development of mathematical models for predicting cooling tower effects and collecting field observations at operating towers. In general, the models concluded that environmental impacts are negligible except within 500 to 1000 feet of the towers and the boundaries of the facilities. Due to the buoyancy of cooling tower emissions, they rise to heights above ground level and dissipate in the ambient air as they are transported by prevailing winds (Excelsior, 2006b).

Relevant experience with cooling towers in Minnesota is available from Xcel Energy's Sherburne County Generating Station near Becker, Minnesota. Detailed studies were carried out at the Sherburne County Generating Station because the plant is located in close proximity to Interstate Highway 94 and Minnesota Highway 10. Modeling analyses conducted during permitting of Sherburne County Generating Station Unit 3 predicted no significant impacts on nearby highways. Subsequent experience has shown that effects of the Sherburne County Generating Station cooling towers have been limited to isolated observation of very light snow on a few occasions per year, but no significant fog or other impacts have been observed. The Sherburne County Generating Station cooling tower facility is approximately twice as large as the proposed Mesaba Generating Station cooling towers in terms of total heat dissipation to the atmosphere. Therefore, despite the somewhat colder climate in northern Minnesota, there is no reason to anticipate off-site fog or icing impacts from the Mesaba Generating Station cooling towers.

There are no major highways, airports, or other sensitive facilities in close proximity to either the West Range Site or the East Range Site. CR 7 **and CR 666 are the closest roadways to the proposed facility for the West Range Site and East Range Site, respectively.** Given data and experience at other cooling tower installations, it is concluded that there would be no significant fogging, icing, or drift deposition impacts of the Mesaba Generating Station cooling towers on off-site human activities or the environment. The only predicted impacts are the visual impact of steam plumes in cold, moist weather conditions, and occasional, very light, localized fallout of snow crystals during times of very low temperature. Deposition of these particles on surrounding ground surfaces would be negligible.

4.3.2.4 Hazardous Air Pollutants

Table 4.3-6 (updated for the Final EIS) shows that the potential to emit individual HAPs from the Phase I only and Phase I and II combined Mesaba Generating Station would be below the 10-ton per year major source threshold. Additionally, at 12.0 and 24.1 tons per year of combined HAPs for Phase I and combined Phases I and II, respectively, the Mesaba Generating Station would be below the 25-ton per year major source thresholds for HAPs. Therefore, Phases I and II of the Mesaba Energy Project are not major sources of HAPs as defined under the NESHAP. **Note that based on agency comments on the Draft EIS, an updated AERA analysis was performed that generally provides a more conservative level of analysis and is presented in Section 4.17. However, the general conclusions regarding impacts, as stated in the Draft EIS, remain unchanged. Updated findings on the potential impacts to health risk are discussed in Section 4.17 and Appendix C.**

Table 4.3-6. Annual Hazardous Air Pollutant Emissions (Phase I and Phases I & II)

CAS No. or MPCA No.	Compound	Annual Average HAP Emission (TPY)				Total Phase I	Phase I & Phase II
		CTGs	TVB	Flare	Fugitive		
75-07-0	Acetaldehyde	4.41E-02	1.58E-04	3.94E-04		4.47E-02	8.93E-02
98-86-2	Acetophenone	2.21E-02	7.92E-05	1.98E-04		2.24E-02	4.48E-02
107-02-8	Acrolein	4.28E-01	1.53E-03	3.83E-03		4.34E-01	8.67E-01
7440-36-0	Antimony	2.73E-02	2.77E-04	6.93E-04		2.83E-02	5.66E-02
7440-38-2	Arsenic	5.91E-02	1.48E-03	3.70E-03		6.42E-02	1.28E-01
71-43-2	Benzene	6.12E-02	2.83E-02	7.08E-02	6.25E-03	1.66E-01	3.33E-01
100-44-7	Benzyl chloride	1.03E+00	3.70E-03	9.24E-03		1.05E+00	2.09E+00
7440-41-7	Beryllium	6.31E-03	7.88E-06	1.97E-05		6.33E-03	1.27E-02
92-52-4	Biphenyl	2.51E-03	8.97E-06	2.24E-05		2.54E-03	5.08E-03

Table 4.3-6. Annual Hazardous Air Pollutant Emissions (Phase I and Phases I & II)

CAS No. or MPCA No.	Compound	Annual Average HAP Emission (TPY)				Total Phase I	Phase I & Phase II
		CTGs	TVB	Flare	Fugitive		
117-81-7	Bis(2-ethylhexyl)phthalate (DEHP)	1.08E-01	**3.85E-04**	9.64E-04		1.09E-01	2.18E-01
75-25-2	Bromoform	**5.76E-02**	2.01E-04	**5.04E-04**		**5.83E-02**	**1.17E-01**
7440-43-9	Cadmium	2.34E-01	5.67E-05	1.42E-04		2.35E-01	4.69E-01
75-15-0	Carbon disulfide	1.13E+00	4.03E-03	1.01E-02	3.35E-02	1.17E+00	2.35E+00
463581	Carbonyl sulfide				5.83E-02	5.83E-02	1.17E-01
532-27-4	Chloroacetophenone, 2-	1.03E-02	3.68E-05	9.20E-05		1.05E-02	2.09E-02
108-90-7	Chlorobenzene	**3.25E-02**	1.14E-04	**2.85E-04**		**3.29E-02**	6.58E-02
67-66-3	Chloroform	**8.71E-02**	**3.15E-04**	7.88E-04		8.82E-02	**1.76E-01**
0-00-5	Chromium, total	1.27E-02	1.05E-03	2.62E-03		1.64E-02	3.28E-02
18540-29-9	Chromium, (hexavalent)	3.82E-03	3.14E-04	7.86E-04		4.92E-03	9.85E-03
7440-48-4	Cobalt	6.37E-03	1.20E-03	2.99E-03		1.06E-02	2.11E-02
98-82-8	Cumene	7.82E-03	2.63E-05	6.57E-05		7.92E-03	1.58E-02
57-12-5	Cyanide (Cyanide ion, Inorganic cyanides, Isocyanide)	**1.48E-01**	**3.88E-03**	**9.70E-03**	8.80E-03	**1.70E-01**	**3.41E-01**
77-78-1	Dimethyl sulfate	7.09E-02	2.53E-04	6.33E-04		7.18E-02	1.44E-01
121-14-2	Dinitrotoluene, 2,4-	4.13E-04	1.49E-06	3.72E-06		4.19E-04	**8.37E-04**
100-41-4	Ethyl benzene	1.39E-01	**2.53E-02**	**6.33E-02**	**9.24E-04**	**2.28E-01**	4.57E-01
75-00-3	Ethyl chloride (Chloroethane)	6.20E-02	2.19E-04	**5.48E-04**		**6.28E-02**	**1.26E-01**
106-93-4	Ethylene dibromide (Dibromoethane)	1.77E-03	6.31E-06	1.58E-05		1.79E-03	3.59E-03
107-06-2	Ethylene dichloride (1,2-Dichloroethane)	5.91E-02	2.10E-04	5.26E-04		5.98E-02	1.20E-01
50-00-0	Formaldehyde	4.17E-01	1.49E-03	3.72E-03	**1.14E-06**	4.22E-01	8.44E-01
110-54-3	Hexane	9.89E-02	3.50E-04	8.76E-04	1.49E-03	1.02E-01	2.03E-01
7647-01-0	Hydrochloric acid	9.56E-02	3.01E-04	**7.51E-04**	3.36E-02	1.30E-01	2.60E-01
7664-39-3	Hydrogen fluoride (Hydrofluoric acid)	1.23E+00	5.26E-05	1.31E-04		1.23E+00	2.45E+00
78-59-1	Isophorone	8.56E-01	3.06E-03	7.64E-03		8.67E-01	1.73E+00

Table 4.3-6. Annual Hazardous Air Pollutant Emissions (Phase I and Phases I & II)

CAS No. or MPCA No.	Compound	Annual Average HAP Emission (TPY)				Total Phase I	Phase I & Phase II
		CTGs	TVB	Flare	Fugitive		
7439-92-1	Lead	1.37E-02	6.34E-05	1.59E-04		1.39E-02	2.78E-02
7439-96-5	Manganese	2.55E-02	2.38E-03	5.94E-03		3.38E-02	6.76E-02
7439-97-6	Mercury	1.23E-02	**6.55E-04**	1.64E-04		1.31E-02	**2.61E-02**
74-83-9	Methyl bromide (Bromomethane)	1.23E+00	1.15E-02	2.88E-02		1.27E+00	2.54E+00
74-87-3	Methyl chloride (Chloromethane)	7.82E-01	**6.65E-03**	**1.66E-02**		8.06E-01	1.61E+00
71-55-6	Methyl chloroform (1,1,1 – Trichloroethane)	2.95E-02	**1.05E-04**	2.63E-04		2.99E-02	5.98E-02
78-93-3	Methyl ethyl ketone (2-Butanone)	5.76E-01	2.06E-03	**5.15E-03**		5.83E-01	1.17E+00
60-34-4	Methyl hydrazine	2.51E-01	8.97E-04	2.24E-03		2.54E-01	5.08E-01
80-62-6	Methyl methacrylate	**2.95E-02**	**1.05E-04**	2.63E-04		2.99E-02	5.98E-02
1634-04-4	Methyl tert butyl ether	**5.17E-02**	1.84E-04	4.60E-04		5.23E-02	1.05E-01
75-09-2	Methylene chloride (Dichloromethane)	5.65E-02	5.56E-04	1.39E-03		5.84E-02	1.17E-01
91-20-3	Naphthalene	6.39E-02	**8.03E-04**	2.01E-03	2.58E-05	6.67E-02	1.33E-01
7440-02-0	Nickel	**9.67E-03**	4.20E-03	**1.05E-02**		2.44E-02	4.87E-02
108-95-2	Phenol	9.49E-01	1.18E-02	2.96E-02	**7.82E-08**	9.90E-01	1.98E+00
123-38-6	Proprionaldehyde	5.61E-01	2.01E-03	5.01E-03		5.68E-01	1.14E+00
7784-49-2	Selenium	1.37E-02	2.37E-04	5.93E-04		1.45E-02	2.90E-02
100-42-5	Styrene	3.69E-02	1.32E-04	3.31E-04		3.74E-02	7.47E-02
127-18-4	Tetrachloroethylene (Perchloroethylene)	6.35E-02	2.27E-04	5.67E-04		6.43E-02	1.29E-01
108-88-3	Toluene	8.09E-04	**1.52E-02**	**3.79E-02**	**7.37E-04**	**5.46E-02**	**1.09E-01**
108-05-4	Vinyl acetate	1.12E-02	4.03E-05	1.01E-04		1.14E-02	2.27E-02
1330-20-7	Xylenes	5.46E-02	1.26E-02	3.14E-02	**9.24E-04**	9.95E-02	1.99E-01

Table 4.3-6. Annual Hazardous Air Pollutant Emissions (Phase I and Phases I & II)

CAS No. or MPCA No.	Compound	Annual Average HAP Emission (TPY)				Total Phase I	Phase I & Phase II
		CTGs	TVB	Flare	Fugitive		
	Total Federal HAPs	1.14E+01	**1.50E-01**	3.75E-01	1.45E-01	1.20E+01	2.41E+01

Bold typeface denotes updated values for the Final EIS; values were updated to reflect MPCA's comments on Excelsior's Joint Application submitted to the Minnesota Public Utilities Commission regarding detection limits; Source: Excelsior, 2006d **and Excelsior, 2009b**

4.3.2.5 NAAQS/MAAQS, PSD Increment, and AQRVs Impact Analyses (West Range Site and East Range Site)

State and Federal air quality rules prohibit emissions from a new facility that cause or contribute to a conflict with MAAQS or NAAQS. In addition, emissions cannot exceed established PSD increments. As discussed in Section 4.3.1.1, to demonstrate compliance with these requirements, an air dispersion modeling analysis for the Mesaba Generating Station at the West Range Site **and East Range Site** was conducted **(to provide an improved comparable review between the two sites, new analysis was performed on the East Range Site for the Final EIS). For criteria pollutants that were shown to have a significant impact in ambient air at any point, more refined modeling was carried out to evaluate compliance with PSD increments and the stricter NAAQS or MAAQS (see Table 4.3-2). Additionally, for Class I areas, separate sets of Class I modeling analyses addressed PSD Class I increments for SO_2, PM_{10}, and NO_x and the AQRVs.**

Note that because the worst-case operating condition would occur when operating the combined Phases I and II (i.e., under any given circumstance, two identical units performing at the same operating level would emit twice the pollutant mass of one unit under the same circumstance), no separate ambient air quality modeling studies were conducted to verify compliance with ambient air quality standards and Class II PSD increments during the single phase. Therefore, by confirming compliance with the applicable standards during the combined phase under a given circumstance, it is understood that compliance would also be achieved for the Phase I-only operation. Although not modeled, under the given circumstance (i.e., two separate, identical units, operating under identical conditions with the single and combined phases located in close proximity to each other and no terrain obstacles affecting one unit more than another), it is expected that the Phase-I only impacts would be halved in comparison to the combined phase or, at the very least, fall within state and federal thresholds if the combined phase demonstrated compliance with applicable limits.

Potential criteria and non-criteria pollutant emissions are expected from the following Mesaba Generating Station sources: CTGs, TVBs, flares, fugitive emission leaks, material handling systems, auxiliary boilers, cooling towers, emergency generators, and emergency firewater pump engines (Excelsior, 2006b). Fugitive emissions of PM_{10} would result from the storage and handling of coal and other materials. As discussed in Section 4.3.1.1, air quality modeling addressed emissions from all of the sources, except the two emergency fire pumps and the two emergency diesel generators, which are considered to result in negligible air impacts. As demonstrated in Table 4.3-7 **(updated for the Final EIS)**, the Mesaba Energy Project has the potential to emit annually, one or more of the regulated criteria pollutants above the PSD significance threshold; therefore, it would be a significant source of air emissions.

Table 4.3-7. Annual Criteria Air Pollutant Emissions (Phase I Only and Phase I & II Combined)

Pollutant	PSD Significance Threshold (TPY)	Phase I Potential to Emit[1] (TPY)	Phase I & II Potential to Emit[1] (TPY)
CO	100	**1,270**	2,539
NO_X	40	**1,436**	2,872
SO_2	40	**695**	1,390
PM	25	**271[2]/360[3]**	**542[2]/719[3]**
PM_{10}	15	**266[2]/355[3]**	**532**[2]/709[3]
O_3 as VOC	40	**99**	197
Pb	0.6	**0.015**	0.030
Sulfuric Acid (H_2SO_4) (mist)	7	**65**	130
Hydrogen Sulfide (H_2S)	10	**9**	17

Table has been updated for the Final EIS (bold typeface denotes updated values)
[1] The potential to emit is the maximum capacity of a stationary source to emit any air pollutant under its physical and operational design (i.e., the worst-case scenario) and does not include any regulatory limitations. For the Mesaba Generating Station sources, the worst-case scenario assumes full load at 8760 hrs per year.
[2] West Range Site.
[3] East Range Site: Higher emissions because water quality at the East Range Site results in higher PM_{10} emissions from the cooling tower.
Source: Excelsior, 2006d

Because the Mesaba Generating Station could potentially emit more than 100 tpy of the criteria pollutants (except Pb), it would be a major source of air emissions under the PSD regulation. Ozone (O_3) emissions could not be modeled or analyzed because O_3 is not emitted directly from a combustion source. O_3 is formed from photochemical reactions involving emitted VOCs and NO_X, which take a long time to complete. Consequently, O_3 can travel far from the sources of its precursors and the contribution of an individual source to O_3 concentrations at any particular location cannot be readily quantified. Furthermore, compliance with O_3 standards is normally analyzed as part of a state or regional implementation plan. Emissions of Pb were not modeled because the potential Pb emissions from the proposed project were determined to be less than the PSD significant impact threshold. Impacts due to these emissions for both the West Range and East Range sites are examined in more detail in the following sections.

Predictive (Near-Field) Modeling Results

Significant Impact Analysis

Table 4.3-8 (updated for the Final EIS) shows modeled **Phases I and II combined** impacts at normal operation **and at the alternative short-term/flaring scenarios as described in Section 4.3.1.3 and in Appendix B (Section B.1.1). The maximum expected point source criteria pollutant emission rates from each phase of the Mesaba Energy Project for different averaging times and operating scenarios were used as model input for the air modeling analyses. In response to comments from the FLMs, Excelsior has identified the worst-case emission scenarios that are possible in various operating scenarios including flaring. The worst-case flaring scenario was very conservative, as it reflects the simultaneous startup of two gasification trains concurrent with a third train experiencing an upset/malfunction. To address emission rates and stack gas conditions for these worst-case short-term scenarios, air modeling was also carried out for applicable averaging times**

(24 hours and less) using the emission rates given in Appendix B (Tables B.1-3 through B.1-5), which represent worst-case maximum emissions for each scenario. **Although Phase I-only emissions are not presented in the table, it should be noted that emissions for Phase I would be halved in comparison to the levels that would occur during the combined phase.**

Table 4.3-8. Highest Project Impacts and PSD SILs for Phases I and II Combined

Pollutant	Averaging Time	West Range Site		East Range Site		SIL µg/m^3
		Normal Operation µg/m^3	Alternative Flaring µg/m^3	Normal Operation µg/m^3	Alternative Flaring µg/m^3	
SO_2	1-hour	**124.1**	**93.1**	**304.1**	**140.5**	25
	3-hour	**74.7**	**53.5**	**208.7**	**82.3**	25
	24-hour	**31.1**	**21.7**	**62.5**	**35.4**	5
	Annual	**4.01**	N/A	**3.70**	**N/A**	1
PM_{10}	24-hour	**28.2**	**28.2**	**32.6**	**28.2**	5
	Annual	**1.75**	N/A	**4.15**	**N/A**	1
CO	1-hour	**158.7**	**2,034**	**178.2**	**4,716**	2000
	8-hour	**60.1**	**260.4**	**116.9**	**634.7**	500
NO_X	Annual	**7.16**	N/A	**7.93**	**N/A**	1

Table has been updated for the Final EIS (bold typeface denotes updated/new values).

Results of AERMOD modeling of operations at the Mesaba Generating Station, Phases I and Phase II, produce the following conclusions:

- **During Phase I normal operation, impacts are above the applicable SILs for all pollutants and all averaging times, except for the annual PM_{10} and 1- and 8-hour CO at the West Range Site, and 1- and 8-hour CO at the East Range Site. During Phase II normal operation,** impacts are above the applicable SIL for all pollutants, and all averaging times, except for **the 1- and** 8-hour CO **at the West Range and East Range Sites**.
- Impacts are generally greatest under normal operating conditions, except for CO; highest CO impacts would occur during **the alternative scenario**.

Wherever modeled pollutant concentration increases exceed the SILs, further modeling is required under PSD rules to ensure that the Class II PSD increment for the area is not violated. Because the highest predicted impacts were significant, increment and NAAQS compliance modeling was necessary for SO_2, PM_{10}, and NO_X. This further evaluation included all sources within 50 kilometers (31 miles) of the project's area of impact. There are no applicable PSD increments for CO. The normal operation scenario was addressed in PSD increment and NAAQS analyses for SO_2, PM_{10}, and NO_X since they represent the highest concentrations. The **alternative flaring** scenario was addressed only for the CO NAAQS demonstration.

The farthest distance from the site where the SILs are exceeded determines the significant impact area. Based on the modeling results, the maximum radius of the significant impact area for each pollutant is **50** kilometers (**31** miles) for SO_2, **2** kilometers (1.**2** miles) for PM_{10}, 3.0 kilometers (1.9 miles) for NO_X, and 0.**8** kilometers (0.**5** miles) for CO. The highest predicted concentrations for any pollutant were found to occur within approximately 1 kilometer (0.6 miles) of **either site**. Thus, impacts of the Mesaba Generating Station would be limited to a small area in close proximity to the site.

PSD Increment Analysis (Near-Field) Modeling

Increment analyses were completed for SO_2, PM_{10}, and NO_X. The modeling included all Phase I and Phase II sources at maximum emission rates in normal operation plus all nearby increment consuming (and expanding) emissions sources. The results of the increment analyses are shown in Table 4.3-9 (updated for Final EIS), along with a comparison to the allowable Class II PSD increments. **Although the emissions for Phase-I only are not presented in the table, it should be noted that the emissions for Phase I would be halved in comparison to the levels that would occur during the combined phase.** The data in Table 4.3-9 demonstrate that the Mesaba Energy Project, in combination with all other nearby and regional PSD sources, would comply with all state and Federal Class II increment limits **for both Phases I-only and Phases I and II combined**. **Note that based on the revised modeling protocol, updated estimates for the West Range Site are presented in Table 4.3-9; additionally, new modeling has been conducted for the East Range Site and is included in the table.**

Table 4.3-9. Results of Class II PSD Increment Analysis for Phases I and II Combined

Pollutant	Averaging Time	Highest* Concentration ($\mu g/m^3$)		PSD Increment Limits ($\mu g/m^3$)
		West Range Site	East Range Site	
SO_2	1-hour	**118.2**	**294.3**	512
	3-hour	**71.2**	**200.4**	512
	24-hour	**21.0**	**52.5**	91
	Annual	**4.2**	**2.9**	20
PM_{10}	24-hour	**24.8**	**26.3**	30
	Annual	**1.7**	**0.7**	17
NO_2	Annual	**7.6**	**8.1**	25

*For short-term periods, the highest second-high concentration from 5 years of meteorological data is shown. For annual average, the highest concentration for any of the 5 years is listed. **Note that this table has been revised based on comments on the Draft EIS (bold typeface denotes updated/new values) – the analysis reflects modeling based on a revised modeling protocol (TRC et. al., 2008 and 2009). New modeling results for the East Range Site have been added to the table.**

Class II NAAQS Evaluation

The NAAQS modeling calculated the maximum impact of the Mesaba Generating Station and all other regional sources and compared the highest total impacts, plus background concentrations, to applicable MAAQS and NAAQS. Maximum emission rates in normal operation were modeled for all Mesaba Generating Station sources and pollutants, except in the case of CO for which the startup scenario had the maximum impacts. Excelsior did not quantify or model the $PM_{2.5}$ emissions from the proposed power plant. Research indicates that multipliers in the range of 0.06 to 0.11 can be used to infer or scale $PM_{2.5}$ concentrations from PM_{10} data (USEPA, 2005).

Tables 4.3-10 and 4.3-11 summarize results of the NAAQS model analysis and the $PM_{2.5}$ estimation, respectively. **Although Phase I-only emissions are not presented in these tables, it should be noted that the emissions for Phase I would be halved in comparison to the levels that would occur during the combined phase.** For SO_2, PM_{10}, and NO_X, Table 4.3-10 **(updated for the Final EIS)** shows maximum impacts of the Mesaba Energy Project plus local sources that were explicitly included in the 5-year model runs, all regional sources from FAR modeling of the highest impact days, and **the background values supplied by MPCA**. For CO, no inventory of regional emissions is available. Therefore, the data in Table 4.3-10 shows CO concentrations from the Mesaba Energy Project alone **(using the worst-case flaring scenario)** and conservative total concentration estimates obtained by adding an urban background concentration to predicted Mesaba Generating Station impacts.

Table 4.3-10. Results of Class II NAAQS Modeling for Phases I and II Combined

Pollutant	Averaging Time	Background (ug/m^3)	Total [1] at West Range (ug/m^3)	Total [1] at East Range (ug/m^3)	NAAQS / MAAQS [4] (ug/m^3)
SO_2	1-hour	10	**521.9**	**565.1**	1300
	3-hour	10	**237.6**	**360.4**	915
	24-hour	10	**73.3**	**166.5**	365
	Annual	2	**8.6**	**30.8**	60
PM_{10} [2]	24-hour	20	**126.1**	**112.2**	150
	Annual	10	**37.9**	**32.9**	50
NO_X	Annual	5	**17.0**	**32.5**	100
CO	1-hour	7,000[3]	**8,959**	**11,565**	40,000

[1] Listed Highest Concentrations include Mesaba, all regional sources, and background. They are highest second-high for 1 to 24-hour averaging times except for PM_{10}, which is the highest 6th high from 5 years. Annual average values are the highest for any year.
[2] Although the EPA revoked the annual PM_{10} standard in December 2006, the standard is still in the Minnesota regulations.
[3] Background CO concentrations are very conservative estimates from urban monitors in Minneapolis/St. Paul. No background data exist for the Mesaba Generating Station area.
[4] Value represents the more stringent standard of the two standards.
Table updated for Final EIS (bold typeface denotes updated/new values)

For Phase I-only and Phases I and II combined, all predicted concentrations are below allowable levels, and the results demonstrate compliance with all MAAQS and NAAQS. Data for $PM_{2.5}$ was estimated using PM_{10} concentrations as a basis **for modeled sources and IMPROVE ambient monitoring for background**. **Although the IMPROVE monitors are not federal reference monitors, data from these sources are currently the best available. The IMPROVE monitoring program consists of a national network of air quality monitors designed to support the EPA's Regional Haze Rule program. This data has helped to define baseline natural conditions for the program and will be used in the future to assess the performance of the program. Given its end use by the EPA, the IMPROVE database undergoes extensive quality control and validation, which provides some confidence that the data are representative of monitored PM background.**

The majority of PM_{10} impacts are a result of fugitive emissions. When using a multiplier of 0.11 for relative $PM_{2.5}$ to PM_{10}, the resulting concentrations of 24-hour and annual $PM_{2.5}$, as shown in Table 4.3-11 **(new table added for Final EIS)**, would not exceed their respective NAAQS standards **for the single and combined phases**. Additionally, there are very low impacts of regional sources within the Phase I and II Mesaba Generating Station's significant impact area.

Table 4.3-11. Estimated $PM_{2.5}$ Concentration for Phase I and II Combined [1]

Pollutant	Averaging Time	Background (ug/m^3)	Total [2] at West Range (ug/m^3)	Total [2] at East Range (ug/m^3)	NAAQS (ug/m^3)
$PM_{2.5}$	24-hour	20	31.7	30.1	35
	Annual	5	8.1	7.5	15

[1] $PM_{2.5}$ concentrations are estimated based on the 0.11 ratio of $PM_{2.5}$ to PM_{10}. Ambient concentrations were calculated from IMPROVE ambient monitoring data from nearby Class I areas (BWCAW and VNP), using available data from 2000-2003. Because recent ambient data already includes many sources that were also modeled and, therefore, the results reflect substantial double-counting, these concentration are considered conservative. Note that this table is new for the Final EIS.
[2] Includes Mesaba, all regional sources, and background.

Minnesota and PSD Regulations Monitoring Requirements

Minnesota and Federal PSD regulations specify *de minimis* monitoring concentrations. Under PSD regulations, pre-construction monitoring may be required if projected emissions from the Mesaba Energy Project exceed the *de minimis* threshold and background concentrations related to existing sources in the vicinity of the proposed Mesaba Generating Station are exceeding the *de minimis* levels. The PSD *de minimis* monitoring concentrations are shown in Table 4.3-12 **(updated for Final EIS) for the combined phase (for Phase I-only, the emissions would be half of the estimates shown in the table)**; in addition to the maximum projected Mesaba Energy Project SO_2, PM_{10}, NO_2, and CO concentrations (see also Table 4.3-8). As previously mentioned in Section 4.3.1.2, the Pb and O_3 emissions were not modeled because O_3 is not emitted directly from a combustion source and potential Pb emissions from the proposed project are negligible.

Table 4.3-12. PSD Significant Monitoring Concentrations and Maximum Impacts from Mesaba Energy Project (Phases I and II Combined)

Pollutant	Averaging Time	Highest Impact at West Range Site ($\mu g/m^3$)	Highest Impact at East Range Site ($\mu g/m^3$)	*De Minimis* Monitoring Level ($\mu g/m^3$)
SO_2	24-hour	**31.1**	**62.4**	13
PM_{10}	24-hour	**28.2**	**32.6**	10
NO_2	Annual	**7.2**	**7.9**	14
CO	8-hour	**260**	**635**	575

Table updated for Final EIS **(bold typeface denotes updated/new values)**.

During Phase I-only, levels for NO_2 and CO are below the *de minimis* monitoring concentration levels for both sites. During the combined phase, Table 4.3-12 indicates that **for both sites,** the levels for NO_2 are below the *de minimis* monitoring concentrations and SO_2 and PM_{10} model-predicted levels exceed the threshold monitoring concentrations. **Additionally, CO exceeds the threshold at the East Range Site.** Based on background PM_{10} monitoring data available in northeast Minnesota from Virginia, Duluth, and from an IMPROVE monitoring in the northern Class I areas, background PM_{10} concentrations are below *de minimis* levels. Additionally, limited SO_2 data from Ely, MN and Voyageurs National Park also indicate that background SO_2 concentrations are low in northern Minnesota, and are generally below the *de minimis* monitoring levels. **No CO monitoring data was available near the proposed sites; however, it is assumed that the predicted increase above the *de minimis* monitoring level at the East Range Site would not be a significant impact as only the flaring scenario at the East Range Site exceeded monitoring thresholds.** An application requesting a waiver of the preconstruction monitoring requirements was submitted to the MPCA with the application for a Part 70/New Source Review Construction Authorization Permit. Section 3.3.3 provides existing local and regional air quality data.

The results of the NAAQS compliance analysis (see Table 4.3-10) indicate that the Mesaba Energy Project, Phase I and II, would not violate these standards and total ambient pollutant concentrations levels would remain well below applicable limits. The combination of existing representative regional monitoring data and low predicted ambient pollutant concentration levels, which do not violate any NAAQS standards, indicate that pre-construction monitoring is not necessary and would not contribute to a significant improvement in impact assessment.

Class I Area (Far-Field) Modeling Results

Air quality modeling analyses were conducted to estimate the impact of the Mesaba Energy Project on air quality in Class I areas. The analyses address impacts to the BWCAW, VNP, RLW**, and IRNP**.

The Class I increment analyses address PSD Class I increments for SO_2, PM_{10}, and NO_X and the AQRV analyses address nitrogen and sulfur deposition and visibility.

Class I Impacts and Increment Consumption

The CALPUFF model was used to calculate pollutant impacts from the Mesaba Energy Project for Class I areas. **Supplemental modeling using AERMOD and the methodology described in the near-field modeling approach in Section 4.3.1.4 was conducted for a small number of receptors in the BWCAW that fell within 50 kilometers of the East Range Site.** The two-phase Mesaba Generating Station was modeled **at the worst-case emission rates for both sites** and the results were compared with Class I PSD increments and SILs (see Tables 4.3-13 and 4.3-14). **For both sites, sensitivity analyses were conducted for Phase I, which compared impacts of worst-case flaring emissions versus worst-case normal operation emissions. Modeling results indicate that normal operations would result in higher impacts in all cases except for the 3-hour SO_2. Therefore, the results shown for all non-flaring cases in Table 4.3-13 (updated for the Final EIS) are based on both phases of the West Range Site operating at the "proposed" emission rates. While modeling runs were conducted for other scenarios with lower emissions, these modeled impacts were lower than those for the worst-case scenario as shown below; thus, these other scenarios would be within compliance. Where SILs were exceeded, these maximum values are shown in italics and underlined typeface in the table.**

Table 4.3-13. Class I PSD Increment Modeling Results for West Range Site (Phase I & II at 'Proposed' Emission Levels)

Pollutant	Averaging Period	Year Evaluated			PSD Inc ($\mu g/m^3$)	PSD Class I SIL ($\mu g/m^3$)	Max (3) ($\mu g/m^3$)
		2002 (1)	2003 (2)	2004 (2)			
Boundary Waters Canoe Area Wilderness							
SO_2	3-Hour (N*)	**1.74**	**1.42**	**1.93**	**25**	**1**	***1.93***
	3-Hour (2F*)	**2.97**	**2.80**	**3.12**	**25**	**1**	***3.12***
	3-Hour (1F*)	**1.48**	**1.43**	**1.55**	25	1	***1.55***
	24-Hour	**0.39**	**0.35**	**0.56**	5	0.2	***0.56***
	Annual	**0.018**	**0.018**	**0.018**	2	0.1	**0.018**
NO_X	Annual	**0.017**	**0.015**	**0.017**	2.5	0.1	**0.017**
PM_{10}	24-Hour	**0.25**	**0.37**	**0.25**	8	0.3	***0.37***
	Annual	**0.012**	**0.013**	**0.012**	4	0.2	**0.013**
Voyageurs National Park							
SO_2	3-Hour (N*)	**1.28**	**2.05**	**1.77**	**25**	**1**	***2.05***
	3-Hour (2F*)	**2.21**	**3.64**	**3.32**	**25**	**1**	***3.64***
	3-Hour (1F*)	**1.11**	**1.81**	**1.64**	25	1	***1.81***
	24-Hour	**0.33**	**0.40**	**0.64**	5	0.2	***0.64***
	Annual	**0.018**	**0.024**	**0.022**	2	0.1	**0.024**
NO_X	Annual	**0.016**	**0.023**	**0.020**	2.5	0.1	**0.023**
PM_{10}	24-Hour	**0.29**	**0.26**	**0.56**	8	0.3	***0.56***
	Annual	**0.012**	**0.015**	**0.015**	4	0.2	**0.015**

Table 4.3-13. Class I PSD Increment Modeling Results for West Range Site (Phase I & II at 'Proposed' Emission Levels)

Pollutant	Averaging Period	Year Evaluated			PSD Inc ($\mu g/m^3$)	PSD Class I SIL ($\mu g/m^3$)	Max [3] ($\mu g/m^3$)
		2002 [1]	2003 [2]	2004 [2]			
Rainbow Lakes Wilderness							
SO_2	3-Hour (N*)	**0.49**	**0.43**	**0.41**	**25**	**1**	**0.49**
	3-Hour (2F*)	**0.67**	**0.76**	**0.60**	**25**	**1**	**0.76**
	3-Hour (1F*)	**0.33**	**0.38**	**0.31**	25	1	**0.38**
	24-Hour	**0.11**	**0.09**	**0.09**	5	0.2	**0.11**
	Annual	**0.010**	**0.009**	**0.007**	2	0.1	**0.010**
NO_X	Annual	**0.009**	**0.015**	**0.006**	2.5	0.1	**0.015**
PM_{10}	24-Hour	**0.13**	**0.11**	**0.09**	8	0.3	**0.13**
	Annual	**0.008**	**0.008**	**0.006**	4	0.2	**0.008**

* Normal operation ('N'), two-phase flaring ('2F'), and single-phase flaring ('1F') scenarios were analyzed.
[1] 12km MM5 data, 1km CALMET grid resolution
[2] 36km MM5 data, 4km CALMET grid resolution
[3] SILs exceedances are denoted in italicized and underlined typeface.
Table updated for Final EIS (bold typeface denotes updated/new values).

Because the East Range Site is in closer proximity to the Class I areas, the Class I PSD increment modeling for this site was based on assuming that Phase I was operating at the "proposed" emission rates (listed in Appendix B, Table B.2-2) and Phase II was operating at the "enhanced" emission rates (listed in Appendix B, Table B.2-3). The Class I PSD increment modeling results for the East Range Site are shown in Table 4.3-14 **(new table for the Final EIS)**. Where SILs were exceeded, these maximum values are shown in italics and underlined typeface in the table.

Table 4.3-14. Class I PSD Increment Modeling Results for East Range Site (Phase I at 'Proposed' Emission Levels; Phase II at 'Enhanced' Emission Levels)

Pollutant	Averaging Period	Year Evaluated			PSD Class I Inc ($\mu g/m^3$)	PSD Class I SIL ($\mu g/m^3$)	Max [3] ($\mu g/m^3$)
		2002 [1]	2003 [2]	2004 [2]			
Boundary Waters Canoe Area Wilderness							
SO_2	3-Hour (N*)	3.77	3.46	3.49	25	1	*3.77*
	3-Hour (2F*)	7.90	7.75	7.49	25	1	*7.90*
	3-Hour (1F*)	3.96	3.82	3.65	25	1	*3.96*
	24-Hour	0.72	0.73	1.02	5	0.2	*1.02*
	Annual	0.041	0.053	0.044	2	0.1	0.053
NO_X	Annual	0.050	0.067	0.057	2.5	0.1	0.067
PM_{10}	24-Hour	0.77	0.53	0.40	8	0.3	*0.77*
	Annual	0.023	0.026	0.022	4	0.2	0.026

Table 4.3-14. Class I PSD Increment Modeling Results for East Range Site (Phase I at 'Proposed' Emission Levels; Phase II at 'Enhanced' Emission Levels)

Pollutant	Averaging Period	Year Evaluated			PSD Class I Inc ($\mu g/m^3$)	PSD Class I SIL ($\mu g/m^3$)	Max [3] ($\mu g/m^3$)
		2002 [1]	2003 [2]	2004 [2]			
Voyageurs National Park							
SO_2	3-Hour (N*)	1.28	0.89	0.96	25	1	*1.28*
	3-Hour (2F*)	3.20	2.18	2.14	25	1	*3.20*
	3-Hour (1F*)	1.60	1.09	1.07	25	1	*1.60*
	24-Hour	0.26	0.23	0.25	5	0.2	*0.26*
	Annual	0.010	0.011	0.012	2	0.1	0.012
NO_X	Annual	0.010	0.010	0.012	2.5	0.1	0.012
PM_{10}	24-Hour	0.19	0.25	0.20	8	0.3	0.25
	Annual	0.008	0.009	0.009	4	0.2	0.009
Rainbow Lakes Wilderness							
SO_2	3-Hour (N*)	0.72	0.70	0.69	25	1	0.72
	3-Hour (2F*)	1.64	1.80	1.50	25	1	*1.80*
	3-Hour (1F*)	0.79	0.86	0.78	25	1	0.86
	24-Hour	0.17	0.12	0.19	5	0.2	0.19
	Annual	0.008	0.009	0.010	2	0.1	0.010
NO_X	Annual	0.007	0.009	0.010	2.5	0.1	0.010
PM_{10}	24-Hour	0.16	0.11	0.21	8	0.3	0.21
	Annual	0.008	0.008	0.009	4	0.2	0.009
Isle Royale National Park							
SO_2	3-Hour (N*)	0.24	0.27	0.36	25	1	0.36
	3-Hour (2F*)	0.57	0.69	1.01	25	1	*1.01*
	3-Hour (1F*)	0.28	0.34	0.52	25	1	0.52
	24-Hour	0.07	0.05	0.08	5	0.2	0.08
	Annual	0.004	0.004	0.004	2	0.1	0.004
NO_X	Annual	0.005	0.003	0.004	2.5	0.1	0.005
PM_{10}	24-Hour	0.15	0.08	0.07	8	0.3	0.15
	Annual	0.008	0.007	0.006	4	0.2	0.008

Source: Excelsior
* Normal operation ('N'), two-phase flaring ('2F'), and single-phase flaring ('1F') scenarios were analyzed.
[1] 12km MM5 data, 1km CALMET grid resolution
[2] 36km MM5 data, 4km CALMET grid resolution
[3] SILs exceedances are denoted in italicized and underlined typeface.
New table for the Final EIS.

The data indicate that maximum Mesaba Energy Project impacts are below allowable PSD increments for all pollutants in Class I areas **for both the Phase I-only emissions and Phases I and II combined emissions**. Long-term impacts are also below the SILs, indicating that impacts would not be significant,

with no further analysis necessary. **However, for the West Range Site, impacts are indicated to exceed the SILs for short-term SO_2 and PM_{10} at BWCAW and VNP (as shown in italicized and underlined typeface in Table 4.3-13). For the East Range Site, impacts are indicated to exceed the SILs for short-term SO_2 and PM_{10} at BWCAW and short-term SO_2 at VNP (Table 4.2-14). These results are consistent with those from the AERMOD modeling for BWCAW receptors within 50 kilometers of the East Range Site – i.e., the same SILs were exceeded.** Because of the 3-hour and 24-hour SO_2 **and 24-hour PM_{10}** projected impacts, it was necessary**, under PSD regulations,** to conduct a cumulative impact analysis, including other regional SO_2 **and PM_{10}** increment sources as well as reasonably foreseeable sources, to quantify total PSD increment consumption **at both sites**. **The cumulative analysis has been updated for the Final EIS, which includes an expanded sources inventory, and is discussed in Section 5.2.2 and Appendix D1.**

While the flaring scenario for the East Range Site also indicated potential impacts above some SILs for RLW and IRNP, a cumulative analysis was not conducted for those Class I areas because cumulative analyses based on infrequent startup/shutdown/malfunction occurrences are not appropriate; the underlying assumption in the cumulative impact analysis is that these conditions would prevail continuously every hour of each year. This scenario is not possible given the limited number of potential hours of flaring events. Also, these occurrences are unlikely to coincide with the maximum impacts shown by other sources.

Class I (Far-Field) Visibility/Regional Haze Analysis

As discussed in Section 4.3.1.4, current FLM guidance specifies the use of CALPOST Method 2 for calculation of visibility impacts. In Method 2, relative humidity data from the nearest surface weather station is used to calculate both source and background light extinction. Since the issuance of Method 2, the FLMs have developed a revised draft FLAG document, referred to as Method 8, for calculating visibility impacts. Therefore, results using both Method 2 and Method 8 are presented in this section. The Method 2 approach relies on the maximum extinction values for comparison to the threshold levels of concern, and focuses on the number of days modeled per year above the 5 percent and 10 percent light extinction thresholds, while Method 8 focuses on the light extinction modeled for the 8th worst day of each year (i.e., the 98th percentile) (see Section 4.3.1.4).

A range of emission scenarios was modeled (Section 4.3.1.4) and the results for visibility impacts are presented in Tables 4.3-14 and 4.3-15 for the West Range Site and East Range Site, respectively (new tables for the Final EIS). The "proposed" and "enhanced" emission rates are listed in Appendix B, Tables B.2-2 and B.2-3, respectively; 'None' in the tables reflects a Phase I-only analysis. As with the PSD increment analyses, while flaring scenarios were modeled, the results were lower than (or essentially the same as) their correlative normal operation scenarios, and therefore, would not represent the worst-case operating scenario and was not considered further. The set of scenarios modeled for the East Range Site includes more controls due to its closer proximity to Class I areas.

At the request of the Forest Service (letter dated July 31, 2009; see Appendix E), total number of days over the three years modeled are included in the tables for Method 2. Typically, however, visibility impacts are reported on an annual basis as this provides additional information on the distribution of events over the modeled period, which is indicative of the potential for particular years of meteorology to dominate the modeling results, especially when the modeled period is comprised of varied meteorological data files. Note that Method 2 does not specify that a certain number of days per year over the reference value is considered an exceedance. With respect to Method 8, current FLAG guidance (2000) specifies the use of annual average background visibility conditions to assess a source's potential visibility impact (values listed under column, *8th high ΔB_{ext} Annual,* in Tables 4.3-14 and 4.3-15). Proposed FLAG guidance (2008) recommends a tiered approach, where the 20 percent best natural background conditions may be used to predict

impacts, if recommended by the FLMs. Therefore, at the request of the Forest Service (letter dated July 31, 2009; see Appendix E), impacts predicted against the 20 percent best natural conditions are included in the table (values listed under column, *8th high* ΔB_{ext} *20%*, in Tables 4.3-15 and 4.3-16).

Table 4.3-15. Class I Visibility Modeling Results – West Range Site

Emission Rate		Method 2								Method 8					
		2002 (1)		2003 (2)		2004 (2)		Total (3) (2002-2004)		2002 (1)		2003 (2)		2004 (2)	
Phase I	Phase II	Days ≥ 5%	Days ≥ 10%	Days ≥ 5%	Days ≥ 10%	Days ≥ 5%	Days ≥ 10%	Days ≥ 5%	Days ≥ 10%	8th high ΔB_{ext} Annual (%)	8th high ΔB_{ext} 20% (4) (%)	8th high ΔB_{ext} Annual (%)	8th high ΔB_{ext} 20% (4) (%)	8th high ΔB_{ext} Annual (%)	8th high ΔB_{ext} 20% (4) (%)
Boundary Waters Canoe Area Wilderness															
Proposed	None	1	0	3	0	1	0	5	0	1.80	2.62	2.47	3.55	2.51	3.60
Proposed	Proposed	19	1	21	6	14	6	54	13	5.13	7.40	4.82	6.92	5.04	7.22
Proposed	Enhanced	9	0	15	3	11	0	35	3	3.86	5.57	3.62	5.17	4.04	5.75
Voyageurs National Park															
Proposed	None	1	0	2	0	6	1	9	1	1.98	2.86	2.99	4.31	2.71	3.88
Proposed	Proposed	13	3	16	2	22	7	51	12	4.80	6.89	5.95	8.57	5.46	7.82
Proposed	Enhanced	6	0	7	2	15	4	28	6	3.73	5.33	4.63	6.64	4.23	6.08

(1) 12km MM5 data, 1km CALMET grid resolution
(2) 36km MM5 data, 4km CALMET grid resolution;
(3) Total number of days over the three years modeled are included in the table at the request of the Forest Service (letter dated July 31, 2009; see Appendix E); however, note that Method 2 does not specify that a certain number of days per year over the reference value is considered an exceedance. The number of days exceeded over the reference value is typically reported by year.
(4) Current FLAG guidance (2000) specifies the use of annual average background visibility conditions to assess a source's potential visibility impact. Proposed FLAG guidance (2008) recommends a tiered approach, where the 20% best natural background conditions may be used to predict impacts, if recommended by the FLMs. Therefore, impacts predicted against the 20% best natural conditions are included in the table at the request of the Forest Service (letter dated July 31, 2009; see Appendix E).
New table for Final EIS.

Regarding the results of Method 2, the visibility modeling analysis results for the West Range Site shown in Table 4.3-15 indicate that impacts greater than 5 or 10 percent light extinction could occur at some point within BWCAW and VNP. Depending on the operating scenario and the Class I area, the number of days per year with greater than 5 percent light extinction ranges from 1 to 22; the number of days greater than 10 percent light extinction ranges from 0 to 7. The Method 8 results (based on annual average background conditions) indicate that only for the scenario with the highest potential emissions, i.e., the "proposed" emission rates for both Phase I and Phase II, would any 8th highest values be above the 5 percent extinction threshold, and then, for only 2 of the 3 years modeled in each Class I area. The operating scenario for Phase I-only with "proposed" control and the operating scenario for Phase I with "proposed" control and Phase II with "enhanced" control, are both predicted to result in 8th highest values below the 5 percent threshold.

Based on correspondence from the Forest Service dated July 31, 2009 (see Appendix E), DOE understands that the Forest Service feels that the modeled impacts to visibility at either site require mitigation. Therefore, DOE would consider such mitigation as a condition of the Record of Decision, pending progress in negotiations between Excelsior and MPCA regarding the BACT decision.

Table 4.3-16. Class I Visibility Modeling Results – East Range Site

Emission Rate		Method 2								Method 8					
		2002 (1)		2003 (2)		2004 (2)		Total (3) (2002-2004)		2002 (1)		2003 (2)		2004 (2)	
Phase I	Phase II	Days ≥ 5%	Days ≥ 10%	Days ≥ 5%	Days ≥ 10%	Days ≥ 5%	Days ≥ 10%	Days ≥ 5%	Days ≥ 10%	8th high ΔB_{ext} Annual (%)	8th high ΔB_{ext} 20% (4) (%)	8th high ΔB_{ext} Annual (%)	8th high ΔB_{ext} 20% (4) (%)	8th high ΔB_{ext} Annual (%)	8th high ΔB_{ext} 20% (4) (%)
Boundary Waters Canoe Area Wilderness															
Proposed	None	46	7	15	0	10	0	71	7	6.23	8.97	6.16	8.80	5.30	7.62
Proposed	Proposed	86	29	60	9	47	5	193	43	9.89	14.14	10.28	14.69	8.63	12.31
Proposed	Enhanced	50	8	34	1	19	0	103	9	7.42	10.43	7.42	10.53	6.29	8.92
Voyageurs National Park															
Proposed	None	1	0	2	0	3	1	6	1	1.94	2.81	2.45	3.52	2.50	3.59
Proposed	Proposed	3	1	4	0	7	2	14	3	2.98	4.28	3.81	5.49	3.72	5.32
Proposed	Enhanced	1	0	1	0	2	0	4	0	2.07	2.96	2.54	3.61	2.43	3.46
Isle Royale National Park															
Proposed	None	1	0	0	0	0	0	1	0	1.50	2.17	1.24	1.81	1.25	1.80
Proposed	Enhanced	2	1	0	0	0	0	2	1	2.26	3.26	1.82	2.63	1.86	2.65
Enhanced	Enhanced	1	0	0	0	0	0	1	0	1.50	2.17	1.16	1.64	1.24	1.77

(1) 12km MM5 data, 1km CALMET grid resolution
(2) 36km MM5 data, 4km CALMET grid resolution;
(3) Total number of days over the three years modeled are included in the table at the request of the Forest Service (letter dated July 31, 2009; see Appendix E); however, note that Method 2 does not specify that a certain number of days per year over the reference value is considered an exceedance. The number of days exceeded over the reference value is typically reported by year.
(4) Current FLAG guidance (2000) specifies the use of annual average background visibility conditions to assess a source's potential visibility impact. Proposed FLAG guidance (2008) recommends a tiered approach, where the 20% best natural background conditions may be used to predict impacts, if recommended by the FLMs. Therefore, impacts predicted against the 20% best natural conditions are included in the table at the request of the Forest Service (letter dated July 31, 2009; see Appendix E).

New table for Final EIS.

The visibility modeling analysis results for the East Range Site shown in Table 4.3-16 reflect the influence of the site's closer proximity to BWCAW and the commensurate higher predicted number of days with a change in light extinction above 5 and 10 percent for the same operating scenarios. Both the Method 2 and Method 8 results (based on annual average background conditions) indicate that emissions associated with any of the operating scenarios and project phases have the potential to produce impacts above 5 percent light extinction. Depending on the operating scenario and the Class I area, the number of days per year with greater than 5 percent light extinction ranges from 0 to 86; the number of days greater than 10 percent light extinction ranges from 0 to 29. Since even the lowest emission rate case (Phase I "proposed" and Phase II "enhanced") would result in potentially adverse impacts at BWCAW, further refinement of the modeling approach and methodology or mitigation of the predicted impacts would likely be required. A possible mitigation is by offsetting the predicted impacts through the identification and acquisition of sufficient emissions reductions from non-project sources.

Since the East Range Site is within 50 kilometers of BWCAW, some of the predicted visibility impact events discussed above occurred at receptors within 50 kilometers and, per guidance from the FLMs, those receptors were preliminarily subject to analysis using the CALPUFF modeling system. For such receptors, the visibility analyses could be performed using the PLUVUE model to determine the potential plume blight impacts, instead of using the CALPUFF modeling system.

Should the East Range Site be selected, Excelsior would conduct a more refined plume blight impact analysis for these receptors.

Additionally, the predicted visibility impacts could potentially be mitigated by offsetting an equivalent number of visibility events in the Class I area by reducing emissions such as SO_2 from sources not associated with the project. Excelsior has investigated this potential mitigation option and has identified sources of emissions near the East Range Site that may be considered for the mitigation effort. For example, a major source of SO_2 emissions, located less than 3 kilometers from the East Range Site, was investigated to illustrate potential mitigation options. Supplemental modeling analyses of the effectiveness of a sample offset scenario at reducing model-predicted visibility impacts were conducted based on this major source. These analyses were conducted only as examples to provide information and illustrate the concept of mitigation. The discussion and results of the analysis are provided in Section 5.3.2.2. Should the East Range Site be selected for the project, Excelsior would be required to compare the practical feasibility of this mitigation option versus other feasible options. Therefore, use of some combination of appropriate operating scenarios, refined modeling analyses, and acquisition of any necessary emission offsets from nearby sources would be considered for mitigation to reduce any predicted adverse visibility impacts to less than significant.

Based on correspondence from the Forest Service dated July 31, 2009 (see Appendix E), DOE understands that the Forest Service feels that the modeled impacts to visibility at either site require mitigation. Therefore, DOE would consider such mitigation as a condition of the Record of Decision, pending progress in negotiations between MPCA and Excelsior regarding the BACT determination.

The predicted visibility impacts on the other Class I areas evaluated for the East Range Site (VNP and IRNP) would be less than at BWCAW with only a few days per year predicted to be above the 5 percent threshold based on the Method 2 analyses. The Method 8 results show that all 8th high values at both Class I areas are well below the 5 percent light extinction threshold.

Supplemental Visibility Modeling Analysis

As discussed in Section 4.3.1.1, the FLMs provided technical comments on the revised modeling protocol (TRC et. al., 2008) and, after further consultation, the FLMs identified the model settings that they would accept for the Mesaba Energy Project (Bunyak, 2009). The letter also noted that Excelsior could submit supplemental model runs. Therefore, in order to determine whether model settings affected the results and because Excelsior believed that higher resolution modeling would be more technically accurate, supplementary modeling was also conducted for various combinations of MM5 and CALMET grid resolutions as discussed in Section 4.3.1.3. Table 4.3-17 (new table for the Final EIS) compares the results for these modeling variations for 2002 (the only year in which higher-resolution MM5 data is available), using the "proposed" emission rates for Phase I and "enhanced" emission rates for Phase II (as a test case).

Subsequent to the acceptance of the latest modeling protocol by the FLMs, the Forest Service submitted a letter to DOE (dated July 31, 2009; see Appendix E) that referenced a memo issued by the EPA Model Clearinghouse in May 2009 (EPA, 2009b; see Appendix E). This memo provides EPA's comments on an air modeling protocol for an electric generating unit in eastern South Dakota and indicates EPA's concurrence with Region 8's position on the proposed grid resolution (EPA, 2009c). The memo states that use of a finer resolution in CALMET/CALPUFF (i.e., 1-kilometer grid resolution) is not adequately justified given the geographical characteristics of the domain of interest (i.e., South Dakota and Minnesota). The results of the supplemental visibility analysis are included in this EIS since this supplemental modeling had been agreed to by the FLMs prior to the release of the EPA memo and since the supplemental modeling provides a better understanding of the effects of modeling parameters on predicted visibility impacts. However, DOE

understands that the Forest Service now considers the results to be of "little value" (see Forest Service letter in Appendix E).

Table 4.3-17. Class I Visibility Modeling – Comparison of Meteorological Data Resolutions for 2002 - West Range Site / East Range Site [(1)]

Resolution		Method 2		Method 8
MM5	CALMET	Days ≥ 5%	Days ≥ 10%	8th high ΔB_{ext} (%)
Boundary Waters Canoe Area Wilderness				
12 km	1 km	9 / 86	0 / 29	3.86 / 9.89
36 km	1 km	9 / 90	1 / 33	3.82 / 10.29
36 km	4 km	9 / 83	1/ 24	3.91 / 9.58
Voyageurs National Park				
12 km	1 km	6 / 3	0 / 1	3.73 / 2.98
36 km	1 km	13 / 7	0 / 1	3.50 / 3.39
36 km	4 km	16 / 8	0 / 2	4.48 / 3.77

(1) Emissions: Phase I at 'Proposed' and Phase II at 'Enhanced' emissions levels for both West Range and East Range Sites. Results are presented for both sites in each cell of the table: [West Range result] / [East Range result]. New table for the Final EIS.

For the West Range Site, the predicted visibility impacts on BWCAW in Table 4.3-17 show little change and no trend as a function of the resolution of the meteorological data. In contrast, for the West Range Site impacts on VNP, as the resolution of the meteorological data and grid increases, the visibility impact results show a significant reduction in both the frequency of predicted light extinction events above 5 percent and in the magnitude of the maximum predicted event. For the impacts of the East Range Site on BWCAW, both the maximum frequency of light extinction events above 5 percent and the maximum event occurred using the 36-kilometer MM5 data together with a CALMET grid resolution of 1 kilometer. For the impacts of both the West Range and East Range sites on VNP, both the maximum frequency of light extinction events above 5 percent and the maximum event occurred using the 36-kilometer MM5 data together with a CALMET grid resolution of 4 kilometers.

12-kilometer MM5 data is not available for 2003 and 2004. However, Excelsior conducted additional modeling as supplementary information using 1-kilometer CALMET grid resolution for those years. These results, along with 2002 using 12-kilometer MM5 data, are shown in Tables 4.3-18 and 4.3-19 for the West Range Site and East Range Site, respectively (new tables for the Final EIS).

For the West Range Site, the effects of the higher resolution MM5 data are relatively small and they are partially obscured by the year-to-year variability that apparently occurred in the meteorological data. Nonetheless, the results presented in Table 4.3-18 show that the 2002 meteorological data tended to produce a higher frequency of predicted days with a light extinction above 5 percent, compared to the results for the 2003 and 2004 data, all of which had the same 36-kilometer MM5 and 1-kilometer CALMET grid resolution. In contrast, the more refined 12-kilometer MM5 meteorological data used for 2002 are nearly indistinguishable from the results for the 2003 and 2004 data, which were based on the less refined 36-kilometer MM5 data. Thus, in this instance, the use of the more refined 12-kilometer MM5 data canceled the effect of the year-to-year variability in the meteorological data.

Table 4.3-18. Class I Visibility Supplementary Modeling Results – West Range Site

Emission Rate		Method 2						Method 8		
Phase I	Phase II	2002 (1),(2)		2003 (2)		2004 (2)		2002(1),(2)	2003 (2)	2004 (2)
		Days≥ 5%	Days ≥ 10%	Days≥ 5%	Days ≥ 10%	Days≥ 5%	Days≥ 10%	8th high ΔB_{ext} (%)	8th high ΔB_{ext} (%)	8th high ΔB_{ext} (%)
Boundary Waters Canoe Area Wilderness										
Proposed	None	1 / 1	0 / 0	3	0	1	0	1.80 / 2.52	2.17	2.36
Proposed	Enhanced	9 / 9	0 / 1	7	1	5	0	3.86 / 3.82	3.34	3.79
Voyageurs National Park										
Proposed	None	1 / 2	0 / 0	2	0	3	0	1.98 / 2.32	2.46	2.19
Proposed	Enhanced	6 / 13	0 / 0	5	1	7	2	3.73 / 3.50	3.87	3.35

(1) 12-km MM5 data, 1-km CALMET grid resolution
(2) 36-km MM5 data, 1-km CALMET grid resolution
Note, values in 2002 columns are presented for both grid resolutions: [12-km MM5 result] / [36-km MM5 result]. New table for the Final EIS.

Table 4.3-19. Class I Visibility Supplementary Modeling Results – East Range Site

Emission Rate		Method 2						Method 8		
Phase I	Phase II	2002 (1),(2)		2003 (2)		2004 (2)		2002(1) / (2)	2003 (2)	2004 (2)
		Days ≥ 5%	Days ≥ 10%	Days ≥ 5%	Days ≥ 10%	Days ≥ 5%	Days ≥ 10%	8th high ΔB_{ext} (%)	8th high ΔB_{ext} (%)	8th high ΔB_{ext} (%)
Boundary Waters Canoe Area Wilderness										
Proposed	None	46 / 48	7 / 7	26	3	14	2	6.23 / 6.44	6.54	6.29
Proposed	Enhanced	86 / 90	29 / 33	65	13	49	7	9.89 / 10.29	10.76	9.70
Voyageurs National Park										
Proposed	None	1 / 1	0 / 0	3	0	3	0	1.94 / 2.22	2.12	2.05
Proposed	Enhanced	3 / 7	1 / 1	5	1	6	2	2.98 / 3.39	3.44	3.20

(1) 12-km MM5 data, 1-km CALMET grid resolution
(2) 36-km MM5 data, 1-km CALMET grid resolution
Note, values in 2002 columns are presented for both grid resolutions: [12-km MM5 result] / [36-km MM5 result]. New table for the Final EIS.

In comparison to the West Range Site, the effects of the higher resolution MM5 data at the East Range Site are even smaller and more obscured by the year-to-year variability that apparently occurred in the meteorological data. Similar to the West Range Site, the East Range Site results presented in Table 4.3-19 show that the 2002 meteorological data tended to produce a higher frequency of predicted days with a light extinction above 5 percent, compared to the results for the 2003 and 2004 data, all of which had the same 36-kilometer MM5 and 1-kilometer CALMET grid resolution. In contrast to the results for the West Range Site, results for the East Range Site also

show that the more refined 12-kilometer MM5 meteorological data used for 2002 tended to produce a higher frequency of predicted days with a light extinction above 5 percent, compared to the results for the 2003 and 2004 data, which were based on the less refined 36-kilometer MM5 data. Thus, in this instance, the use of the more refined 12-kilometer MM5 data did not cancel the effect of the year to year variability in the meteorological data.

As discussed previously, in order to provide information and illustrate the concept of mitigation, Excelsior conducted supplemental modeling analyses on the effectiveness of a sample offset scenario at reducing model-predicted visibility impacts for the East Range Site. The results and the mitigation concept are discussed in Section 5.3.2.2.

In addition to the discussion noted above regarding the modeled results and potential mitigation of any adverse impact, it is also important to take into account the draft FLAG Phase I Report, which includes an expanded discussion of the process for adverse impact determination that in the event that initial modeling predicts calculated visibility impacts greater than the defined thresholds (e.g., 5 percent). That report states that further analysis can be conducted and additional contextual factors considered before a project-specific determination is made. According to the draft, the defined threshold does not represent the ultimate test for adverse impact determination, but rather a level at which additional analysis is triggered, similar to the DAT for nitrogen and sulfur deposition, discussed later in this section. The following are examples of other factors to consider:

- **Current pollutant concentrations and AQRV impacts in the Class I area**
- **Air quality trends in the Class I area**
- **Emission changes that have occurred or would occur (i.e., enforceable) by the time the new source begins operation**
- **Whether there are approved SIPs that account for new source growth and demonstrate attainment of national ambient air quality standards and "reasonable progress" toward visibility goals**
- **The expected useful life of the source**
- **The stringency of the emission limits (e.g., Best Available Control Technology)**
- **Other considerations such as options put forth by the applicant that would produce ancillary environmental benefits to AQRVs (e.g., reductions in toxic air contaminants, pollution prevention investments)**
- **Comments received from the public or other agencies during the comment period prior to issuing the permit**

Furthermore, Minnesota is developing a State Implementation Plan for implementing the Regional Haze Rule, which is an additional consideration when evaluating potential visibility impacts (discussed in Section 5.2.2).

Deposition of Nitrogen and Sulfur

Potential impacts to soils, waters, and vegetation in Class I areas were evaluated based on the model-predicted pollutant concentrations and the magnitude of predicted annual deposition of nitrogen and sulfur. Criteria for assessment of deposition impacts are different for Forest Service areas (BWCAW and RLW) and NPS areas (i.e., VNP). The NPS has established a DAT of 0.01 kilograms per hectare per year for both nitrogen and sulfur deposition for Class I areas in the eastern United States. A DAT is the additional amount of nitrogen or sulfur deposition within a Class I area, below which estimated impacts from a proposed, new, or modified source are considered insignificant.

It should be noted that the Forest Service has set screening criteria for potential air pollution impacts on vegetation for SO_2 and another set of criteria for the assessment of sulfur and nitrogen

deposition impacts to terrestrial and aquatic ecosystems. According to the Forest Service Green Line, screening values "were set at levels at which it was reasonably certain that no significant change would be observed in ecosystems that contain large numbers of sensitive components." Potential cumulative nitrogen and sulfur deposition impacts to soils, waters, and vegetation in Class I areas were updated for the Final EIS and are discussed in Section 5.2.2 and Appendix D1. The CALPUFF results for each of the Class I areas were processed with CALPOST to calculate total annual deposition of nitrogen and nitrogen at each receptor as a result of Mesaba Generating Station emissions. Total sulfur deposition is calculated from the wet (rain, snow, fog) and dry (particle, gas) deposition of SO_2 and sulfate; total nitrogen is represented by the sum of nitrogen from wet and dry fluxes of nitric acid, nitrate, ammonium sulfate and ammonium nitrate, and the dry flux of NO_X. Results for the West Range Site and East Range Site are shown in Table 4.3-20 **(new table for the Final EIS)**. **Exceedances above the DAT are denoted in bold typeface in the table.**

Table 4.3-20. Class I Deposition Modeling Results – West Range Site / East Range Site

Emission Rate		Nitrogen Deposition (kg/ha-yr)			Sulfur Deposition (kg/ha-yr)		
Phase I	**Phase II**	**2002 (1)**	**2003 (2)**	**2004 (2)**	**2002 (1)**	**2003 (2)**	**2004 (2)**
Boundary Waters Canoe Area Wilderness							
Proposed	None	0.0039 / **0.0156**	0.0041 / **0.0176**	0.0038 / **0.0166**	0.0058 / **0.0246**	0.0069 / **0.0255**	0.0057 / **0.0269**
Proposed	Proposed	0.0077 / **0.0219**	0.0082 / **0.0247**	0.0075 / **0.0230**	**0.0115** / **0.0346**	**0.0138** / **0.0359**	**0.0114** / **0.0376**
Proposed	Enhanced	0.0053 / **0.0218**	0.0056 / **0.0144**	0.0052 / **0.0130**	0.0081 / **0.0202**	0.0097 / **0.0211**	0.0080 / **0.0219**
Voyageurs National Park							
Proposed	None	0.0042 / 0.0044	0.0049 / 0.0042	0.0046 / 0.0054	0.0074 / 0.0082	0.0079 / 0.0075	0.0075 / 0.0087
Proposed	Proposed	0.0084 / 0.0061	0.0099 / 0.0059	0.0092 / 0.0074	**0.0146** / **0.0115**	**0.0159** / **0.0105**	**0.0150** / **0.0122**
Proposed	Enhanced	0.0058 / 0.0035	0.0068 / 0.0034	0.0063 / 0.0042	**0.0103** / 0.0067	**0.0112** / 0.0062	**0.0106** / 0.0071
Rainbow Lakes Wilderness							
Proposed	None	0.0020 / 0.0020	0.0021 / 0.0031	0.0020 / 0.0034	0.0030 / 0.0032	0.0033 / 0.0044	0.0029 / 0.0048
Proposed	Proposed	0.0040 / 0.0027	0.0042 / 0.0043	0.0040 / 0.0047	0.0060 / 0.0044	0.0065 / 0.0061	0.0059 / 0.0067
Proposed	Enhanced	0.0027 / 0.0015	0.0029 / 0.0024	0.0027 / 0.0025	0.0042 / 0.0026	0.0046 / 0.0036	0.0041 / 0.0039
Isle Royale National Park (East Range Site only)							
Proposed	None	0.0012	0.0011	0.0012	0.0032	0.0028	0.0034
Proposed	Enhanced	0.0017	0.0015	0.0017	0.0045	0.0040	0.0048
Enhanced	Enhanced	0.0009	0.0008	0.0009	0.0026	0.0023	0.0028

(1) 12km MM5 data, 1km CALMET grid resolution
(2) 36km MM5 data, 4km CALMET grid resolution
Note, this is a new table for the Final EIS; exceedances above the DAT (0.01 kg/ha-yr) are denoted in bold typeface. Values for both the West Range and East Range Sites are included for BWCAW, VNP and RLW - results are presented for both sites in each cell of the table: [West Range result] / [East Range result].

As shown in Table 4.3-20, the CALPUFF modeling results for nitrogen deposition for the West Range Site indicate that there would be no exceedances of the DAT at any of the Class I areas for all operating scenarios. The sulfur deposition modeling results indicate that there would be no DAT

exceedances under the Phase I-only scenario; DAT exceedances would occur at BWCAW for "proposed"/"proposed" scenario and VNP for "proposed"/"proposed" and "proposed"/ "enhanced" scenarios. For the East Range Site, the nitrogen deposition modeling results indicate that DAT exceedances would occur for all operating scenarios at the BWCAW. The sulfur deposition modeling results indicate that DAT exceedances would occur at BWCAW for all operating scenarios and at VNP for the "proposed"/ "proposed" scenario. Note, however, that the deposition analysis is considered conservative as it uses worst-case emissions and 100 percent operation. The DAT represents a screening level to assess any possibility of adverse impact and is not a regulatory limit. Additionally, based on the deposition assessment criteria that the Forest Service uses, the sulfur and nitrogen deposition rates from the Mesaba Energy Project are considered below Green Line criteria at BWCAW (an updated analysis on cumulative sulfur and nitrogen impacts using Green Line criteria is discussed in Section 5.2.2 and Appendix D1).

It is not expected that sulfur and nitrogen deposition would result in any significant impacts to terrestrial and aquatic resources in any of the Class I areas. However, DOE recognizes that the FLMs have the responsibility for determining whether a more refined analysis would be required or whether mitigation of these predicted impacts would be recommended. If mitigation is recommended by the FLMs, DOE would consider such mitigation as a condition of the Record of Decision.

4.3.2.6 Additional Impact Analysis

Additional evaluation and review were performed to assess the impact of the proposed Mesaba Energy Project.

General Conformity Rule

A conformity review was conducted to assess whether a conformity determination is needed for the proposed Mesaba Energy Project. As discussed in Section 3.3.3.1, Itasca and St. Louis Counties, in which the proposed project sites (i.e., West Range Site and East Range Site, respectively) are located, are in attainment or unclassified with the NAAQS. Consequently, no conformity determination is needed to demonstrate that activities associated with the Mesaba Energy Project would conform to regulations to maintain attainment in the area.

Effects on Economic Growth

Although economic growth is sought due to operation of the proposed facility, the impact on air quality from any ancillary operations should be negligible. Construction activities associated with Mesaba Energy Project would provide approximately 1,500 construction jobs during peak construction periods. Operation of the facility would require approximately 180 workers following construction of the Phase II Mesaba Generating Station, which is expected to be completed and fully operational in 2014. To the extent practical and consistent with skill and operational requirements, the project plans to employ people in the local area, and ample housing and infrastructure should be available to support any new workers required by this proposed project. Any air quality impacts due to residential growth would be in the form of automobile and residential (fuel combustion) emissions that would be dispersed over a large area and therefore have negligible impact. Commercial growth would be expected to occur at a gradual rate in the future, and any significant new source of emissions would be required to undergo permitting by the MPCA. Based on the maximum predicted air pollutant concentrations associated with the proposed power plant, the project is not expected to preclude future development, and it is not expected to restrict other sources in the area that may require air quality permits.

Acid Rain

Acid rain or acid deposition can occur from the release of acid precursors such as SO_2 and NO_X into the atmosphere, which then react with oxygen and water in the atmosphere to form acids that can be

deposited during precipitation events (Cooper, 1994). Acid rain can cause soil degradation, increased acidity of surface water bodies, and slower growth, injury, or death of forests and aquatic habitats. The Acid Rain Program, established under Title IV of the CAA, requires utility generating units greater than 25 MW to obtain a Phase II Acid Rain Permit and meet the objectives of the program (see Section 3.3.4). **The Acid Rain Program was established as a system of marketable allowances to control emissions that contribute to the formation of acid rain. The purchase of allowances by affected units limit the amount of SO_2 and NO_X that can be produced by any one facility, thereby helping to minimize regional effects.** The proposed Mesaba Energy Project would be required to obtain and comply with a Phase II Acid Rain Permit and would be operated in a manner that is consistent with EPA's overall efforts to reduce emissions of acid precursors. Continuous emissions monitoring for SO_2, NO_X, and CO_2 emissions, as well as volumetric gas flow and opacity is a part of the acid rain regulations and includes requirements for monitoring, recordkeeping, and reporting. Since the proposed Mesaba Energy Project would operate within its prescribed allowance, no appreciable impacts related to acid rain would be expected to occur as a result of facility operations.

Clean Air Mercury Rule

As discussed in Section 3.3.4, the CAMR established "standards of performance" limiting mercury emissions from new coal-fired power plants of more than 25 MWe that serves a generator that produces electricity for sale. **However, in a February 2008 ruling, the D.C. Circuit Court of Appeals vacated the CAMR. On February 6, 2009, the EPA filed a motion to dismiss its case, indicating that it would develop emission standards for power plants under 42 U.S.C. § 7412. Regulation under this section would lead to the establishment of Maximum Achievable Control Technology (MACT) standards for each industry group. For new sources, the minimum standard is equivalent to the average level of control achieved by the top 12 percent of existing sources in that industry group. Although the final MACT is unknown at this time, the Mesaba Energy Project would implement mercury control technology, as described below, which would meet or exceed any anticipated regulatory requirement as activated carbon beds to treat pre-combustion syngas would be state-of-the art technology.**

The maximum potential emissions of mercury from the Mesaba Generating Station (both Phase I and Phase II) would be 0.026 tons per year, which is below the major source threshold for HAPs of 10 tpy. The maximum potential emissions are based on the worst-case scenarios, which reflect the highest heat input rates and a cautious approach regarding the design optimizations that are expected (Excelsior, 2006b). However, for the Mesaba Energy Project, the IGCC Power Plant would include a mercury removal system, which would remove mercury from the syngas.

During syngas clean-up process, fixed beds of activated carbon would be provided to remove residual mercury from the syngas (Excelsior, 2006b). The activated carbon capacity for mercury ranges up to 20 percent by weight of the carbon (Parsons, 2002). The mercury removal system would remove enough mercury from the syngas so that the mercury content of the syngas fuel is no more than 10 percent of the mercury contained in the solid IGCC feedstock. The IGCC technology has an advantage over conventional systems because the gas clean up equipment can be much smaller in size and the residence time for allowing contact between a chemical (like mercury) and an absorbent (like activated carbon) can be increased, thereby providing for greater pollutant removal efficiency (Excelsior, 2006d). This pre-combustion gas clean-up process allows for highly effective mercury removal rates, which in the case of Mesaba Energy Project would result in at least 90 percent reduction of the amount in the feedstock. The contribution of Mesaba Generating Station point sources to mercury emission in the region would be minimal and the Mesaba Energy Project would be able to meet stringent utility MACT and cap-and-trade requirements.

Minnesota is currently in the process of determining how to implement the statewide mercury TMDL, which sets an annual air emission target of 789 pounds by 2025. However, no rules have yet

been finalized nor have draft rules been placed on notice for public review. A mercury offset program has not yet been established and any offset project that Mesaba Energy Project might implement would depend on the specifics of that program. To date, Excelsior has met with the MPCA to discuss how to permit the Mesaba Energy Project while working within the framework of evolving guidelines being established for new and expanding sources. Based on discussions at these meetings, MPCA would take into consideration the innovative nature of the Mesaba Energy Project (i.e., the lack of a robust historical testing database from which emission factors might be generated) and the MPCA would allow Excelsior to establish the project's expected annual emissions using the best information it can assemble from published research studies, expert testimony, and testing results from similar mercury control technologies applied on sources in different industrial sectors (i.e., technology transfer). Discussions between MPCA and Excelsior have focused around developing mercury offsets in the amount that the project's expected actual annual emissions exceed the *de minimis* threshold of three pounds per year. As discussed above, Excelsior has proposed mercury emission control consistent with a minimum removal rate of 90 percent, which meets or exceeds best available controls. The need for any additional offsets would be determined by MPCA in the permitting process and the Mesaba Energy Project would be subject to applicable future requirements as final rules are promulgated.

Deposition of Mercury

As part of the AERA, dispersion modeling of mercury emissions was conducted to assess potential health risks associated with potential ingestion of fish tissue that has been exposed to mercury emissions deposited into lakes from the Mesaba Generating Station. The results of the health risk assessment are provided in Section 4.17. The methodology for the risk analysis is provided in Appendix C. The AERA evaluation was completed for the area within a 3-kilometer radius of the proposed facility emission points (Excelsior, 2006b). Air dispersion modeling for mercury from the site is conducted using AERMOD. AERMOD input files, receptor grids, meteorological data and assumptions are the same as those used for the ambient air quality modeling analysis, with one exception: for the risk assessment dispersion modeling, background deposition is included. A wet and dry-vapor deposition and wet and dry-vapor depletion is specified in the model. The MPCA default for background wet-plus-dry ambient mercury deposition of 12.5 micrograms per square meter-year to lake surfaces and 33.6 micrograms per square meter-year to the rest of the watershed was used in the model and included a 10 percent watershed deposition transported to water body. The AERMOD model estimated that the mercury mass concentrations that would be deposited over lakes and watershed from the Mesaba Generating Station would be 1.3×10^{-5} micrograms per cubic meter. The mercury depositional velocity estimated would be 0.01 centimeters per second over the lake and 0.05 centimeters per second over the rest of the watershed.

The model also indicated that Big Diamond Lake would be within the release plume of future facility emissions (Excelsior, 2006b); therefore, the result of this modeling was used to determine the incremental contribution of mercury in fish tissues caught from Big Diamond Lake (see Section 4.17). The risk analysis indicates that the incremental increase in mercury in fish tissue from the proposed facility is 0.003 parts per million. These estimations of risk associated with fish consumed by adult subsistence fishers on Big Diamond Lake indicated that the predicted increment attributable to the proposed facility emission results in a hazard quotient of 0.06, which is less than the acceptable MPCA risk value of 1.0. Mercury emissions and subsequent deposition would be reduced by the high efficiency IGCC technology combined with the mercury removal carbon absorption beds, to ensure that mercury emissions from the facility would be less than 10 percent of the mercury in the feedstock.

Odor

The State of Minnesota does not have regulations to control odor; however, public protection of nuisance odor emissions is offered through the state's public nuisance statute, Chapter 608.73 (SRF, 2004). The CAA regulates emissions of odorous compounds such as VOC and HAPs based on thresholds

for human health impacts not odor. The potential for odors from coal-fired power plants is primarily related to the H_2S and ammonia (NH_3) being produce from the feedstock. In the proposed gasification process, most of the nitrogen and nitrogen in the feedstock would convert to H_2S and NH_3, respectively. In the syngas cooling step of the process, most of the NH_3 and a small portion of CO_2 and H_2S present in the syngas are absorbed in the water that is condensed. The water is collected and sent to the sour water treatment unit. The cooled sour syngas is fed to the AGR system where H_2S is absorb in a solution and sent to the SRU where it is converted to elemental sulfur. The condensed water sent to the sour water treatment unit contains small amounts of dissolved gases (CO_2, NH_3, H_2S, and other trace contaminants). The gases are stripped from the sour water in a two-step process. First, the CO_2 and H_2S are removed in the CO_2-stripper column by steam stripping and directed to the SRU. The rest is treated in an NH_3-stripper column to remove the NH_3 and remaining trace components. The stripped NH_3 is combined with the recycled slurry water. The water that is stripped of the dissolved gases is reused within the plant to minimize water consumption and discharge. Since the SRU and the sour water treatment unit are completely enclosed, there would be no discharges to the atmosphere.

Other odors would be emitted from activities such equipment maintenance, coal pile and coal handling, and sulfur storage and handling. Any of these potential odors should be limited to the immediate site area and should not affect offsite areas. Additionally, reducing VOC and HAP emissions at the facility would have the indirect but added benefit of odor reduction.

4.3.3 Impacts of the No Action Alternative

For the purposes of this EIS, as explained in Section 2.1.1.2, the DOE No Action Alternative is assumed to be equivalent to a “No Build” Alternative. **As a commercial-scale demonstration of the IGCC technology, the Mesaba Energy Project would be a key element in DOE’s research and development effort for IGCC in conjunction with the CCPI Program. Based on an analysis by DOE using the National Emissions Modeling System of the U.S. Energy Information Agency, the No Action Alternative, as a “No-Build” Alternative, would jeopardize potential benefits anticipated from the commercial implementation of IGCC. These benefits include more cost-effective CCS options, progress in reducing greenhouse gas emissions, and cost-effective reductions of emissions of criteria pollutants beyond levels required by regulatory caps in the utility sector. To the extent that IGCC power plants are substituted for existing conventional, coal-fired power plants, commercialization and deployment of the E-Gas technology would contribute to a reduction in visibility impacts attributed to the power plants that are replaced.**

4.3.4 Summary of Impacts

Below is a summary of impacts on air resources based on the criteria discussed in Section 4.3.1.

Basis for Impact	No Action	West Range	East Range
Result in emissions of criteria pollutants and HAPs and conflict with the NSR and PSD regulations	Would not result in emissions of criteria pollutants and HAPs or conflict with NSR and PSD regulations	**For Phases I and II combined,** annual emissions of criteria pollutants from the Mesaba Generating Station (**Table 4.3-7**) would include 1,390 tons of SO_2, 2,872 tons of NO_X, 2,539 tons of CO, 0.03 tons of Pb, **532** tons of PM_{10}, and 197 tons of VOC **(for Phase I-only, levels would be half of those emitted under the combined phase)**. The facility would be a major source of air emissions **for both the single and combined phases** under the PSD regulation because SO_2, NO_X, CO, PM_{10}, and VOC emissions would be greater than **the PSD significance thresholds**. However, process modification and improved work practices would be implemented to limit potential annual emission rates. Based on the result of Class II PSD increment analysis (**Table 4.3-9**), the Mesaba Energy Project would comply with all state and Federal increment limits **for both the single and combined phases**. **Mesaba Generating Station would be below the 10-tpy and 25-tpy for individual and combined major source threshold, respectively, for HAPs for both the single and combined phases.**	**For Phases I and II combined,** annual emissions of criteria pollutants from the Mesaba Generating Station **(Table 4.3-7)** would include 1,390 tons of SO_2, 2,872 tons of NO_X, 2,539 tons of CO, 0.03 tons of Pb, 709 tons of PM_{10}, and 197 tons of VOC **for Phase I-only, levels would be half of those emitted under the combined phase)**. The facility would be a major source of air emissions **for both the single and combined phases** under the PSD regulation because SO_2, NO_X, CO, PM_{10}, and VOC emissions would be greater than **the PSD significance thresholds**. However, process modification and improved work practices would be implemented to limit potential annual emission rates. Based on the result of Class II PSD increment analysis (**Table 4.3-9**), the Mesaba Energy Project would comply with all state and Federal increment limits **for both the single and combined phases**. PM_{10} concentrations would be higher in the East Range Site as a result of higher cooling tower emissions. **Mesaba Generating Station would be below the 10-tpy and 25-tpy for individual and combined major source threshold, respectively, for HAPs for both the single and combined phases.**
Result in changes in air quality related to the NAAQS and MAAQS and conflict with local or regional air quality management plans	Would not result in changes in air quality related to the NAAQS and MAAQS and not conflict with local or regional air quality management plans	Based on the results of Class II NAAQS analysis (**Tables 4.3-10 and 4.3-11**), all predicted concentrations of each the pollutants were below allowable levels and would demonstrate compliance with all NAAQS and MAAQS **for both the single and combined phases**. Therefore, the Mesaba Energy Project would neither result in significant changes air quality that would affect the attainment status of the area nor would it conflict with the local or regional air quality management plans.	**Based on the result of Class II NAAQS analysis (Tables 4.3-10 and 4.3-11), all predicted concentrations of each the pollutants were below allowable levels and would demonstrate compliance with all NAAQS and MAAQS for both the single and combined phases. Therefore, the Mesaba Energy Project would neither result in significant changes air quality that would affect the attainment status of the area nor would it conflict with the local or regional air quality management plans.**

Basis for Impact	No Action	West Range	East Range
Result in consumption of PSD increments, affect visibility, and cause regional haze in Class I areas	Would not result in consumption of PSD increments, affect visibility, or cause regional haze in Class I areas	**Based on the result of Class I areas-related impacts analysis (modeled for "proposed" controls for Phase I and Phase II) (Table 4.3-13), impacts from the Mesaba Energy Project would be below allowable increments of all pollutants in Class I areas and there would be no violation attributable to both the Phase I-only and Phases I and II combined emissions. Long-term impacts would also be below the SILs for all Class I areas, indicating that impacts would be insignificant. However, for short-term SO_2 and PM_{10}, levels are indicated to exceed the SILs in the BWCAW and VNP; thus, a cumulative analysis was conducted and presented in Section 5.2.2.** **The Visibility/regional haze analysis in Class I areas using Method 2 predict that there would be days with ≥5% change in light extinction or ≥10% change in light extinction (Table 4.3-15). Results based on Method 8, indicate that emissions associated with Phases I and II would have the potential to produce impacts above the 5% limit at BWCAW and VNP (Table 4.3-15). The following summarizes the visibility impacts analysis results for both Method 2 and Method 8:** **<u>BWCAW</u>** • **Method 2 (in a given year): 1 to 21 days of ≥5% light extinction and 0 to 6 days of ≥10% light extinction, depending on operating scenario.** • **Method 2 (2002-2004): 5 to 54 days of ≥5% light extinction and 0 to 13 days of ≥10% light extinction, depending on operating scenario.** • **Method 8 (annual): 8th highest values would exceed the 5% limit for "proposed" / "proposed" (highest value, 5.13%).** • **Method 8 (20%): 8th highest values would exceed the 5% limit for "proposed" / "proposed" (highest value, 7.4%) and "proposed" / "enhanced" (highest value, 5.75%).**	**Based on the result of Class I areas-related impacts analysis (modeled for "proposed" controls for Phase I and "enhanced" controls for Phase II) (Table 4.3-14), impacts from the Mesaba Energy Project would be below allowable increments of all pollutants in Class I areas and there would be no violation attributable to both the Phase I-only and Phases I and II combined emissions. Long-term impacts would also be below the SILs, indicating that impacts would be insignificant. However, for short-term SO_2 and PM_{10}, levels are indicated to exceed the SILs in the BWCAW; and short-term SO_2 at VNP; thus, a cumulative analysis was conducted and presented in Section 5.2.2. Additionally, SILs exceeded for short-term SO_2 at IRNP and RLW; however, no cumulative analysis was conducted for these as these occurred for the flaring scenario, which is considered an infrequent event.** **The visibility modeling analysis results for the East Range Site reflect the influence of the site's closer proximity to BWCAW by the commensurate higher predicted number of days with a change in light extinction above 5% and 10% for the same operating scenarios (Table 4.3-16). The following summarizes the visibility impacts analysis results for both Method 2 and Method 8:** **<u>BWCAW</u>** • **Method 2 (in a given year): 10 to 86 days of ≥5% light extinction and 0 to 29 days of ≥10% light extinction, depending on operating scenario.** • **Method 2 (2002-2004): 71 to 193 days of ≥5% light extinction and 7 to 43 days of ≥10% light extinction, depending on operating scenario.** • **Method 8 (annual): 8th highest values would exceed the 5% limit for all operating scenarios modeled (highest value, 10.28%).** • **Method 8 (20%): 8th highest values would exceed the 5% limit for all operating scenarios modeled (highest value, 14.69%).**

Basis for Impact	No Action	West Range	East Range
		VNP • **Method 2 (in a given year): 1 to 22 days of ≥5% light extinction and 0 to 7 days of ≥10% light extinction.** • **Method 2 (2002-2004): 9 to 51 days of ≥5% light extinction and 1 to 12 days of ≥10% light extinction, depending on operating scenario.** • **Method 8 (annual): 8th highest values would exceed the 5% limit for "proposed" / "proposed" (highest value, 5.95%).** • **Method 8 (20%): 8th highest values would exceed the 5% limit for "proposed" / "proposed" (highest value, 8.57%) and "proposed" / "enhanced" (highest value, 6.64%)**.	**VNP** • **Method 2 (in a given year): 1 to 7 days of ≥5% light extinction and 0 to 2 days of ≥10% light extinction.** • **Method 2 (2002-2004): 4 to 14 days of ≥5% light extinction and 0 to 3 days of ≥10% light extinction, depending on operating scenario.** • **Method 8 (annual): 8th highest values would exceed the 5% limit for none of the operating scenarios modeled.** • **Method 8 (20%): 8th highest values would exceed the 5% limit for "proposed" / "proposed" (highest value, 5.49%).** **IRNP** • **Method 2 (in a given year): 0 to 2 days of ≥5% light extinction and 0 to 1 days of ≥10% light extinction.** • **Method 2 (2002-2004): 1 to 2 days of ≥5% light extinction and 0 to 1 days of ≥10% light extinction, depending on operating scenario.** • **Method 8 (annual): 8th highest values would exceed the 5% limit for none of the operating scenarios modeled.** • **Method 8 (20%): 8th highest values would exceed the 5% limit for none of the operating scenarios modeled**.
Result in nitrogen and sulfur deposition in Class I areas	Would not result in N and S deposition in Class I areas	**Nitrogen and sulfur deposition modeling results are presented in Table 4.3-20. No exceedances of the DAT for nitrogen would occur at any of the Class I areas for all operating scenarios. No exceedances of the DAT for sulfur would occur under the Phase I-only scenario; exceedances of the DAT for sulfur would occur at BWCAW for "proposed"/"proposed" scenario and VNP for "proposed"/"proposed" and "proposed"/ "enhanced" scenarios.**	**Nitrogen and sulfur deposition modeling results are presented in Table 4.3-20. DAT exceedances for nitrogen would occur at the BWCAW for all operating scenarios. DAT exceedances for sulfur would occur at BWCAW for all operating scenarios and at VNP for the "proposed"/ "proposed" scenario.**

Basis for Impact	No Action	West Range	East Range
Exceed allowable emissions of SO_2 and NO_X under the state and Federal acid rain regulations	Would not exceed allowable emissions of SO_2 and NO_X under the state and Federal acid rain regulations	As a utility plant generating more than 25 MW of electricity, the Mesaba Energy Project would be required to obtain a Phase II Acid Rain Permit. Since the Mesaba Generating Station would be operated within its prescribed allowance, no appreciable impacts related to acid rain would be expected to occur.	The Acid Rain requirements are independent of the potential sites; therefore the impacts in the East Range Site would be similar to those in the West Range Site.
Exceed allowable emissions of mercury under **regulations related to coal-fired electric utilities**	Would not exceed allowable emissions of mercury under **regulations related to coal-fired electric utilities**	**Based on recent developments, EPA has decided to develop emissions standards for power plants consistent with the D.C. Circuit's 2008 ruling to vacate the CAMR. Although the final MACT is unknown at this time, the Mesaba Energy Project would implement mercury control technology, which would meet or exceed any anticipated regulatory requirement as activated carbon beds to treat pre-combustion syngas would be state-of-the art technology**.	**Similar to the West Range Site, the Mesaba Energy Project at the East Range Site would implement mercury control technology, which would meet or exceed any anticipated regulatory requirement as activated carbon beds to treat pre-combustion syngas would be state-of-the art technology.**
Discharge objectionable odors into the air	Would not discharge objectionable odors into the air	The potential for odors from the Mesaba Generating Station is primarily related to H_2S and NH_3 in the feedstock. Other odors would be emitted from activities such as equipment maintenance, coal pile handling, S storage and handling but would be localized. H_2S and NH_3 odor from processes involved in the IGCC power plant operations would be negligible because the processes are completely enclosed, eliminating discharges into the atmosphere.	Potential odor discharge is independent of potential site; therefore the impacts in the East Range Site would be similar to those in the West Range Site.
Result in fugitive dust emissions during construction and operation	Would not result in fugitive dust emissions during construction and operation	Fugitive dust emissions would be increased during construction and operations from vehicle traffic, transportation of materials, and material handling. The impact would be localized and would decrease with distance from the site.	Emissions from construction and operations are independent of the potential site; therefore, the impacts in the East Range Site would be similar to those in the West Range Site.

Basis for Impact	No Action	West Range	East Range
Causes solar loss, fogging, icing, or salt deposition that interferes with quality of life for nearby residents	Does not cause solar loss, fogging, icing, or salt deposition that interferes with quality of life for nearby residents	Because the steam plumes from the cooling tower consist almost entirely of condensed water, they have no adverse effects other than their visual impact. The drift rate of the cooling towers serving Mesaba Generating Station would be very low (0.001 percent of the circulating water) and **78 tpy of PM would result from drift**. Therefore, deposition of these particles on surrounding ground surfaces would be negligible. Given data and experience at other cooling tower installations, it is concluded that there would be no significant fogging, icing, or drift deposition impacts of the Mesaba Generating Station cooling towers on off-site human activities or the environment. The only predicted impacts are the visual impact of steam plumes in cold, moist weather conditions, and occasional very light localized fallout of snow crystals during times of very low temperature.	Because the steam plumes from the cooling tower consist almost entirely of condensed water, they have no adverse effects other than their visual impact. The drift rate of the cooling towers serving Mesaba Generating Station would be very low (0.001 percent of the circulating water) and **256 tpy of PM would result from drift**. Therefore, deposition of these particles on surrounding ground surfaces would be negligible. Given data and experience at other cooling tower installations, it is concluded that there would be no significant fogging, icing, or drift deposition impacts of the Mesaba Generating Station cooling towers on off-site human activities or the environment. The only predicted impacts are the visual impact of steam plumes in cold, moist weather conditions, and occasional very light localized fallout of snow crystals during times of very low temperature.
Result in emissions from transportation	**Would not result in any transportation-related emissions**	**POVs: During peak construction activities, the following daily emission rates (lb/day) during Phases I and II combined would occur (Table 4.3-3): 0.8 NO_x; 11 CO; 0.48 NMOC; and 0.2 PM. Peak traffic counts from project (during Phase I and II construction overlap) would still be minor fraction of existing AADT threshold and, therefore, impacts are considered negligible (Phase I-only emissions would be half of levels occurring under the combined phase).** **Rail: During operation, the following annual emissions would occur (tpy) (Table 4.3-4): 150,000 CO_2; 1.5 SO_2; 2,300 NO_x; 80 PM; and 410 CO (Phase I-only emissions would be half of levels occurring under the combined phase).** **Trucks: During operation, the following annual emissions would occur (tpy) (Table 4.3-5): 7,700 CO_2; 0.1 SO_2; 60 NO_x; 0.8 PM; and 7 CO (Phase I-only emissions would be half of levels occurring under the combined phase).** **Relative to plant-wide emissions and considering sources are mobile, transportation-related emissions are considered negligible for both the single and combined phases.**	**POVs: During peak construction activities, the daily emission rates and impacts would be similar to those of West Range Site (Table 4.3-3).** **Rail: During operation, the following annual emissions would occur (tpy) (Table 4.3-4): 170,000 CO_2; 1.7 SO_2; 2,600 NO_x; 90 PM; and 460 CO (Phase I-only emissions would be half of levels occurring under the combined phase).** **Trucks: During operation, the following annual emissions would occur (tpy) (Table 4.3-5): 8,100 CO_2; 0.1 SO_2; 61 NO_x; 0.8 PM; and 7 CO (Phase I-only emissions would be half of levels occurring under the combined phase).** **Relative to plant-wide emissions and considering sources are mobile, transportation-related emissions are considered negligible for both the single and combined phases**.

4.3.5 Mitigation Issues

Beyond the project's use of inherently high-efficiency and low-polluting IGCC technology, the BACT analysis for the Mesaba Generating Station identified pollution prevention ("P2") techniques, process modifications, and improved work practices as being consistent with the definition of BACT established at 40 CFR 51.166(b)(12) and with the results of other BACT analyses conducted for previously permitted IGCC facilities (Excelsior, 2006d). The following pollution prevention techniques, process modifications, and improved work practices would be implemented:

- NO_X – Use of nitrogen from the air separation unit as a diluent to reduce flame temperature in the CTGs; using fully treated (i.e., clean) syngas or natural gas in the TVBs; incorporating good flare design; flaring only fully treated syngas; implementing good combustion practices (such as a combination of temperature profile, residence time, turbulence, and excess air levels) in the TVBs; limiting the hours of operation of the fire pumps and emergency generators; and using low-sulfur diesel in the fire pumps and emergency generators.
- CO and VOC – Implementing good combustion practices in the CTGs and TVBs; using fully treated syngas or natural gas in the TVBs; incorporating good flare design; flaring only treated syngas; limiting the hours of operation of the fire pumps and emergency generators; and using low-sulfur diesel in the fire pumps and emergency generators.
- SO_2 – Using fully treated syngas in the CTGs; recirculating tail gas from the sulfur recovery unit to the gasifier; using fully treated syngas or natural gas in the TVBs; implementing good combustion practices in the TVBs; incorporating good flare design; flaring only fully treated syngas; limiting the hours of operation of the fire pumps and emergency generators; and using low-sulfur diesel in the fire pumps and emergency generators.
- H_2SO_4 – Using fully treated syngas in the CTGs.
- PM (combustion sources) – Implementing good combustion practices in the CTGs and TVBs; incorporating high efficiency drift eliminators in the cooling towers; using fully treated syngas or natural gas in the TVBs; incorporating good flare design; flaring only treated syngas; limiting the hours of operation of the fire pumps and emergency generators; and using low-sulfur diesel in the fire pumps and emergency generators.
- **PM (material handling) – Enclosing coal conveyors; using dust suppression systems at transfer points; using baghouse filter system to control dust in coal unloading building; applying dust suppressants as needed to reduce windblown dust from active and passive storage piles; minimizing drop heights; imposing speed limits on roadways; and watering unpaved roads as necessary**.

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4.4 GEOLOGY AND SOILS

4.4.1 Approach to Impacts Analysis

4.4.1.1 Regions of Influence

The regions of influence are similarly defined for the West Range and East Range Sites, and include the physical setting for all areas that would be directly and indirectly impacted by construction and operation of the Mesaba Generating Station and its associated HVTL, utility, and transportation corridors. The region of influence includes the IGCC power plant buffer lands, the 100- to 150-foot wide HVTL ROWs and the 150-foot wide pipelines ROW. The majority of the temporary construction impacts would be limited to areas closest to the facility footprint and corridor centerlines.

4.4.1.2 Method of Analysis

The evaluation of potential impacts on the physical setting and physiographic resources considered whether the Proposed Action or an alternative would cause any of the following conditions:

- Soil erosion or loss of topsoil;
- The direct conversion of prime and unique farmland to non-agricultural uses;
- The loss of availability of a known mineral resource that would be of value to the region;
- An on-site or off-site landslide, subsidence, or collapse, potentially resulting from a location on a geologic unit or soil that would be unstable as a result of the project;
- Exposure of people or structures to substantial adverse effects from seismic activity;
- The contamination of soil or mineral resources; or
- The loss of paleontological resources that would be of value to the region.

Impacts to the physical setting were assessed based on map and field resource data. The primary information about geology and soils around the West Range and East Range Sites was compiled using regional geology maps, the Itasca Soil Survey, and preliminary NRCS soil data (Excelsior, 2006b; Jirsa et al., 2005; USDA, 1987). At this time, a soil survey for St. Louis County is not available. The environmental consequences discussion in this section addresses the potential impacts to the geology, mineral resources, soil quality, and from seismic events. Certain impacts to the physical setting are related to other resource concerns, specifically impacts from fugitive dust emissions and soil erosion; these impacts are also discussed in Section 4.3 (Air Quality) and 4.5 (Water Resources), respectively.

The disturbance area describes the maximum area where potential impacts to the physical setting may occur. This area would also include the permanent impacts from structures such as foundations and rail beds. The magnitude of potential impacts from increased erosion and farmland loss are defined by the disturbance area, while the presence or absence of construction-restricting deposits (e.g., glacial till and peat) would determine the potential for collapse.

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).

4.4.2 Common Impacts of the Proposed Action

The sections below describe the common impacts to the physical setting from the construction and operation of the Proposed Action and alternatives. Since these impacts could occur to some extent at both the West and East Range Sites, they are described in general terms.

4.4.2.1 Impacts of Construction

Direct impacts to the physical setting would occur during construction, which would last three years for Phase I, and an additional two to three years for Phase II. Both the West and East Range Sites would require clear cutting, grading, and basic earthmoving activities during the construction phase. In addition, the network of water (process water, potable water, and sanitary sewers) and natural gas pipelines would primarily require clearing vegetation and trenching. These activities could increase the potential for soil erosion as well as topsoil loss. Implementation of erosion best management practices, such as stockpiling and covering topsoil, installing wind and silt fences, and reseeding the disturbed areas would minimize the long-term impacts from construction. **Prior to construction, Excelsior would use the National Geodetic Survey's website to compare the current location of geodetic markers to the proposed construction corridors. If there were any conflicts, Excelsior would notify the National Geodetic Survey 90 days prior to the markers' potential disturbance by construction.**

Portions of the West Range and East Range structures would be constructed on glacial till. The till is generally a sandy lean clay or clayey sand, which easily retains water, and is generally easily eroded and difficult to re-vegetate, especially when disturbed. Construction activities that disturb glacial till below the topsoil would have the potential to increase erosion. In order to minimize soil erosion and sediment transport, it would be necessary to develop and implement a SWPPP and use techniques as described in the MPCA's *Best Management Practices for Dealing with Storm Water Runoff from Urban, Suburban and Developing Areas of Minnesota* (MPCA, 2000). Establishment of vegetative cover on the till would require placement of topsoil, which would be stockpiled and covered until construction measures were completed. Additional discussions about the potential impacts and mitigation measures on the area vegetation are provided in Section 4.8, Biological Resources.

In areas with a high water table or poor drainage, the saturated glacial till would be unsuitable for building stable foundations. Coarse alluvium consisting of sand and gravel is suitable for use as foundation fill if it is processed to remove cobbles and boulders. Finer grained material would tend to erode easily on slopes if it remains un-vegetated. Alluvial deposits would also need to be compacted to ensure foundation stability, and sand and gravel with high fines content may need to be dewatered if it is too wet. After construction, topsoil replacement over the sand and gravel would improve the establishment of vegetative cover, and reduce the potential erosion impacts.

Organic soils such as peat or muck tend to be spongy and unstable when loaded. These materials are not suitable beneath building or equipment foundations, and they increase the potential for uneven subsidence. To minimize these potential impacts, the peat and muck deposits would be excavated and replaced with competent fill prior to construction of the power station facilities. Excavation of large amounts of peat would contribute to the potential for erosion around the construction site. Along the HVTL corridors, the typical drilled shaft foundation, (e.g., caisson) would not be suitable in the peat deposits, and other foundation types (e.g., helical piles or driven piles) may need to be considered. Peat is also not suitable for support of transmission tower foundations, so the foundations would need to extend through the peat deposit to suitable bearing soils or bedrock. Foundation types and depths would be further evaluated after a geotechnical investigation has been performed in the selected utility corridor.

Peat is also highly compressible and does not support heavy construction equipment; therefore, equipment movement over unstablized organic materials could generate unstable and unsafe conditions. This would be mitigated by use of stabilizing equipment such as crane mats and/or low ground pressure equipment. Construction during the winter months could also reduce the difficulty of construction within

areas of peat, and it would minimize erosion impacts to the soft, compressible, wet soils found in the wetlands.

Construction of temporary haul roads would be necessary along the HVTL and other utility corridors to provide access for material delivery and personnel. To minimize the long-term erosion impacts, these haul roads would be removed and vegetation re-established within the ROW.

Both proposed facility sites and corridors would disturb some soils classified as prime farmland soils, as well as soils classified as farmland of statewide importance. These soils require special consideration during construction. The USDA tracks conversions of prime or statewide important soils to other uses through their NRCS. Impacts or direct conversions of prime or statewide important farmland would require completion of a Farmland Conversion Impact Rating, Form AD-1006, by the NRCS in Itasca County and St. Louis County. A soil survey for Itasca County has been completed; however, the NRCS has not completed the soil survey for St. Louis County; therefore, the amount of potentially disturbed farmland soils is not available.

Construction-related impacts to soils could also occur from the accidental release of contaminants such as fuels, lubricants, and antifreeze. These types of materials may be stored in the staging area of the Mesaba Generating Station construction area, and any spills could result in localized soil contamination and could potentially migrate into the groundwater. However, the scale of the project and localized use would preclude large spills. Should a spill occur, prompt response actions (including adequate sampling and remediation) would be performed in accordance with state and Federal regulations.

Standard post-construction restoration activities would reduce the long-term impacts from soil erosion. These activities would include removing and disposing of debris, dismantling all temporary facilities (including staging and lay down areas), leveling or filling tire ruts, employing appropriate erosion control measures, and reseeding areas disturbed by construction activities with vegetation similar to that which was removed. Disturbed areas would be restored to their original condition to the extent practicable.

Route selection and construction of new HVTLs, pipelines, rail alignments, and access roads would be required for the Mesaba Energy Project Phase I. Also, during construction of the Phase I plant, the Phase II footprint would be cleared and prepared as a staging and laydown area for stockpiling of construction materials and storage of equipment, as well as for a cement batch plant. Therefore, the incremental impacts from construction of the Phase II plant would be negligible with respect to the affected site and corridors. With the exception of the temporary use of off-site laydown areas for Phase II construction, which would occur on one or more previously disturbed sites, the impacts on geology and soils would be essentially the same for Phase I as for both phases of the Mesaba Energy Project.

4.4.2.2 Impacts of Operation

The potential impacts to the physical setting from the operation of the Proposed Action would be low when compared to the impacts from construction. The**re is a low** potential of a significant earthquake (Mooney, 1979). Minnesota is located on one of the most stable areas of North America, and earthquakes with a Richter magnitude of 4 or greater are very rare. The lack of high-intensity earthquakes, together with the infrequency of earthquakes in general, implies a low risk level for Minnesota (Mooney, 1979). In addition, the State Building Code considers the state to be in a Seismic Risk Zone 0 (Mooney, 1979) and states that “any seismic earthquake provisions in this code are deleted and not required.” Therefore, no activities from construction or operation of the Proposed Action or alternatives would expose workers or local residents to seismic hazards.

Ground surface disturbances related to repair activities to the pipelines, HVTL, roads, and rail alignments could occur during the operation phase of the power station. However, these disturbances would be temporary, would occur within the areas previously disturbed during construction, and would

not result in any additional impacts from those previously discussed for construction activities. Repairs may require clearing vegetation and some soil exposure in order to make the necessary repairs; however, with appropriate grading and re-vegetation practices, potential erosion impacts would be mitigated.

Rail and car traffic would increase the potential for soil contamination around the generating station and rail alignments as a result of spills of hazardous materials. However, such spills would likely be small and related to operation of the rail cars and vehicles, rather than a large container spill. Section 4.16, Materials and Waste Management, describes the impacts related to waste and hazardous materials at the power station.

In the event that the project eventually incorporated carbon capture technology, it is possible that carbon dioxide would be transported by pipeline to a yet undetermined sequestration location. Possible effects on geology and soils of this pipeline cannot be determined at this time.

The incremental impacts on geology and soils from operation of the two-phased generating station would be negligible in comparison to the operation of Phase I only.

4.4.3 Impacts on West Range Site and Corridors

4.4.3.1 Impacts of Construction

Table 4.4-1 summarizes the information about surface disturbance and earthmoving activities due to construction of the IGCC power plant. Construction of the plant would occur exclusively within the West Range Site, approximately **1,708** acres. Prior to construction, clearing and grubbing would clear the existing forest for the power station footprint and staging/lay down areas. The existing topsoil would be removed and stockpiled for later restoration use. Extensive grading would be required, generating a flat area for the temporary staging and lay down areas, and a stable foundation for the plant. Some of the fill would cover existing organic soils.

Table 4.4-1. Areas of Disturbance (West Range Site)

Structure	Area of Disturbance (acres)	Total Prime Farmland Soils and Farmland of Statewide Importance (acres)	Earthwork Cut (cubic yards)	Earthwork Fill (cubic yards)
IGCC Power Plant Footprint Phase I	202[1]	88	3,100,000	2,350,000
IGCC Power Plant Footprint Phase II	---[2]	65	---[2]	---[2]

[1] Area is for both Phase I and Phase II footprints, and does not include the buffer land that would not be disturbed. The area occupied by Phase II would need to be initially cleared to accommodate the laydown of the building materials.
[2] Included in Phase I construction.

Construction of the Mesaba Generating Station would increase the potential for erosion where the soils are disturbed. Some of the glacial material, such as the Nashwauk and Keewatin series till, have the potential to be easily eroded when disturbed. Excavated peat and muck from the site foundations could also be subject to erosion.

Construction of the Mesaba Generating Station would disturb a maximum of **152** acres of “Prime Farmland,” “Prime Farmland if drained” and “Farmland of Statewide Importance” (Table 4.4-1). Soils within the proposed power plant footprint and in the most disturbed areas would be permanently altered. These soils are currently located in a forested area with no current farming production. NRCS would need to complete Form AD-1006, the Farmland Conversion Impact Rating, to calculate the potential

impacts to farmland soils. The entire IGCC power plant would be located within the Taconite city limits, and thus, exempted from Minnesota Regulation 4400.3450, described in section 4.4.1.2.

The only **process water** facilities associated with the West Range Site outside the city limits of Taconite and Marble are 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).

Table 4.4-2 presents key information about the HVTL alternative corridors for the West Range location. All of these corridors would require minimal grading, as the transmission tower elevations would vary with the topography. Construction along new corridors (for portions of HVTL Alternatives WRA-1 and WRA-1A) would require clearing and grubbing to clear all vegetation.

The proposed HVTL towers would be constructed at existing grade and be supported by a concrete pier foundation. The standard foundation would require an excavation 15 to 55 feet deep and would be 7 to 12 feet in diameter. Along the existing corridors, the previous HVTL towers would be removed and replaced with the new transmission towers that would accommodate both the existing lines and new HVTL. The disturbance of soils would be expected to be limited to those areas around the new transmission towers, as well as any necessary access roads for the construction equipment. The potential for erosion would be reduced by employing pre- and post-construction best management practices.

Table 4.4-2. Areas of Disturbance Associated with HVTL Corridors (West Range Site)

Structure	Area of Disturbance (acres)	Temporary ROW (width in feet)	Total Prime Farmland Soils and Farmland of Statewide importance (acres)		Tower Foundation Excavation requirements
			Temporary ROW area	Permanent disturbed area	
HVTL Alternative WRA-1	134	150	95	0.029	15-55 feet deep 7 to 12 feet diameter
HVTL Alternative WRA-1A	136	150	77	0.025	15-55 feet deep 7 to 12 feet diameter
HVTL Phase II Alternative Route WRB-2A	—[1]	—[1]	262	0.049	15-55 feet deep 7 to 12 feet diameter

[1] Data not available

The HVTL corridors would cross a variety of glacial deposits, including till, lacustrine, and alluvium. Organic deposits are also present around areas with low topography and shallow water tables. Construction activities would seek to minimize impacts to the peat and muck deposits by operating in these areas during the winter months, while the ground is frozen. In areas where the frozen ground would not support the weight of the construction equipment, cribbing or matting would be laid on the ground to distribute the weight. In addition, other foundations types (helical piles or driven piles) may be considered in areas of easily compressible and wet organic soils to increase the tower stability.

Construction of temporary haul roads could be necessary along the HVTL corridor in the wetland areas to provide access for material delivery and personnel. These haul roads would be completely removed and vegetation reestablished on the ROW. Erosion control measures and accepted best management practices would be implemented to minimize erosion impacts in these areas during construction.

All of the HVTL alternative corridors would cross “Prime Farmland” soils and “Farmland of Statewide Importance.” The soils would be permanently altered where the transmission tower foundations would be constructed. HVTL Alternative WRA-1 would permanently disturb 0.029 acres,

Alternative WRA-1A would disturb 0.025 acres, and the Phase II Alternative would disturb 0.049 acres. Some farmland soils within the HVTL ROW may be temporarily disturbed from construction traffic, but would be restored with vegetation (Table 4.4-2).

The HVTL alternatives would cross sections of the Coleraine Formation south of Taconite. The Coleraine formation is an irregular conglomerate bed found between the older bedrock and the glacial deposits. Preserved marine shells and shark and reptile teeth have been recovered from excavated rock from this formation in mine tailing piles around the towns of Coleraine and Bovey. The Hill-Mine Annex State Park also holds fossil hunts in the excavated material. However, most of the Coleraine Formation bedrock in this area is 150 feet or more below the ground surface, which is well below the bottom of the proposed HVTL tower foundations, and no impacts to the fossils are anticipated.

Several pipeline corridors would be constructed as part the West Range IGCC power plant. Table 4.4-3 summarizes the key information used to describe the impacts from the construction of these pipelines. Some pipeline corridors would be constructed within previously undisturbed areas. Portions of the Process Water Segment 3 would require extensive clearing and grubbing activities for the new corridors. Some corridors (Process Water Segment 2, Sewer and Water Pipelines) would follow **CR 7 and would** connect **with** the Mesaba Generating Station **via the ROW for Access Road 3,** which would require **some** additional clearing **in the corridor**. Other corridors (e.g., Process Water Segment 1 pipeline) would cross areas already disturbed from past mining activities. **[Text in the Draft EIS pertaining to Cooling Tower Blowdown Outfalls has been eliminated in this paragraph and Table 4.4-3 based on the proposed use of an enhanced ZLD system at the West Range Site.]**

Construction on the pipeline corridors would attempt to mitigate erosion impacts around steep terrain and areas with poor drainage. On steep terrain or in wet areas, the ROWs may be graded at two elevations or diversion dams may be built to facilitate construction, and would be restored to their original conditions upon completion of construction. Excavation and grading will only be undertaken where necessary to increase stability and decrease the gradient of unstable slopes.

Table 4.4-3. Areas of Disturbance Along Proposed Pipeline Corridors (West Range Site)

Structure	Area of Disturbance (acres)	Temporary ROW (width in feet)	Total Prime Farmland Soils and Farmland of Statewide Importance (acres)		Excavation Requirements
			Temporary ROW Area	Permanent Disturbed Area	
Natural Gas Alternative 1	**135**	100	**99**	**76**	16-24” diameter pipe; Trench: 72” deep
Natural Gas Alternative 2	84	100	**64**	**58**	16-24” diameter pipe; Trench: 72” deep
Natural Gas Alternative 3	**99**	100	**64**	**51**	16-24” diameter pipe; Trench: 72” deep
Process Water Segment 1	40	150	**3.0**	**2**.0	Trench: 7-8 feet deep
Process Water Segment 2	**39**	150	**32**	**21**	Trench: 7-8 feet deep
Process Water Segment 3	**88**	150	52	35	Trench: 7-8 feet deep
Sewer and Water Line	**35**	100	**22**	**9**	**Sewer**: 12” diameter, trench graded but no deeper than 8 ft **Water**: 12” diameter trench 60” below surface

Potential construction impacts from unstable ground surface would be similar to those previously described for the HVTL corridors. In areas with large quantities of wet organic soils, construction may

need to occur during the winter months. Construction of temporary haul roads may also be necessary along Process Water Segment 3 pipeline in the wetland areas to provide stable access for personnel and material delivery. These roads would be completely removed and re-vegetated after construction is complete.

The natural gas pipeline alternatives would initially travel over a new corridor, and either join one of the HVTL Plan A corridors (Gas Pipeline Alignment Alternative 1 and 2), or travel along US 169 (Gas Pipeline Alternative 3). All three alternatives would require minimal grading, but clearing and grubbing would be necessary through existing forest areas.

The potable water and sewer lines would follow the proposed **Access Road 3** and CR 7 to the main municipal pipelines at US 169. Trees and other vegetation would be cleared along the water and sewer pipeline corridor. Standard best management practices, approved by the MPCA, would reduce the potential for soil erosion in these areas. After construction, the vegetation and the roadway surface would be re-established.

Table 4.4-3 presents the potential impacts from pipeline construction activities to soils classified as "Prime Farmland," "Prime Farmland if Drained," and "Farmland of Statewide Importance." If the farmland soils were excavated, covered, or excessively disturbed, than they would be altered from their original designation and effectively impacted. Soils disturbed through trenching activities are included in the permanent disturbed area. Other farmland soils within the construction ROW may be disturbed by traffic or other construction activities, but not significantly altered. Permanent changes to the amount of farmland soils would be reduced by restricting construction traffic to access roads close to the centerline and re-establishing vegetation to pre-construction conditions.

The rail alignment alternatives and access roads would connect the Mesaba Generating Station area to existing highways and main rail corridors. These corridors would be built at the beginning of the construction phase to facilitate personnel, equipment, and materials transport. Table 4.4-4 presents the key information used to describe the potential impacts from construction activities. **[Rail Alternative 1B was eliminated from further consideration based on the Draft EIS analysis. Therefore, text pertaining to Rail Alternative 1B has been eliminated in the following paragraphs and Table 4.4-4.]**

Construction of Rail Line Alternative 1A or **3B** would cut through existing forest to the cleared areas at the Mesaba Generating Station. Near the southern tip of Big Diamond Lake, the alternatives would generally follow an old railroad grade. In order to avoid a large mine tailings pile, Alternative**s** 1A **and 3B** would turn to the northwest to follow a new corridor between Big Diamond Lake and Dunning Lake. Trees and other vegetation would be cleared along the rail line corridor, and the vegetation would be re-established in areas of temporary disturbance after construction is completed on the rail line.

Rail alignments would require cuts and fills to attain an acceptable grade. Cuts would primarily be through till and coarse alluvium, and in some cases bedrock. The rail alternatives would require filling the low areas located between Big Diamond and Dunning Lake, and cutting through uneven terrain. **The Alternative 3B rail loop would also require additional cuts and fills around a 40-foot tall hill.** The rail loop of Alternative 1A would be located on up to 50 feet of fill material. Some of this fill would bury existing organic soils. Some of the cut material (sorted till, granite bedrock) would be used for the fill. Peat and muck would only be used as fill in constructed wetlands.

In the area between Big Diamond Lake and Dunning Lake and up to the power station, Alternative**s** 1A **and 3B** construction would require cuts of 30 to 78 feet below grade. Embankments as high as 36 feet would be required to cross low areas. If a surplus of fill material occurs, it would be graded around the Mesaba Generating Station, covered in topsoil and re-vegetated.

Table 4.4-4. Areas of Disturbance Along Rail Alignment Alternatives and Access Road (West Range Site)

Structure	Area of Disturbance (acres)	Maximum Temporary ROW (width in feet)	Total Prime Farmland Soils and Farmland of Statewide Importance (acres)		Earthwork Cut (cubic yards)	Earthwork Fill (cubic yards)
			Max temporary ROW	Permanent		
Rail Alignment 1A	**118**	Variable (80-450)	**50**	**22**	**3,725,000**	**610,000**
1A Center Loop	—[1]	—[2]	**25**	**27**	—[2]	—[2]
Rail Alignment 3B	**107**	**Variable (80-450)**	**66**	**33**	**2,620,000**	**620,000**
3B Center Loop	**—**[2]	**—**[2]	**—**[2]	**—**[2]	**—**[2]	**—**[2]
Access Road 3	**20**	**200**	**20**	**12**	**—**[1]	**—**[1]

[1]Data not available
[2]Data are included with the rail alignment

Both rail alignments would cross small sections of peat deposits, **although** most of **Rail Alternative 1A** rail loop would be **built on** wet organic soils. In these areas, special construction techniques would be necessary in order to stabilize the railway. It may be possible to construct railroad embankments over the material if the embankments were built up slowly over time. The determining factor would be the extent of long-term secondary compression of the peat and the impact of that compression on the project feature in question. Another option would be to excavate peat and muck deposits and replace the material with competent fill prior to construction, which would expose more topsoil to erosive processes. During construction, crane mats could also be used to mitigate damage to soft organic soils.

Permanent impacts to the soils classified as "Prime Farmland" or "Farmland of Statewide Importance" would occur below the rail bed, and within the area covered by the IGCC rail loop, as presented in Table 4.4-4.

As described in Section 2.3.1.2, the realignment of CR 7 (Access Road 1) has been deferred by Itasca County because of reduced state funding priority. Access Road 1 would be an extension of CR 7 by Itasca County that would require cuts through previously disturbed and undisturbed areas. Such cuts could be significant and the scenic view would be compromised if the road passed too closely to existing residential properties causing numerous driveways to be visible from the highway.

As described in Section 2.3.1.2, Access Road 2 would be contingent on the realignment of CR 7, which has been deferred by Itasca County since publication of the Draft EIS. Access Road 2 would require clearing of wooded areas in the southern part of the property.

Access Road 3 would be built to connect CR 7 to the Mesaba Generating Station **near the southwestern corner of the property**. This would require clearing vegetation and temporarily disturbing some soils within the construction corridor. After construction, vegetation would be re-established in areas of temporary impact. **[Text pertaining to Access Roads 1 and 2 in the Draft EIS has been eliminated in this paragraph and Table 4.4-4 based on the deferment of the CR 7 realignment project by Itasca County.]**

In areas with wet soil, additional dewatering processes and sediment compaction would be necessary to create a stable foundation for the roadbed. The roadway alignments would also cross organic (peat) soils outside of the plant site. To prevent the potential for subsidence, the peat deposits may either be

removed or improved by dewatering processes with reinforced embankments. Additional construction procedures would be required to prevent construction impacts from subsidence on soft soils. Crane mats and/or low ground pressure equipment would be used in these areas. Construction during the winter months may also alleviate impacts due to construction.

During construction of Phase I, materials used for construction would initially be stored in the Phase II footprint, which would be prepared for use as a staging and laydown area. Therefore, the incremental impacts from construction of the Phase II plant would be **negligible on the West Range Site property. For Phase II, Excelsior would establish off-site construction staging and laydown areas on 85 acres of land at potential sites described in Chapter 2 and shown in Figure 2.3-3. The potential Phase II laydown areas have all been disturbed during prior uses by mineral extraction companies. Excelsior would select the appropriate sites for the necessary acreage prior to construction, taking into account the potential effects to soil disturbance. The lands would be cleaned and restored to their pre-existing condition at the end of Phase II construction.**

Because route selection and construction of new HVTLs, pipelines, rail alignments, and access roads would be required for the Mesaba Energy Project Phase I, and the Phase II footprint would be used as a laydown area for Phase I construction, the incremental impacts from construction of the Phase II plant would be negligible with respect to the site and affected corridors. Therefore, except for the temporary use of off-site laydown areas that have been previously disturbed, the impacts on geology and soils would be essentially the same for Phase I as for both phases of the Mesaba Energy Project at the West Range Site.

4.4.3.2 Impacts of Operation

No operational impacts other than those discussed in Section 4.4.2.2 are anticipated.

4.4.4 Impacts on East Range Site and Corridors

4.4.4.1 Impacts of Construction

Potential impacts to the physical setting at the East Range Site from construction would be similar to those described for the West Range Site. Phase I and II construction would occur within the **East Range Site property**, encompassing **1,322** acres**, and cause disturbance as indicated in** Table 4.4-5. Part of the forest within the buffer lands has historically been harvested for timber. Prior to construction, the existing vegetation would be cleared and grubbed. The land would be graded and fill would be added, if needed. Topsoil removed during construction would be stockpiled for use during the restoration phase. These construction activities would disturb the soil and increase the potential for soil erosion, especially on the till deposits, which erode easily when disturbed. Careful grading and proper reseeding of the area surrounding the footprint would mitigate these potential impacts.

No organic deposits are located within the buffer land area. Till compacts poorly when wet, so dewatering may be required to ensure that potential impacts from facility subsidence would not occur.

At this time, NRCS has not completed a soil survey for St. Louis County, which includes the proposed East Range IGCC power plant and associated corridors. From the preliminary information available, there are no soils classified as “Prime Farmland” or “Farmland of Statewide Importance” within the East Range Site (Excelsior, 2006b). To verify the preliminary results prior to construction, the NRCS would complete Form AD-1006, the Farmland Conversion Impact Rating.

The proposed East Range IGCC Power Station Footprint and Buffer Land, as well as 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. The only associated facilities of 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. Therefore, the prime farmland exclusion does not apply to either the East Range IGCC Power Station Footprint, Buffer Land,

any of the associated facilities or additional lands except for the two identified Process Water Supply Pipeline Segments. No active farming is currently being conducted at the East Range Site.

Table 4.4-5. Areas of Disturbance (East Range Site)

Structure	Area of Disturbance (acres)	Total Prime Farmland Soils and Farmland of Statewide importance (acres)	Earthwork Cut (cubic yards)	Earthwork Fill (cubic yards)
IGCC Power Plant Footprint & Buffer Land	**182**[1]	0[2]	**3,349,000**	**1,146,000**

[1] **Area is for both Phase I and Phase II footprints, and does not include the buffer land that would not be disturbed. The area occupied by Phase II would need to be initially cleared to accommodate the laydown of the building materials.**
[2] Preliminary soil survey results indicate no Prime Farmland Soils or Farmland of Statewide Importance are located in the buffer land area. This number may change when the soil survey is officially released.
Source: Excelsior, 2006b

In general, the HVTL alternative corridors would follow existing ROWs from the Mesaba Generating Station to the Forbes Substation. The existing HVTL structures would be replaced with taller, single-pole steel towers. One new segment would be built around Eveleth to connect the 39L to the 37L at the Thunderbird Mine Substation. Minimal grading would be required, and vegetation would be cleared in areas around Eveleth to provide equipment access and to expand the existing corridors' ROW. To minimize the potential for increased soil erosion from construction, the towers would be built at the existing grade, and cleared areas would be reseeded. Table 4.4-6 presents the area of disturbance, the HVTL ROW and the foundation excavation requirements. Permanent impacts to the soil would occur directly around the foundations of the HVTL structures and along the corridor centerline.

The HVTL corridors would cross a variety of physiographic features, including wetlands, areas with organic (peat) soils, and shallow or exposed bedrock. These areas would require special construction techniques in order to ensure the HVTL structures are stable. The standard drilled shaft foundations would not be possible in peat deposits, which may require helical or driven piles to stabilize the tower. In areas where the bedrock is close to the surface, post-tensioned rock anchors may need to be bored into the bedrock to stabilize the foundation.

Table 4.4-6. Areas of Disturbance Associated with HVTL Corridors (East Range Site)

Structure	Area of Disturbance (acres)	HVTL ROW (width in feet)	Tower Foundation Excavation Requirements
HVTL Alternative 1	**764**	100	15-55 feet deep 7 to 12 feet diameter
HVTL Alternative 2	**753**	100	15-55 feet deep 7 to 12 feet diameter

Organic deposits such as peat are also highly compressible and do not support heavy construction equipment. Therefore, construction in these areas would require the use of crane mats or low ground pressure equipment. Waiting for the organic deposits to freeze during the winter months may also alleviate the difficulty of construction, and it would minimize impacts to of the soft, compressible, wet soils found in the wetlands. Temporary haul roads may need to be constructed along the HVTL corridor in the wetland areas to provide access for material delivery and personnel. These haul roads would be

completely removed when vegetation is re-established on the ROW. Potential impacts to wetlands from construction activities are discussed in Section 4.7.

Around Eveleth, the HVTL Alternative 2 corridor would pass by mine pits and tailings piles. A new corridor would connect the 39L to the 37L at the Thunderbird Mine Substation. Where the new HVTL alignment would encounter mine pits, the corridor would be routed around the pit(s), if necessary. If the corridor crossed a tailings pile, special foundations would be required to accommodate the variable soil and rock material within the pile. Standard best management practices would be used to control erosion of the loose surficial materials during construction on the mine tailing.

The preliminary soil survey datasets are not complete for the areas that would be crossed by the HVTL corridors; therefore, the potential impacts to farmlands cannot be determined at this time. The potential impacts would be determined when NRCS generates a Farmland Conversion Impact Rating.

The proposed pipeline corridors would cross bedrock, wetlands, and disturbed mining areas. **The process water pipeline** network would connect the flooded mine pits on Cliffs-Erie property with the Mesaba Generating Station. A cooling tower blowdown pipeline would not be used and an enhanced ZLD system would be added to the power station to treat the blowdown. The area of disturbance, temporary ROW and excavation requirements from pipeline construction are presented in Table 4.4-7.

All of the natural gas pipelines would be located on existing corridors or on disturbed ground. The natural gas pipeline would be constructed within an existing gas pipeline corridor serving Cliffs-Erie. The process water pipelines would be located on soil disrupted by mining activities. The sewer and potable water lines would be placed along the 43L HVTL corridor to connect to the Hoyt Lakes wastewater and drinking water systems, and would cause similar construction impacts to the HVTL corridors. The pipelines would require minimal grading. Around irregular topography, construction of the natural gas pipeline would use grading and cut-and-fill techniques to minimize the potential erosion impacts.

Table 4.4-7. Areas of Disturbance Along Proposed Pipeline Corridors (East Range Site)

Structure	Area of Disturbance (acres)	Maximum Temporary ROW (width in feet)	Excavation Requirements
Natural Gas Pipeline	**128**	100	16-24” diameter pipe; Trench: 72” deep
Process Water 2WX-SITE	16	150	Trench: 10 feet deep
Process Water 2WX-W	10	150	Trench: 10 feet deep
Process Water 2W-2E	2.9	150	Trench: 10 feet deep
Process Water 3-2E	1**2**	150	Trench: 10 feet deep
Process Water K-2WX	3.4	150	Trench: 10 feet deep
Process Water S-2WX	39	150	Trench: 10 feet deep
Process Water 9S-6	9.6	150	Trench: 10 feet deep
Process Water 9N-6	18	150	Trench: 10 feet deep
Sewer and Water Line	2**0**	100	**Sewer**: 12” diameter; Trench graded but no deeper than 8 feet **Water**: Pipe 6” diameter; Trench: 60” below surface

Trenching in the pipeline corridors would excavate both topsoil and subsoil in two subsequent passes. The soils would be separated and stockpiled, then used to restore the post construction landscape. To minimize any impacts that might occur when crossing water bodies, directional drilling may be used. However, in some cases, open cut and fill procedures would still be used to cross water bodies. The impacts would be reduced by using guidance from the U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, and the MNDNR. Additional impacts to the water resources from directional drilling are addressed in Section 4.5, Water Resources.

Using preliminary soil survey data, the natural gas pipeline corridor was analyzed qualitatively in the immediate area surrounding the East Range buffer land area. One area of potential impact was identified. The natural gas pipeline will affect an area of Cloquet loam as it has been preliminarily mapped by the NRCS. A rough scale, based on preliminary maps, indicates approximately 0.25 acres of "Farmland of Statewide Importance" could be impacted within the natural gas pipeline permanent ROW (70-foot width). However, because this estimate is based on unconfirmed preliminary mapping data, the NRCS would determine the actual acreage of this impact to soils classified as farmland of statewide importance within the East Range project area when it calculates the Farmland Conversion Impact Rating.

The process water pipelines primarily cross deposits from mining operations. In areas with glacial material remaining (Pipelines 6-S-2WX, K-2WX, 2WX-Site, 2WX-2W), the cleared area would be grubbed and any topsoil would be stockpiled for later use. The till found along these pipelines has an "easily erodes" characteristic, which would be minimized with BMPs. The amount of soils classified as "Prime Farmland" and "Farmland of Statewide Importance" has not been determined around the process water pipelines. However, the pipelines would be located in highly disturbed areas from past mining activities.

The rail alignment alternatives and the access road corridors would cross both upland and wetland areas around the Mesaba Generating Station. Table 4.4-8 presents the key information about the rail alignment alternatives and access road used to determine the potential impacts from construction.

The potential impacts would generally be similar to the ones described above and for the road and rail corridors at the West Range Site. The land within the construction ROW would be cleared and grubbed. BMPs and post-construction reclamation would be required to prevent increased loss of topsoil and till. The rail alignment Alternatives 1 and 2 would require filling some of the wetlands to attain the appropriate grade. To maintain stability, muck and peat may need to be removed from these wetlands. Prime Farmland Soil impacts would be calculated when NRCS reviews the NEPA process.

The access road would approach the IGCC facility from the **east**. **It** would primarily cross till, so any cleared areas would be graded and reseeded to minimize the potential for increased erosion. Preliminary soil maps of the area indicate that no soils classified as "Prime Farmland" or "Farmland of Statewide Importance" would be disturbed by the access road construction.

Table 4.4-8. Areas of Disturbance Along Rail Alignment Alternatives and Access Road (East Range Site)

Structure	Area of Disturbance (acres)	Maximum Temporary ROW (width in feet)	Earthwork Cut (cubic yards)	Earthwork Fill (cubic yards)
Rail Alignment Alternative 1	**53**	Variable (75-490)	2,390,000	**123**,000
Alternative 1 Center Loop	105	—[1]	—[2]	—[2]
Rail Alignment Alternative 2	**58**	Variable (75-490)	2,180,000	**116**,000
Access Road	**46**	200	—[1]	—[1]

[1] Data not available
[2] Data are included with the rail alignment

During construction of Phase I, materials used for construction would initially be stored in the Phase II footprint, which would be prepared for use as a staging and laydown area. Therefore, the incremental impacts from construction of the Phase II plant would be **negligible on the East Range Site property. For Phase II, Excelsior would establish off-site construction staging and laydown areas on 85 acres of land at potential sites described in Chapter 2 and shown in Figure 2.3-5. The potential Phase II laydown areas have all been disturbed during prior uses by mineral extraction companies. Excelsior would select the appropriate sites for the necessary acreage prior to construction, taking into account the potential effects to soil disturbance. The lands would be cleaned and restored to their pre-existing condition at the end of Phase II construction.**

Because route selection and construction of new HVTLs, pipelines, rail alignments, and access roads would be required for the Mesaba Energy Project Phase I, and the Phase II footprint would be used as a laydown area for Phase I construction, the incremental impacts from construction of the Phase II plant would be negligible with respect to the site and affected corridors. Therefore, except for the temporary use of off-site laydown areas that have been previously disturbed, the impacts on geology and soils would be essentially the same for Phase I as for both phases of the Mesaba Energy Project at the East Range Site.

4.4.4.2 Impacts of Operation

No operational impacts other than those discussed in Section 4.4.2.2 are anticipated.

4.4.5 Impacts of the No Action Alternative

For the purposes of this EIS, as explained in Section 2.1.1.2, the DOE No Action Alternative is assumed to be equivalent to a “No Build” Alternative. Therefore, construction and operational impacts associated with the Proposed Action would not occur. Areas within the existing HVTL and pipeline corridors would remain in their current state and would be disturbed by repair activities from ongoing operations. However, areas of disturbance would be smaller than required for the Proposed Action and would be restricted to the existing corridors.

4.4.6 Summary of Impacts

The impacts on geology and soils described below would be essentially the same for the two-phased Mesaba Generating Station as they would for Phase I only.

Basis for Impact	No Action	West Range	East Range
Result in soil erosion or loss of topsoil.	No soil disturbance.	Soils disturbed within construction ROW, may increase erosion.	Soils disturbed within construction ROW, may increase erosion.
Result in direct conversion of prime and unique farmland to non-agricultural uses.	No prime or unique farmland conversion.	The site and buffer lands are exempted from Minnesota Regulation 4400.3450, as they are located within the cities of Taconite and Marble. Only 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 have potential for impacting prime farmlands. Depending on which corridors would be selected, approximately **243** to **338** acres of Prime Farmland soils would be disturbed during the construction process.[1]	The site and buffer lands are exempted from Minnesota Regulation 4400.3450, as they are located within the City of Hoyt Lakes. Preliminary information shows no Prime Farmland soils at the East Range power plant site. No soil survey data is currently available for the East Range corridors.
Result in the loss of availability of a known mineral resource that would be of value to the region.	No mineral resource loss.	No mineral resource loss.	No mineral resource loss.
Located on a geologic unit or soil that would be unstable as a result of the project.	Soils remain unmodified.	Portions located on wet glacial till and peat.	Portions located on wet glacial till and peat.
Expose people or structures to adverse effects from seismic activity.	No exposure to seismic activity.	No exposure to seismic activity.	No exposure to seismic activity.
Result in the contamination of soil or mineral resources.	No soil contamination.	Increased potential for spills.	Increased potential for spills.
Result in the loss of paleontological resources.	No loss to paleontological resources.	No loss to paleontological resources.	No loss to paleontological resources.

[1] This range was calculated from the maximum and minimum Prime Farmland values for the West Range power plant site and corridors, found in tables 4.4-1 through 4.4-4. Permanent loss of farmland acreage would occur on the footprints of aboveground structures only. **Pipelines that share corridors would reduce the overall disturbance to prime farmland soils.**

4.5 WATER RESOURCES

4.5.1 Approach to Impacts Analysis

4.5.1.1 Region of Influence

The region of influence for surface water resources includes those watersheds and sub-watersheds where the potential footprints and associated rights-of-way of the Mesaba Generating Station as well as the roads, rail lines, HVTLs, process water lines, cooling tower blowdown lines, and utility lines (i.e., potable water, gravity sewer, and natural gas) that would support Mesaba Energy Project operations are located.

4.5.1.2 Method of Analysis

The evaluation of potential impacts on water resources considered whether the Proposed Action or an alternative would cause any of the following conditions:

- Change the availability of surface water resources for current or future uses;
- Conflict with established water rights;
- Modify surface waters such that water quality no longer meets applicable water quality criteria or standards established in accordance with the CWA, state regulations, or permits;
- Conflict with regional water quality management plans or goals;
- Deplete groundwater supplies or interfere with groundwater recharge such that there would be a net deficit in aquifer volume or local water table affecting availability for existing and planned uses;
- Violate any Federal, state, or regional water quality standards or discharge limitations;
- Degrade groundwater quality;
- Conflict with regional aquifer management plans or goals;
- Change stormwater discharges affecting drainage patterns, flooding, and/or erosion and sedimentation;
- Conflict with applicable stormwater management plans or ordinances; or
- Modify Federally and/or state-listed protected water bodies.

Wetlands, rivers, and streams are regulated under the CWA as administered by the EPA, USACE, MNDNR, and the Minnesota Wetland Conservation Act. Wetlands and stream crossings are discussed in Section 4.7.

4.5.2 Common Impacts of the Proposed Action

This section describes potential impacts to surface water resources that would be common to the implementation of the Proposed Action at both the West Range and East Range Sites. The general requirements for water for the various aspects of the Mesaba Generating Station would be the same for the West Range and East Range Sites, as those specified in Section 2.

4.5.2.1 Industrial Wastewater Treatment/Discharges

Zero Liquid Discharge System

After publication of the Draft EIS, Excelsior announced its commitment to implement an enhanced ZLD system for the West Range Site, comparable to the system originally proposed for the East Range Site. The Draft EIS (Section 5.3.2.1, Mitigation Alternative 3, and Appendix H) described implementation of an enhanced ZLD system and potential impacts at the West Range Site. The majority of water quality concerns at the West Range Site as initially described in the Draft EIS were reduced; discharges of process wastewater and cooling tower blowdown into any

water bodies were eliminated, associated blowdown pipelines were eliminated, and water appropriation demand has been reduced by reusing (instead of by discharging blowdown) and by increasing cycles of concentration in the cooling towers. This section contains new text that provides more details on the sour water treatment and the ZLD systems for the treatment of contact and non-contact wastewater. [Text in the Draft EIS relating to potential industrial wastewater discharges at the West Range Site and differences in process water treatment between the East Range and West Range Sites was deleted from this section.]

The enhanced ZLD system is made up of two separate ZLD units that treat two different wastewater streams—contact wastewater (process water from the gasification that has been through sour water treatment) and non-contact wastewater (primarily cooling tower blowdown). Excelsior completed a report – *Final Water Retention, Recovery & Reuse Report* (Granherne, 2009) – that describes the ZLD unit for the treatment of non-contact wastewater and stormwater streams at the West Range Site. This report was added to the Final EIS as Appendix H2.

Sour Water Treatment and ZLD System for Treatment of Contact Water

As discussed in Section 2.2.1.4, water condensed during cooling of the sour syngas contains small amounts of dissolved gases (CO_2, NH_3, H_2S and other trace contaminants). The process water must be treated to remove these dissolved gases before being recycled to the coal grinding and slurry preparation area or being blown down to the ZLD unit. The dissolved gases are driven from the water using steam-stripping. The steam provides heat and a sweeping medium to expel the gases from the water, resulting in a water purification level sufficient for reuse within the plant and/or for blowdown to the ZLD unit. This purification process is called the sour water treatment process and is illustrated in Figure 2.2-9.

The gases are stripped from the sour water (water with dissolved sulfur compounds and other contaminants condensed from the syngas) in a two-step process—first, the CO_2 and most of the H_2S are removed in the CO_2 stripper column by steam stripping and directed to the Sulfur Recovery Unit. The water exits the bottom of this column, is cooled, and a major portion is recycled to feedstock grinding and slurry preparation. The rest is treated in an ammonia stripper column to remove the ammonia and remaining trace components. The stripped ammonia is combined with the recycled slurry water. A portion of the ammonia-stripped water is blown down to the ZLD, with the rest being reused within the plant. Reuse of water within the gasification plant minimizes water consumption and discharge. This unit is a totally enclosed process with no emissions to the atmosphere.

Essentially, the ZLD unit concentrates and evaporates the process condensate. The blowdown stream from the ammonia stripper would be pumped to a brine concentrator**,** which would use steam or vapor compression to indirectly heat and evaporate water from the wastewater stream. The water vapor generated would then be compressed and condensed and the high quality distillate would be recycled to the syngas moisturization system or to other water uses in the plant, reducing fresh water consumption, and, more importantly, concentrating heavy metals and other contaminants of concern into a solid waste stream. The concentrated brine would be further processed in a heated rotary drum dryer/crystallizer. There the remaining water would be vaporized and a solid filter cake material would be collected for proper disposal in existing approved waste management facilities. **Figure 2.2-10 illustrates integration of the ZLD unit to treat the contact wastewater from the gasification process.** The ZLD unit to be used for the Mesaba Generating Station would be the same system that has been successfully employed at the Wabash **River Plant** to control permit exceedances of metals in that plant's discharges. **The Wabash River Plant has never experienced a shutdown due to the ZLD unit not being available (Lynch, 2009).** No wastewater discharges would be generated from the contact wastewater ZLD system.

ZLD Unit for Treatment of Non-Contact Water

All industrial wastewaters (i.e., non-domestic wastewaters) generated beyond those already used in the gasification and slag processing operations, discussed above, would be processed through a separate ZLD unit such that there would be no process-related wastewaters, including non-contact cooling tower blowdown, discharged from the Mesaba Generating Station.

A ZLD report (*Final Water Retention, Recovery & Reuse Report* [Granherne, 2009]) for the West Range Site has been completed as part of Excelsior's NPDES application submittal to MPCA and has been added as Appendix H2 for the Final EIS. The ZLD report identifies the system for treating the project's non-contact wastewater streams. These streams include cooling tower blowdown, smaller flows from water treatment system regeneration, use of service water, and surface runoff streams from the project. The ZLD unit feeds are qualitatively characterized relative to their TDS and TSS levels, which ultimately determine sludge generation rates for off-site disposal. Additional parameters of interest include pH and dissolved and free organics. The following are the feed streams to the ZLD unit:

- Cooling Towers Blowdown - these streams are characterized as having elevated TDS levels due to COC within the cooling tower systems. TSS levels are mitigated by filtered raw water makeup and settling in the cooling tower basin.
- Raw water Multi-Media Pressure Filters Backwash - this stream is characterized as having raw water TDS levels and high TSS levels due to its solids removal from the incoming supply water.
- ZLD Pressure Filters Backwash - this stream is characterized as having generally the level of TDS and TSS from the cooling tower blowdown streams since these are the predominant flows.
- Oil-Water Separator Underflow - this stream is characterized as clarified and filtered raw water with minimal oil and grease content.
- Mixed Bed Polisher Regeneration Flows - this stream is characterized as having high TDS and little to no TSS levels.
- Stormwater and snowmelt flows would carry some TSS, but have very low TDS.

Figure 4.5-1 is a conceptual representation of the ZLD unit. See Appendix H2 for a more detailed description on the process components as labeled in the figure.

Pollutants and Water Quality

Implementation of the enhanced ZLD system for the West Range Site would eliminate discharges of process water and cooling tower blowdown into any water bodies. Thus, no pollutants would be discharged into any surface waters, which would eliminate the majority of water quality concerns at the West Range Site as originally discussed in the Draft EIS, including TDS, thermal, mercury, and phosphorus. However, because water would be pumped into the Canisteo Mine Pit (CMP) from various sources to offset water appropriation, increase in phosphorus concentration in the CMP would result as these sources (mainly the Prairie River) have existing levels of phosphorus and would, therefore, add to the existing phosphorus levels in the CMP. Section 4.5.3.2 provides an updated phosphorus analysis for the West Range Site. Sections 4.3 and 4.17 discuss potential impacts from mercury emissions. [Text regarding potential industrial wastewater discharges and associated water quality impacts was deleted from this section.]

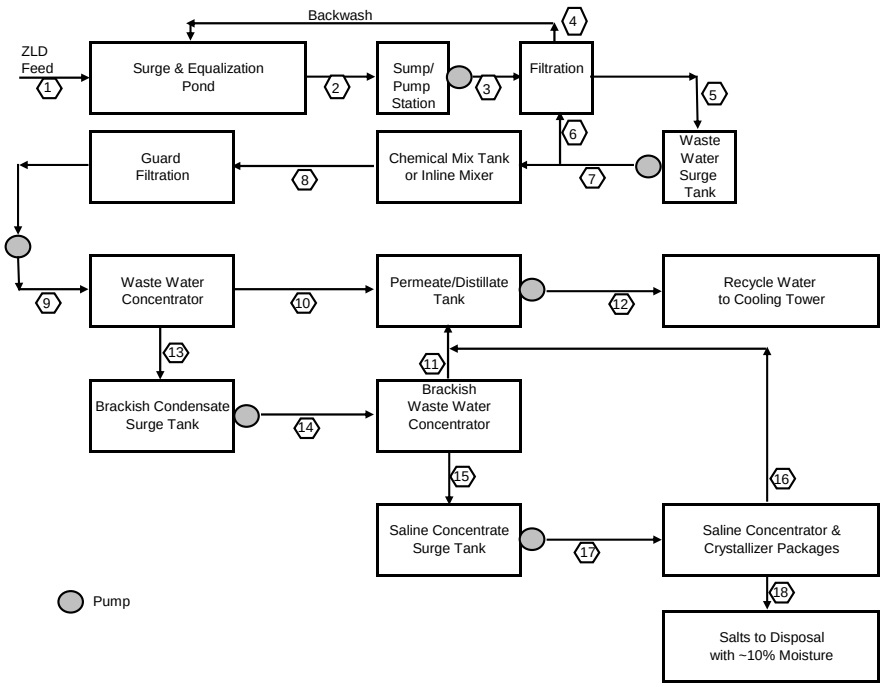

Figure 4.5-1. Conceptual Diagram for ZLD Unit for Treatment of Non-Contact Water (Granherne, 2009) (added for Final EIS)

4.5.2.2 Process Water Requirements

As presented in Section 2.2.2.3, process water is required at the Mesaba Generating Station for cooling in the power cycle, for slurrying the coal feedstock to the gasifier, and for various other contact/non-contact cooling purposes. Figure 2.2-10 provides a generalized flow diagram of process water sources and components within the IGCC power plant.

By using the enhanced ZLD system, the average annual water appropriation rate has been reduced by 900 gallons per minute (gpm) per phase (1,800 gpm total) and has eliminated blowdown discharge. Table 4.5-1 defines the average and peak water requirements (added in Final EIS). Peak rates would occur on hot, humid days. Note that water demand would be similar for both the West Range and East Range Sites.

Table 4.5-1. Process Water Requirements, Phases I and Phases I & II

Phase	West Range Site and East Range Site	
	Average Annual Demand (gpm [cfs])	Peak Demand (gpm [cfs])
Mesaba Energy Project (Phase I)	3,500 (7.8)	5,000 (11.1)
Mesaba Generating Station (Phases I & II)	7,000 (15.6)	10,000 (22.3)

New table added in Final EIS to reflect implementation of an enhanced ZLD system at the West Range Site.
gpm – gallons per minute; cfs – cubic feet per second

The largest share of the water appropriated is consumed by evaporative cooling. The annual average rate of evaporative loss would be about 3,320 gpm for Phase I (evaporative losses from Phase II would be

expected to be identical). Peak evaporative losses for each phase of the Mesaba Generating Station are identified in the NPDES permit application as approaching 3,500 gpm. Peak utilization rates would occur on hot summer days. Most of the water lost to evaporation would come from mine pits that currently do not have an outflow (e.g., no discharge of overflow water) into local streams or rivers. These mines pits have been filling with water since the cessation of mining activities, generally 10 to 20 years ago. Some water that is currently part of the water balance for the watersheds would be lost to evaporation (water from the Prairie River, dewatering of the Hill Annex Mine Pit Complex, withdrawals from Colby Lake), but these losses are relatively small in comparison to the average flows of the Prairie and Swan Rivers (discussed later in Section 4.5.3.1).

The maximum appropriation of water from the resources at either site would be dependent upon many factors, including the COC in the cooling towers, the fuel consumed, ambient conditions, the extent to which cooling tower blowdown is treated to remove total dissolved solids, the chemistry of the receiving waters, and the water quality criteria standards applied to those waters. The COC in the cooling towers would be dependent upon source water chemistry, including the concentrations of mercury, total dissolved solids and hardness. In general, if the source water is relatively low in TDS, the COC in the Mesaba Generating Station's cooling towers can be increased, resulting in lower make-up rates. Availability of water for these processes is analyzed in Sections 4.5.3.1 and 4.5.4.1 for the West Range and East Range Sites, respectively.

4.5.2.3 Sanitary Discharges

Sanitary wastewaters produced during the operation of the Mesaba Generating Station would be relatively small (about 30 gallons per person per day) and would be discharged to a nearby POTW. In the case of the West Range Site, the closest POTW is the CBT regional WWTF located in Bovey. This system would be accessed via the City of Taconite's sanitary sewer system. In the case of the East Range Site, the closest POTW is the Hoyt Lakes WWTF. The Hoyt Lakes WWTF would be accessed near the Syl Laskin Energy Center, where the City would be responsible for constructing a satellite WWTF there or constructing a new pipeline from that point to the City's existing WWTF. As an alternative, sanitary wastewaters from plant activities could be managed on site via a septic system or stand-alone wastewater treatment system. Specific impacts of sanitary discharges are discussed in Sections 4.5.3.3 and 4.5.4.2 for the West Range and East Range Sites, respectively. **Since publication of the Draft EIS, Excelsior announced its commitment to make significant capital improvements to the CBT WWTF when construction commences on the proposed power plant (Excelsior, 2008). Section 4.5.3.3 was updated to reflect Excelsior's latest plans for the CBT WWTF.**

4.5.2.4 Water Intakes and Pumping Systems

Since publication of the Draft EIS, findings from an investigation into potential intake structures recommend the use of angle well intakes (Barr, 2008b), and a description of this type of structure has been added to this section. The types of water intake structures and pumping systems would be similar for the West and East Range Sites. **Three** types of intake structures could be employed for water withdrawal: **two** designed for permanent withdrawals and one for seasonal withdrawals. These **three** types of intake structures, caisson**, angle well,** and floating, are depicted in Figure 4.5-2 **(angle well figure added in Final EIS)**.

Process water pumped from a combination of nearby water features would be piped to the Mesaba IGCC Power Station. Raw water from the pipeline would be processed through a micro-filtration system prior to use in the plant. As the engineering and design of the generating station proceeds, the design concepts presented herein would be tailored to each specific circumstance and optimized to reduce power consumption demands.

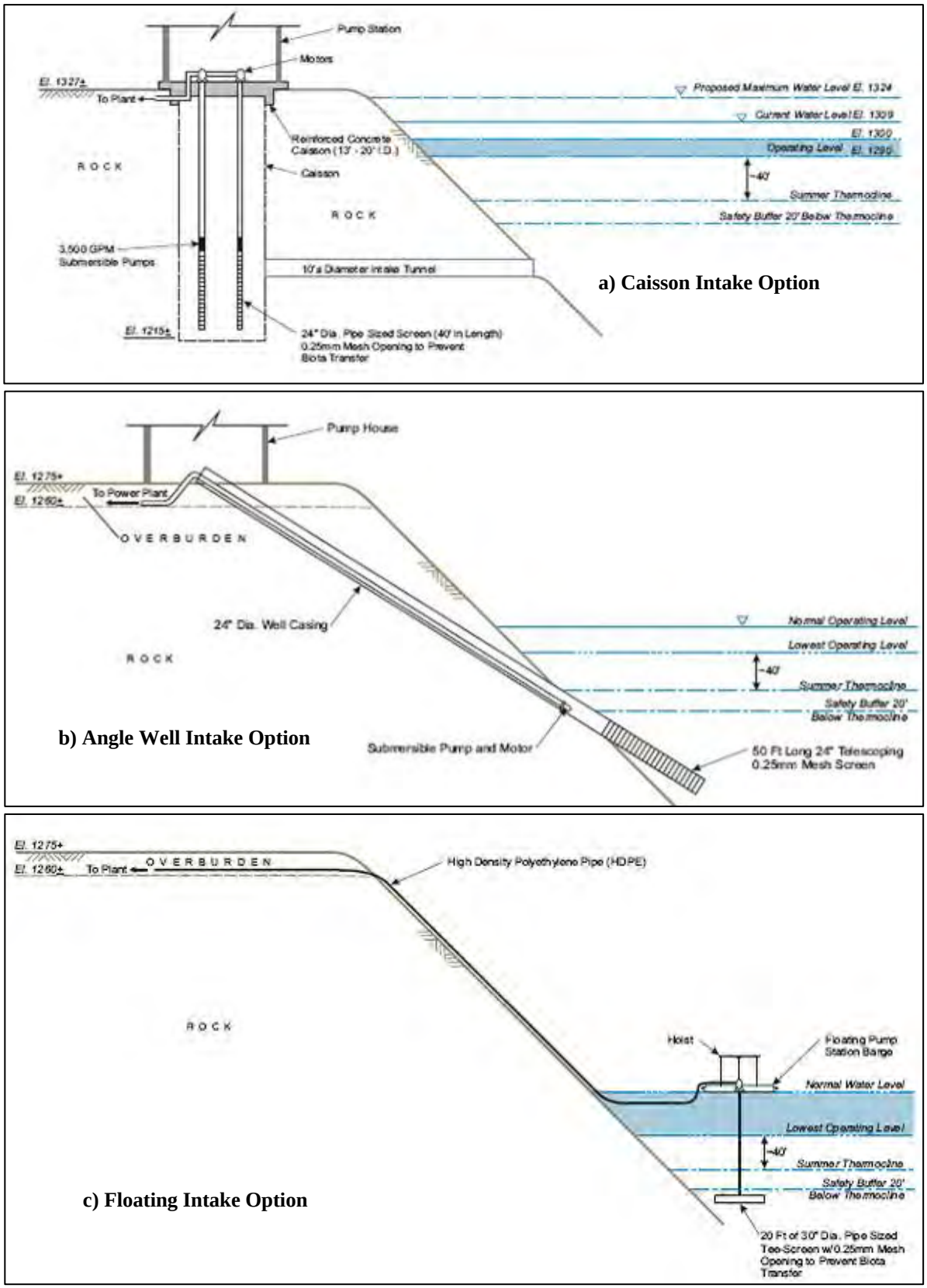

Figure 4.5-2. Water Intake Structures, Conceptual Designs (angle well intake option added in Final EIS)

The caisson intake structure would involve construction of a 13- to 20-foot diameter vertical shaft that would act as a wet well. The actual diameter of the vertical shaft would be based on equipment requirements, such as the number of pumps and the dimensions of the pumping equipment, as well as on constructability issues related to connecting the shaft to the pit. The caisson would be constructed to an elevation necessary to obtain submerged pumping conditions under the lowest anticipated pit water levels, including an emergency buffer. Connecting the shaft to the pit can be accomplished by several methods. One such method includes constructing a large horizontal tunnel (approximately 10 feet in diameter) from the caisson to the pit for water collection.

Water would enter the central caisson through the horizontal tunnel and rise to the normal water elevation. The horizontal tunnel would be constructed using hard rock tunneling techniques. The tunneling would be stopped short of the pit to allow the equipment to be removed prior to flooding of the caisson by pit water. The final opening from the horizontal intake tunnel to the pit would be made by blasting or drilling on the pit side from a barge on the pit water surface. The horizontal tunnel would be sized to limit intake velocities to 0.5 feet per second. With this method, CWA screening requirements of Section 316(b) of the CWA would be met in the caisson using either tee screens or conventional well screens. Pumps in the caisson would be conventional turbine pumps, commonly used in wet well applications.

A second method to withdraw water from the pit, the angle well intake, would rely on diagonal drilling methods to install several smaller diameter holes (approximately 24 inches in diameter) into the pit. Submersible pumps would be used in this configuration. Either the caisson intake method or angle well intake method would implement a system to allow access to the deeper, cooler water if determined to be necessary or cost effective. Both systems would meet CWA Section 316(b) requirements that reflect the best technology available to protect aquatic organisms from impingement or entrainment. Use of an ultra-fine mesh screens (0.25 millimeters in diameter) is expected to prevent biota transfer between basins at all sites. A new supply pipe would be constructed from the intake systems to deliver water to the IGCC Power Station for cooling and other plant needs.

Floating intake structures conducive to fluctuating water levels are available and commonly used by mines for pumping systems. This system includes placing pumps and intake structures on a floating platform in the mine pit. A pipe with wedge wire screen is extended to withdraw water from the desired depth. A sufficient length of screen would be provided to ensure that intake velocities are maintained below 0.5 feet per second and to ensure that thermal stratification is not disrupted. This system would also meet CWA Section 316(b) requirements to protect aquatic organisms from impingement or entrainment. An ultra-fine screen (0.25 millimeters in diameter) is expected to prevent biota transfer between basins at all sites. A supply pipe would be designed to convey water from the floating platform to the proposed facility.

4.5.2.5 Stormwater Management

Pre-Construction

All construction sites greater than 1 acre in size are required to obtain a General Construction Stormwater Permit to discharge stormwater from the MPCA, the agency responsible for the state's stormwater program. Under MPCA requirements, two parties—the owner (Excelsior) and the operator (person, typically the project's general contractor, who has day-to-day operational control or the ability to modify project plans and specifications)—must be covered jointly under the permit. Thus, prior to any construction activities, Excelsior would have to apply for a National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) stormwater permit for construction activities, either the general permit or an individual permit. The steps involved in applying for the permit are as follows:

- Identify construction site boundaries, parcel identification, and project schedule;
- Determine if additional permits, beyond the stormwater permit, are required;
- Determine if an Environmental Review is needed;
- Understand the requirements of the general permit for stormwater from construction activities;
- Identify waters that have the potential to receive a discharge of stormwater runoff (including special and/or impaired waters);
- Determine if discharges from the construction site would impact other protected resources (i.e., endangered species, historic properties, calcareous fens);
- Prepare a SWPPP;
- Identify discharges;
- Determine eligibility for the Construction Stormwater General Permit; and
- Complete and submit an application form for an MPCA NPDES/SDS stormwater permit for construction activity.

The West Range Site is not within 2,000 feet of any special or impaired waters; however, the HVTL and natural gas corridors would cross the Swan River (impaired) several times. The East Range Site is within 2,000 feet of an impaired water body (Colby Lake) and a special water body (Wyman Creek, a trout stream). Utility corridors would cross the Partridge River (impaired) at multiple points. Special wetlands (calcareous fens), endangered species, and historic properties are discussed in Sections 4.7, 4.8, and 4.9 of this EIS, respectively.

In accordance with 40 CFR Part 122.26(b)(14)(x) and presented above, Excelsior would develop a SWPPP prior to undertaking any construction activities that identifies sediment and erosion control BMPs. The plan would include a description of the nature of the construction activity and address the following:

- Potential for discharging sediment and/or other potential pollutants from the site;
- Location and type of all temporary and permanent erosion prevention and sediment control BMPs, along with procedures for establishing additional temporary BMPs as necessary for the site conditions during construction;
- Site maps with existing and final grades, including dividing lines and direction of flow for all pre- and post-construction stormwater runoff drainage areas located within the project limits. The site map must also include impervious surfaces and soil types;
- Locations of areas not to be disturbed;
- Location of areas where construction would be phased to minimize duration of exposed soil areas;
- All surface waters and existing wetlands, which can be identified on maps such as USGS 7.5 minute quadrangle maps or equivalent maps within 0.5 miles of the project boundaries, which would receive stormwater runoff from the construction site during or after construction; and
- Methods to be used for final stabilization of all exposed soil areas.

The SWPPP would be submitted to the MPCA for approval prior to the initiation of any construction activities. **As discussed above, Excelsior and the designated operator would be responsible for the compliance of construction activities under the SWPPP and provisions of the construction stormwater permits. For either the West Range Site or the East Range Site and prior to operation of the LEPGP, HVTLs, and natural gas pipeline (West Range Site only), Excelsior would apply for coverage under the Minnesota General Permit for Industrial Activity (MN G611000), or would apply for a Certification of No Exposure.**

Construction

Once permit coverage is granted, construction would begin. Initial project site preparation activities would include building access roads, clearing brush and trees, leveling and grading the site, bringing in necessary utilities, and undertaking dewatering activities that may be required. Construction of temporary parking, offices, and material storage areas at this time would involve the use of earthmoving and logging equipment to clear and prepare the site for construction of the plant. Trucks would be required to bring fill material for roadways and the plant, remove harvested timber, remove debris from the site, and stockpile fill material. Gravel and road base would be utilized for the temporary roads, material storage, and parking areas.

Stormwater discharge during construction could affect surface waters because of changes in volume, runoff patterns, and quality. In general, construction activities expose disturbed land and introduce the potential for increased erosion; however, BMPs through the proposed project's erosion and sediment control plan required under the General Permit, would be employed to minimize soil loss and minimize water quality degradation to water resources, including wetlands. Construction of stormwater facilities and site grading would result in the immediate alteration of surface water flow across the construction site. Runoff would be directed to sediment basins on the IGCC Power Station Footprint, where construction activities would result in at least 10 acres draining to a common location. Construction of other, linear project elements is unlikely to exceed this limit.

In general, erosion and sediment control measures and stormwater management would consist of BMPs, including techniques such as grading that would induce positive drainage, hay bales, silt fences, and revegetation to minimize or prevent soil exposed during construction from being carried off-site and deposited in surface waters as sediment. The BMPs would detail the erosion and sediment control measures and accidental spill prevention and control measures. The BMPs would be implemented, inspected, and maintained to minimize the potential for adversely affecting downstream water quality during the construction phase.

During Phase II construction at either project location, temporary off-site staging and laydown areas would be used to stockpile materials and store equipment, and for a cement batch plant. Excelsior would establish these off-site construction staging and laydown areas on 85 acres of land selected from potential sites as described in Sections 2.2.4.1 and 2.3. All of the candidate sites are located on lands that have been disturbed or cleared during prior uses by mineral extraction companies and, therefore, do not contain any surface waters. It is assumed that the entire laydown area would be cleared and high-use portions would be graveled or lined in some manner. Erosion and sediment control measures and stormwater management would also be used at these laydown areas and consist of BMPs, including use of silt fencing around the perimeter of the staging area and entrance stabilization techniques to reduce the transport of dust and soils off site by construction vehicles. At the end of construction for Phase II, disturbed areas would be revegetated and the laydown area would be restored to pre-existing conditions. Therefore, impacts to water resources from use of these laydown areas are considered minor.

Operation

The project would create more than 1 acre of new impervious surfaces, and, therefore, a permanent stormwater management system would be required under the NPDES permit. The permanent stormwater management system must provide water quality treatment for ½ inch of runoff from the new impervious surfaces before discharge to surface waters. This treatment may be obtained by construction of wet sedimentation basins, infiltration/filtration, regional ponds, or a combination of practices. Design criteria for wet sedimentation basins can be found in the MPCA NPDES General Permit for Construction Activities.

As part of the planned addition of an enhanced ZLD system at the West Range Site, all stormwater discharges (within a 24-hour, 100-year storm event) would be eliminated, as stormwater would be treated and reused within the plant, primarily for cooling water (see Appendix H2 for more details).

The SWPPP would detail any permanent stormwater management system to be left in place once construction is complete. [Text in the Draft EIS regarding cooling tower blowdown and a permitted outfall has been deleted.] Stormwater generated during the operation of the Mesaba Generating Station would be managed as follows:

- Stormwater with potential to become contaminated with process solids/liquids would be segregated from process equipment by curbs, elevated drain funnels and other means and returned as make-up to the feedstock slurrying system or other process water use.
- Stormwater that could become contaminated with oil (such as water runoff from parking lots) would be routed through an oil/water separator and then directed to a ZLD system.

The on-site storage areas for the feedstock handling system would incorporate dust suppression systems (including covered conveyers and other enclosures, dust suppression sprays, and vent filters) and would be paved, lined, or otherwise controlled to enable collection and treatment of stormwater runoff and to prevent infiltration to groundwater of chemical species leached from feedstock materials and/or flux. The entire feedstock grinding and slurry preparation facility would be paved and curbed to contain spills, leaks, wash-down, and stormwater runoff. A trench system would carry this water to a sump that would pump it into the recycle-water storage tank.

4.5.2.6 Groundwater

Groundwater was considered as a source of water for plant operations at both the West and East Range Sites; however the limited water yield capacity and the large volumes required for cooling water would require over 50 groundwater wells to be installed. Neither of the two proposed sites would involve the installation of groundwater wells for use as process or potable water sources, nor would either site discharge wastewaters into the ground. Local groundwater (that is in very close proximity to or below the plant site) could be affected by a large spill of materials that could percolate into the groundwater. However, the likelihood is limited as the plant would be operating under plans, such as a Spill Prevention Control and Countermeasures Plan, which require engineering controls and BMPs to limit the potential for spills to migrate and affect surface water or groundwater resources, and to ensure that adequate resources are available to respond to a spill.

Current groundwater levels near the mine pits that would be used as process water sources would be influenced by the operation of the power plant. Since the water levels in the mine pits would be lower than their current levels once the proposed plant becomes operational, groundwater levels in close proximity to the pits would be lowered. However, even under drought conditions, the mine pits would contain a substantial amount of water and the water levels would be well above the mine pit floors. Because many of the existing groundwater wells in the vicinity of the mine pits were constructed and in use during the periods when the mine pits were completely dewatered, it is expected that there would be no effect on the local well yields once the mine pits are partially dewatered. Partially lowering the mine pit water levels in the CMP and HAMP Complex (at the West Range Site) would increase the rate at which groundwater flows into the pits, greatly reducing the potential for any outflow from the pits. For these reasons, no adverse impacts to groundwater resources are anticipated for either the West Range or East Range Sites.

4.5.3 Impacts on the West Range Site and Corridors

This section has been updated since publication of the Draft EIS to reflect implementation of an enhanced ZLD system at the West Range Site, which would eliminate discharges of process water

and cooling tower blowdown into any water bodies, eliminate blowdown pipelines, and decrease water appropriation from 10,300 to 7,000 gpm (for combined Phases I and II). Figures 4.5-3 and 4.5-4 were revised to reflect the latest water balance. Note that Outfalls 001 and 002 as shown in the Draft EIS were eliminated.

One of the reasons the West Range Site is a potential location for the generating station is that abundant sources of good quality water are located nearby. Several abandoned mine pits located in proximity to the site are either currently filled with water and overflowing, are being pumped to avoid flooding of important historical resources due to rising water levels, or are threatening to flood due to rising water levels. Specifically, these pits include the CMP, the **Lind Mine Pit (**LMP**)**, and the HAMP Complex. The HAMP Complex is made up of the Arcturus Mine Pit, GMMP, and HAMP. Figures 4.5-3 and 4.5-4 **(revised in Final EIS)** provide an overview of the water balance for each stage of the proposed power plant.

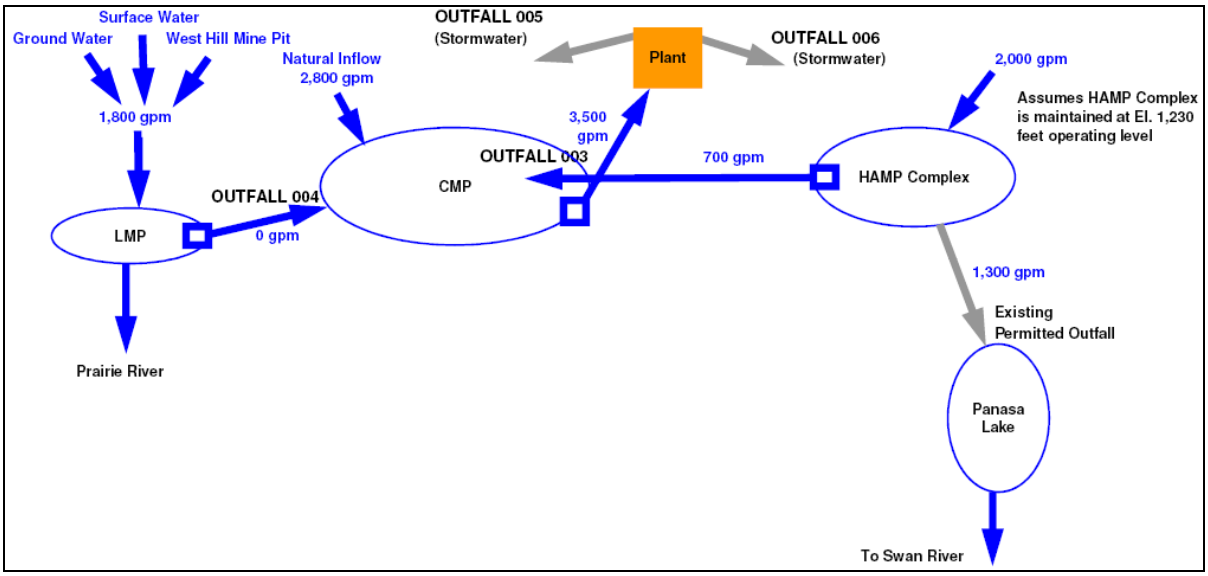

Figure 4.5-3. Phase I Water Balance: West Range IGCC Power Station (revised in Final EIS)

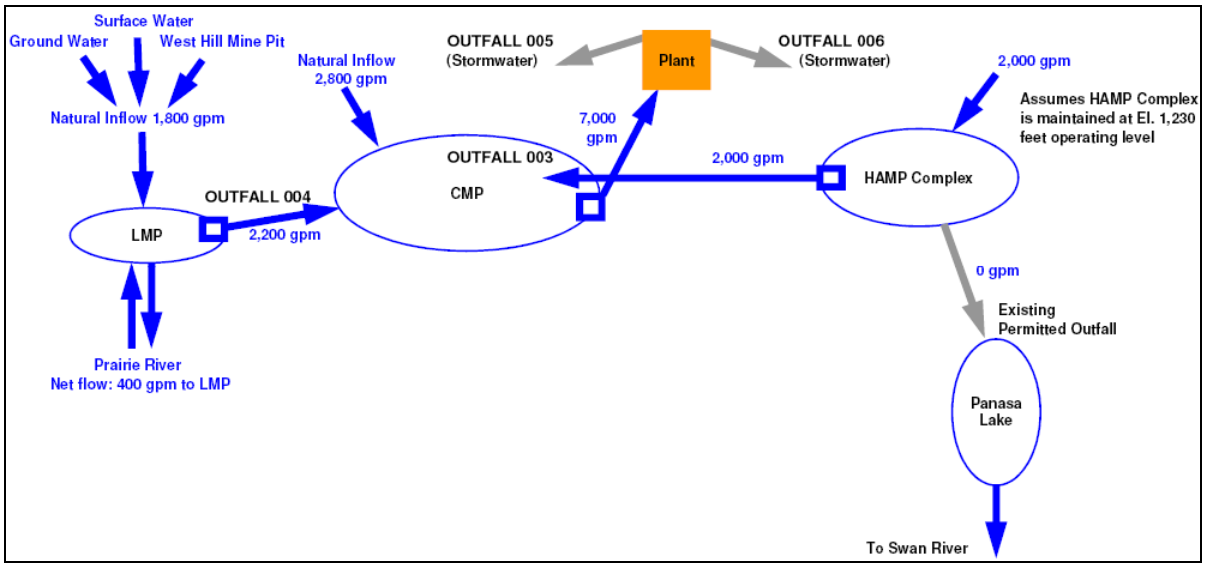

Figure 4.5-4. Phase I and II Water Balance: West Range IGCC Power Station (revised in Final EIS)

4.5.3.1 Process Water Supply Systems

Water Supply Capability

Table 4.5-2 lists the potential sources of process water for operation at the West Range Mesaba Generating Station. The estimated water volumes for these sources are provided in Table 3.5-2 and the chemistry of those potential source waters, where available, is presented in Table 3.5-4. These potential sources of process water are being considered for use in three alternatives. As shown in Table 4.5-2 and Figures 4.5-3 and 4.5-4, process water would be supplied by mine pits and the Prairie River under Alternative 1, Excelsior's preferred alternative. Two additional alternatives for process water were also considered: obtain water from the Mississippi River (Alternative 2); or use groundwater for the process water (Alternative 3).

Table 4.5-2. Process Water Resources Identified for Use at the West Range Site

Potential Resource	Over-Flowing Or Rising?	Information Source	Phase	Alternative
Canisteo Mine Pit	Rising	MNDNR	I/II	1
Hill-Annex Mine Pit Complex[1]	Dewatered on an ongoing basis to avoid flooding of Hill-Annex State Park	MNDNR & Barr	I/II	
Lind Mine Pit	Overflowing	SEH Field Data	**II**	
Prairie River	NA	Minnesota Power	**II**	
Greenway Mine Pit	Overflowing	SEH Field Data	II	Considered as Part of Alternative No. 1, but Rejected on Basis of Cost Effectiveness
Mississippi River	NA	MNDNR	II	2
Groundwater	NA	None	I/II	3

[1] The HAMP Complex includes the Arcturus, Gross-Marble, and Hill-Annex Mine Pits.
NA = Not Applicable

Under Alternative 1, the West Range Site process water would **primarily** be supplied from the mine pits and the recycled process water discharge. **As Table 4.5-2 indicates, the mine pits currently are either filled with water and overflowing, are being pumped to avoid flooding of important historical resources (i.e., the Hill Annex State Park) due to rising water levels, or are under threat of flooding due to rising water levels.**

The estimated water supply capabilities for the potential sources are presented in Table 4.5-3 **(updated to reflect use of the enhanced ZLD system)**. The sustainable supply capability for each water source was estimated using information supplied by the MNDNR, previous engineering studies, and information supplied by local government units. The actual sustainable rates that would be realized are dependent on factors including precipitation, evaporation, pit water levels, and hydrogeological conditions.

Table 4.5-3. Water Source Supply Capability

Water Source	Estimated Range of Flow Available for Withdrawals (gpm)	Assumed Sustainable Withdrawal Flow for Water Balance Modeling (gpm)
Canisteo Mine Pit	810 – 4,190	2,800
HAMP Complex	1,590 – 4,030[1]	2,000[2] **3,500**[3]
Lind Mine Pit	1,600 – 2,000	1,800[4]
Prairie River	0 – 2,470[5]	2,470[6]
Total	4,350 – 16,190	**>9,100 – 10,600**[7]

Table has been revised to reflect use of enhanced ZLD system. Text regarding discharge from Mesaba Generating Station has been deleted.
[1] Maximum flow occurs at minimum operating elevation.
[2] At an operating elevation of 1,230 feet msl.
[3] **At minimum operating elevation, which would require pumping between Hill Annex and Gross Marble mine pits.**
[4] Estimates of flow are based on one summer flow measurement at the LMP outlet and one summer and one winter measurement taken at the West Hill Mine Pit outlet.
[5] Maximum available flow assumed to be 25% of the 7Q10 flow of the Prairie River.
[6] **For water quality modeling purposes, the Prairie River contributions are assumed to be 400 gpm, as it is the least preferred source.**
[7] **The range is dependent upon HAMP operating elevation. The "greater than" symbol (>) is used because the assumed sustainable withdrawal flows are conservative.**
gpm – gallons per minute

For the combined needs of Phases I and II, existing data currently show that flows greater than those presented in Table 4.5-3 for the CMP might be available, as the inflow of water may increase with decreasing water levels in the CMP. To be conservative, Excelsior has not assumed the availability of such potential excess flows. Information available for the HAMP Complex also suggests increased water flows into the HAMP Complex with decreasing water elevations. For example, records show evidence of flows between 3,900 and 4,000 gpm during the initial years following cessation of mining. However, this increased flow is also not used in the sustainable flow values presented in Table 4.5-3.

Table 4.5-4 **(revised to reflect use of enhanced ZLD system)** compares the long-term sustainable water needs for the Mesaba Generating Station with the potential supplies shown in Table 4.5-3. The data in Table 4.5-4 is based on: (1) discussions with the MNDNR regarding the availability of water in each of the above resources; (2) analyzing stage-storage data made available by the MNDNR; (3) reviewing information the MNDNR had published on each such resource (Excelsior, 2006b); and (4) collecting primary data to confirm the available resource. The last column in Table 4.5-4 represents Excelsior's

conclusion with regard to the capability of the resources listed to meet the operational requirements of Phases I and II, namely that sufficient water supplies are available to demonstrate the long term, sustainable provision of water for the power plant's needs (Excelsior, 2006a).

Table 4.5-4. Process Water Requirements Matched with Water Supply Capabilities

Phase	Average Annual Requirement (gpm)[1]	Peak Requirement (gpm)[1]	Long Term Sustainable Flow (gpm)[2]	Sufficient to Meet Annual Avg. Flow Requirement (Yes/No)
Mesaba Energy Project (Phase I)	3,500	5,000	> 9,100 – 10,600	Yes
Mesaba Generating Station (Phases I & II)	7,000	10,000	> 9,100 – 10,600	Yes

[1] From Table 2.2-3 **(Table revised to reflect use of enhanced ZLD system.)**
[2] The flow presented is sum of the values in the third column of Table 4.5-3 rounded to two significant figures; "greater than" symbol is applied because quantity does not account for 300 gpm discharged back to the CMP during Phase I operations.
gpm – gallons per minute

Even if Excelsior completely utilized all the water from any single potential resource near the West Range Site, there would be no such resource capable of supplying all of the water requirements for both phases of plant development. Therefore, in consideration of its own needs and to help support solutions to local flooding problems **(from potential mine-pit overflow)** previously described, Excelsior undertook to develop a comprehensive water resource management plan for the West Range Site's Mesaba Generating Station (as discussed in the next section). In doing so, it identified the four sources of water (the CMP, HAMP Complex, LMP, and Prairie River) that would support the full load operation of two phases. The surface elevation for each of the mine pit water resources identified for the West Range Site is lower than that of the Mesaba Generating Station; therefore, conveyance of the process water to the plant would require pumping, also discussed in the next section.

Under Alternative 2, the Mississippi River would be used as a water source for both Phases I and II of the Mesaba Energy Project. A pipeline, approximately 10 miles in length, would be required to pump water from the river to the power plant. This pipeline would require several pump stations, electrical facilities, support structures, and land acquisitions to provide adequate flow for the plant. This alternative would not help resolve the pit flooding issues of CMP and HAMP. For these reasons, Excelsior rejected Alternative 2, because it was determined to be unnecessary and inferior to Alternative 1.

Consideration was also given to supplying process water by drilling a number of groundwater wells and developing those wells (Alternative 3). Excelsior rejected this alternative after review of available information that showed most wells in the area can only likely produce between 200 and 300 gpm. Therefore, this alternative would require the development, operation, and maintenance of up to 50 groundwater wells, pump stations, force mains, electric services, and support structures to provide adequate flow for the Mesaba Generating Station. The geographical breadth of this well field, the effect of the drawdown on other nearby wells, and the connections that would have to be maintained would present insurmountable logistical problems. Alternative 3 also would not address the potential flooding issues at the CMP and HAMP. For these reasons, Excelsior determined that Alternative 3 would be impracticable and inferior to Alternative 1.

Water Resources Management Plan

Under Alternative 1, the preferred alternative, the proposed water supply system for Phases I and II would consist of three mine pits, three pumping stations, and an intake to draw water from the Prairie River. **The Water Management Plan was developed and included in Excelsior's water appropriation permit application, which is available in its Joint Application to the Minnesota Public**

Utilities Commission submitted June 2006. The following provides a brief summary of the Water Management Plan for both phases:

- **Phase I**
  - **CMP pump station would pump water to the IGCC Power Station.**
  - **When the water level in the CMP declines to 1,290 feet, water from the HAMP Complex would be pumped to the CMP via a pump station located in the GMMP.**
- **Phase II**
  - **CMP pump station would pump water to the IGCC Power Station.**
  - **Water from the HAMP Complex would be pumped to the CMP via a pump station located in the GMMP. Existing pumps in the HAMP would likely be used to pump water from the HAMP into the GMMP when water level elevations are lowered to increase inflow rates.**
  - **A pumping station in the LMP would pump water to the CMP. An engineered intake structure would be installed on the Prairie River allowing water to flow by gravity into the LMP.**

Phase I would initially involve pumping of the CMP water to the IGCC Power Station. When the CMP water level were to decline to an elevation of 1,290 feet msl, water from the HAMP Complex would be pumped to the CMP to maintain water levels in the CMP (see Figures 4.5-4 and 4.5-5 for the latest water balance and Figure 2.3-2 for the location of process water pump stations and pipelines). Excess water in the HAMP Complex would be pumped to the Panasa Lakes to maintain the desired water levels in the HAMP, as is the current practice.

For Phase II, additional water from the LMP to the CMP would be pumped to support the water requirements. If necessary, the LMP would be supplemented by the Prairie River when river levels are high, via an engineered intake structure on the Prairie River. Table 4.5-5 (added in Final EIS) summarizes the flow rates to and from the water sources, and the pumping capacities per station are listed in Table 4.5-6 (revised to reflect new water balance).

Table 4.5-5. Flow Rates To/From Water Sources at the West Range Site

Phase	HAMP Complex Flow to CMP (gpm)	Estimated Groundwater Flow to CMP (gpm)	LMP to CMP (gpm)	Prairie River to CMP (gpm)	CMP Flow to Power Plant (gpm)
I	700	2,800	0	0	3,500
I & II	2,000	2,800	2,200	400	7,000

Table added for Final EIS.
gpm – gallons per minute

Table 4.5-6. West Range Pumping Station Capacities

Pump Station Location	Pumping Capacity (gpm)
CMP	14,000
HAMP Complex	5,000
LMP / Prairie River	5,000

Table revised to reflect use of enhanced ZLD system and change in water balance.
gpm – gallons per minute

Each pump station intake would meet the CWA Rule 316(b) requirements for cooling water intake structures**. Proposed operating conditions, including pumping stations, are discussed in greater detail below.**

There are no other competing uses for the water in the CMP and LMP other than aesthetic and recreational uses **(potential conflicts with HAMP are described in subsequent section)**. Use of the water resources by the West Range Mesaba Generating Station in terms of the process water usage and discharges, the Water Appropriation Permit Application, and the NPDES Permit Application (Excelsior, 2006a) would assure that the aesthetic and recreational uses are minimally affected. **Because the hydrological connectivity between the mine pits and nearby water resources are complex and impacts are difficult to analyze at this time, water levels and usage would be monitored during operation of the IGCC Power Station, and Excelsior would continue to refine its water management plan and consult with MNDNR to ensure minimal impacts to water resources.**

Excelsior has stated its need to secure areas of the CMP from potential post-9/11 threats. Though closing of the CMP may not be essential, the project proponent believes that limiting the CMP's recreational use, especially near the intake structure, would protect the security of critical infrastructure elements. However, the proponent recognizes that demands for recreational access to the CMP would affect MNDNR's decision—Excelsior will continue to coordinate with MNDNR to determine whether these security interests and local recreational interests can co-exist. Further discussions will involve identifying additional stakeholders in the decision-making process, formulating post-9/11 security options to protect key infrastructure, and selecting the security option best suited to balance local concerns, water needs, and economic development. In general, the project proponent would work with stakeholders to identify options in providing security measures for the proposed cooling water intake structure and pump house (e.g., establishing a designated exclusion zone within the CMP cordoned off with buoys and posted with "No Entry" signs).

Pumping Stations and Intake Structures

Section 4.5.2.4 discussed implementation of intake structures—Figure 4.5-2a shows the caisson intake option for the CMP; Figure 4.5-2b shows the recommended angle well intake option for the CMP; Figure 4.5-2c shows the floating pump station that would be used at the HAMP and LMP intake structures. An ultra-fine screen (0.25-mm diameter) is proposed to prevent biota transfer between basins at all proposed pumping locations. To ensure compliance with 316(b) requirements, intake flows and velocities were analyzed. Table 4.5-7 (added in Final EIS) provides velocity calculations for the CMP intake, as well as for the HAMP and the LMP intake structures, which would be used to augment CMP water levels.

Table 4.5-7. Through-Screen Velocities for Intake Structures at West Range Site

Intake location	CMP	CMP	LMP	HAMP
Type of intake	Caisson	Angle well	Floating intake	Floating intake
Average annual withdrawal rate (gpm)	7,000	7,000	2,200	2,200
Maximum withdrawal rate (gpm)	10,000	10,000	5,000	5,000
Number of intakes at this location	4	4	2	2
Proposed flow rate per intake (gpm)	3,500	3,500	2,500	2,500
Proposed flow rate per intake (cfs)	7.8	7.8	5.6	5.6
Proposed Screen Diameter	24" pipe sized screen	24" telescoping screen	30" pip sized tee screen	30" pip sized tee screen
Screen slot size	10	10	10	10
Square feet of open area per foot of screen (Johnson Screens literature)	0.42	0.34	0.51	0.51
Minimum screen length needed per intake to limit velocity to <0.5 ft/sec, feet	37	46	22	22
Screen length proposed per intake, feet	40	50	25	25
Actual through screen velocity, ft/sec	0.47	0.46	0.43	0.43

Table added in Final EIS
Source: Barr, 2008b
gpm = gallons per minute, cfs = cubic feet per second

As shown in Table 4.5-7, the proposed screen size and design would result in a maximum through-screen intake velocity of less than 0.5 feet-per-second as required by the applicable regulations. In addition, the regulations require that intake volumes be reduced to a level that can be obtained by a closed-cycle recirculating water system. Because an enhanced ZLD system would be used, the intake volumes for the proposed facility would, by definition, be less than or equal to that which can be obtained by a closed-cycle system. Note that the capacity of each intake is greater than the average annual withdrawal rate in order to provide flexibility for system operation and a factor of safety to the intake design in case a portion of the pumping systems fails, needs repair, or otherwise becomes temporarily out-of-service.

Suppliers of ultra-fine mesh screens for use in cooling water intake structure applications have developed systems to monitor the screens for – and clear them of – accumulated debris and/or organisms that attach to the screen, which could potentially result in localized velocity profiles exceeding the 0.5 feet per second threshold specified under the applicable regulations. Such systems monitor the pressure differential inside the screen versus outside the screen to determine the frequency at which sudden bursts of compressed air are injected inside the screen to clear the outer surface of accumulated material. While this cleaning mechanism is effective, the released burst of air rising rapidly to the surface can result in localized turbulence capable of capsizing small watercraft in the immediate area. To prevent accidents related to such cleaning activities, the area around the intake structure and above the screens would be cordoned off from the public. As previously mentioned, Excelsior will continue to coordinate with MNDNR and stakeholders to identify appropriate security measures without compromising recreational use.

CMP Pumping Station

A series of pumps would provide a pumping capacity between 3,500 gpm and 7,000 gpm for Phase I and between **7,000** gpm and **14,000** gpm for Phases I and II. This capacity would be provided in a permanent pumping station proposed at the southeast corner of the CMP. Process water would be pumped from the CMP directly to the Mesaba Generating Station. Figure 2.3-3 provides the location for the process water pump stations and pipelines. **It is anticipated that withdrawal from the CMP would be restricted if water levels reached the 1,250 feet msl elevation range.**

A standby pump would be incorporated for use during a failure or maintenance of one of the primary pumps. The pump station intake would also meet the Section 316(b) CWA requirements for cooling water intake structures (such requirements are to be addressed as part of the NPDES permitting process). The pipeline that extends from the CMP to the Mesaba Generating Station would be approximately 36 inches in diameter. The length of the pipeline that extends from the CMP to the Mesaba Generating Station would be approximately 11,100 feet.

Following publication of the Draft EIS, MNDNR announced its plans to construct a gravity outflow device from the CMP to the Prairie River that would allow the CMP to be maintained at an MNDNR-determined maximum water level (Scenic Range News Forum, 2009). The proposed outflow would eliminate the need for the Mesaba Energy Project to provide an emergency outfall from the CMP pumping station to Holman Lake as originally discussed in the Draft EIS.

For the Draft EIS, Excelsior originally proposed to preclude transferring smelt larvae from the CMP by withdrawing water at depths greater than 250 feet. However, since publication of the Draft EIS it has been estimated that the amount of oxygen to support smelt larvae is adequate throughout the entire CMP water column (Barr, 2008b; Wenck, 2006). Therefore, use of a 200-foot or deeper intake would not ensure the prevention of smelt transfer. Furthermore, an Alden Research Laboratory analysis indicates that a 0.25-millimeter ultra-fine mesh screen alone would effectively prevent smelt transfer (Alden, 2006).

Therefore, instead of constructing a 200-foot deep caisson intake structure for the CMP, Excelsior proposes to install four angle wells. The wells would be directionally drilled to a depth of approximately 20 feet below the summer thermocline—or approximately 60 feet below the surface of the lowest estimated future water level—using ultra-fine mesh screens, i.e., 0.25- millimeter mesh openings, to prevent any viable stage of smelt from passing through the intake. Recent advances in well drilling technology would allow construction of directionally drilled intake structures in bedrock similar to that found near the CMP (Barr, 2008b). Angle wells would not only be feasible at the CMP, but significantly more cost effective than a caisson installed to the same depth. Figure 4.5-2 illustrates conceptual caisson intake and angle well intake designs that could be used for the CMP.

HAMP Complex and LMP Pumping Stations

A floating pump station would be installed at the GMMP end of the HAMP Complex. This pump station would have a capacity of **5,000** gpm and would direct water into the CMP. A floating intake structure is proposed for these mine pits, as they are conducive to fluctuating water levels and commonly used by mines for pumping systems. This system includes placing pumps and intake structures on a floating platform in the mine pit. A pipe with wedge-wire screen is extended to withdraw water from the desired depth. Sufficient length of screen is provided to ensure that intake velocities are maintained below 0.5 feet per second and to ensure thermal stratification is not negatively disrupted. Flexible supply pipe would be designed to convey water from the floating platform to a permanent conveyance pipeline on land. For the HAMP Complex, the pipeline from the GMMP to the CMP would be approximately 24 inches in diameter and would extend approximately 25,400 feet in length.

A pump station designed in the same manner as the HAMP Complex pumping station with a capacity of **5,000** gpm would be installed in the northeast corner of the LMP, and would direct water to the CMP. The pipeline from the LMP to the CMP would be approximately 24 inches in diameter with a length of 11,300 feet.

Pumping at the GMMP and LMP is expected to occur on a seasonal basis (i.e., no winter pumping). Pumping capacity at the HAMP Complex and the LMP**, under such circumstances,** must allow for the capture of the 12-month average annual water supply on a seasonal basis.

Prairie River Intake

The mean annual flow in the Prairie River is 319 cubic feet per second (cfs), and 5 percent of that flow is equal to 16 cfs. The 7Q10 in the Prairie River was determined to be 22 cfs, and 25 percent of that flow is equal to 5.5 cfs. Since 25 percent of the 7Q10 is the smaller amount, the maximum rate at which water can be appropriated from the Prairie River at one time is 2,468 gpm (5.5 cfs).

An engineered intake structure capable of accepting a maximum rate of 2,470 gpm from the Prairie River would be installed in the river and would direct water into the LMP for storage. This engineered intake structure would allow water to flow by gravity only when the water levels in the river rise to a predetermined level during a high water event. During such events, the water would flow over the top of a concrete structure (weir) located in the river and through a wedge wire screen. The screen would be oriented so that the river flow runs parallel to the wedge wires, allowing the screens to be self cleaning. In addition, the structure would be equipped with a flow control valve that would limit intake velocities to 0.5 feet per second or less, minimizing impingement. **The level in the LMP would be maintained at a low enough level to allow for gravity feed of the flow from the Prairie River. The gravity-flow intake would be located at a point downstream of the Prairie Lake Hydropower Facility to avoid impacts to power production at the hydropower facility.**

Pipeline Infrastructure

Routing for the pipelines would be primarily on public property adjacent to existing transportation corridors. Figures showing the entire length of each segment of pipeline are attached as Appendix B of the project proponent's Water Appropriation Permit Application included in the Joint Application (Excelsior, 2006a). **Since publication of the Draft EIS, Excelsior developed Access Road 3 as the preferred road alternative in response to concerns raised by USACE and other agencies about the need to avoid and minimize wetland impacts identified in the Draft EIS. Thus, pipelines associated with proposed process water (Segment 2), potable water, and sanitary sewer pipelines originally shown routed along the proposed realignment of CR7 and Access Road 1 have been revised to follow the new Access Road 3 alignment (see Figure 2.3-2).**

Stormwater Retention and Use

Stormwater estimates indicate that approximately 30.8 acre-feet of runoff for Phase I and 33.6 acre-feet of runoff for Phase II would occur (see Appendix H2). Runoff from precipitation would be collected in a surge and equalization pond to be recovered and recycled within the proposed IGCC Power Station footprint. Preliminary design estimates indicate that a pond capacity of 35 acre-feet would be required. This capacity is conservative, as it is more than adequate to accommodate a 24-hr, 100-yr storm event coinciding with a plant outage. During normal plant operation, capacity requirements would be reduced by the cooling towers' ability to work off accumulated runoff. The collected runoff would be pumped to the cooling tower basins as makeup water over time or, should it require treatment, be directed into the ZLD system. The water would be transferred from the surge and equalization pond to the cooling towers via pump(s).

Water Levels and Water Balance During Operations

[Text in the Draft EIS regarding discharges of cooling water blowdown has been deleted.]Within the context of the permitting process, Excelsior would create a monitoring plan to record levels within the mine pits from which water supplies for the Mesaba Generating Station would be derived and the pumping rates at which waters would be transferred.

Canisteo Mine Pit

The operation of Phases I and II and their impacts on water levels in the CMP have been modeled by Excelsior (Excelsior, 2006a). Modeling results indicate that water levels in the CMP could fluctuate up to 2 feet during a year with average rainfall. Under drought conditions, water levels in the CMP could

fluctuate up to 6 feet. Based on the model runs conducted, Excelsior is proposing to operate the CMP within an operating range of 1,260 to 1,290 feet msl during normal weather conditions. Under extreme drought conditions, Excelsior would operate the CMP in the 1,250 to 1,260 feet msl range. Excelsior proposes to operate within the 1,290- to 1,300-foot msl range during extremely wet periods. **[Text regarding an outfall to Holman Lake has been deleted.]**

The CMP contains some land bridges that are below a water surface elevation of approximately 1,260 feet msl. Under conditions of extreme drought, Phases I and II could potentially reduce water levels within the CMP to a point where land bridges that could isolate one part of the CMP from another begin to appear. This would occur in the event of: (1) the absence of any precipitation input into the pit about 5 years in duration; and (2) peak power production from Phases I and II over the entire period. Exposing the land bridges within the CMP would have limited effects on the water capacity and would not occur over long periods of time. However, it is expected that these conditions are not likely to occur. The water surface elevation of the pit would be 1,290 ± 2 feet msl during a typical year. Water from the other pits would help to augment water levels in the CMP, and should help to prevent significant water level changes. **Because water level variations in the CMP would normally be expected to occur very slowly, biological impacts are expected to be minor (see new text in Section 4.8.2.2 regarding potential impacts on lake trout reproduction).**

Currently, water levels in the CMP are rising and, in time, can be expected to overflow **(Business North, 2007)**. **According to the Water Management Plan, water levels in the CMP would be maintained at approximately 1,290 ft msl, which would alleviate the risk of localized flooding from overflowing pit levels (lowest pit wall altitude is 1,324 ft [Jones, 2002]). DOE acknowledges that higher water levels do not constitute the likelihood of pit wall destabilization and agrees with MNDNR that, without additional stabilization measures, some bank erosion would occur at the proposed operation levels due to natural processes, such as direct precipitation and freeze-thaw cycles on the pit walls (PHE, 2008). However, stabilization of the rail line is not within the scope of this EIS. CN Railway owns the rail line along the part of the bank in closest proximity to the track and would be responsible for restoring the rail to service. CN would determine the specific stabilization method in the event the Mesaba Energy Project is constructed on the West Range Site. In general, the method would depend on the water level at the time of bank stabilization and the erosion that occurs in the interim, and could involve riprap or construction of a retaining wall to stabilize the bank at an angle steeper than natural repose, as well as the use of fill material to restore the eroded bank.**

Summer thermal stratification profiles of the CMP were obtained from MNDNR and are shown in Figure 4.5-5 (added in Final EIS). The data indicates a rapid drop in temperature between 5 and 20 meters below the water surface.

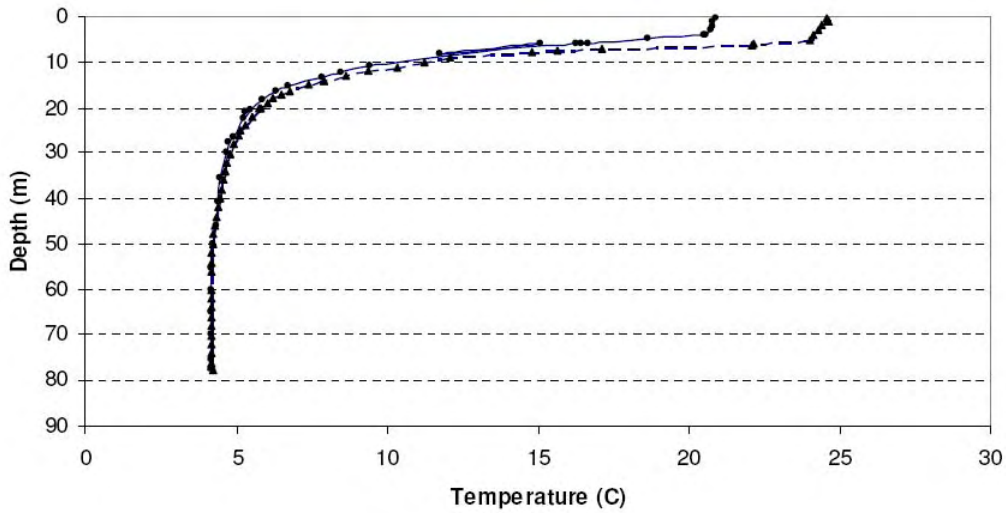

Figure 4.5-5. Temperature Profiles for the Canisteo Mine Pit Using 2006 Data (Barr, 2008b)

Similar lakes in the area with large outlets remain stratified throughout the summer despite having natural outlets (Barr, 2006b). Thermal de-stratification in the CMP is even more unlikely because of its large water volume. Therefore, thermal de-stratification is not expected unless cool water were discharged from the plant onto warmer upper-layer waters. In this case, there would be no thermal discharge from the proposed facility with the implementation of the enhanced ZLD system at the West Range Site. In general, adverse water quality and quantity impacts to the CMP during Phases I and II are considered to be minor. Most of the 3,500 gpm annual evaporative loss associated with Phase I is expected to come from the CMP, which is a mine pit currently with zero to minimal outflow and has not contributed to any overflow to surface waters in nearby subwatersheds since 1985 (i.e., more than twenty years). Thus, the impact of evaporative losses from the CMP to the subwatershed is considered negligible. Annual average evaporative losses of the Mesaba Generating Station would be approximately 7,000 gpm total for the combined Mesaba Phase I and Phase II. Based on estimates provided below, it is expected that this loss would be minor when compared to the existing flows of downstream waterways. Water loss in the CMP from evaporation could have adverse impacts to fish populations and recreational use; however, such impacts are expected to be minor as the water management plan is designed to maintain a stable water level at approximately 1,290 ft under normal operating conditions.

Holman Lake

With implementation of an enhanced ZLD system, the discharge outfall to Holman Lake is no longer required for normal plant operations. Also, MNDNR plans to construct a gravity outflow device from the CMP to the Prairie River that would allow the CMP to be maintained at a water level of approximately 1,313 ft msl (Scenic Range News Forum, 2009). The proposed outflow would eliminate the need for the Mesaba Energy Project to provide an emergency outfall from the CMP pumping station to Holman Lake as originally discussed in the Draft EIS.

Findings from a USGS study conducted in 2002 show that when the CMP's water level is at 1,310 ft (around current levels), approximately 0.01 cfs of groundwater from the CMP outflows to Holman Lake (Jones, 2002). Findings also indicate that groundwater inflow to the CMP is greater when the pit water levels are lower and that at CMP water levels of 1,300 ft or less, no outflow from the CMP to Holman Lake occurs. Additionally, at the time when dewatering activities ended (1985), CMP water levels were at least 300 feet lower than current elevations without any known

significant impacts to Holman Lake. Thus, it is assumed that the proposed operating water levels for the Mesaba Generating Station (i.e., 1,290 ± 2 feet msl during a typical year), could be maintained with minor impacts to Holman Lake.

Trout Lake

The project proponent expects to maintain water levels in the CMP at 1,290 ± 2 feet msl. Therefore, because Trout Lake has a water elevation of approximately 1,288 feet msl (MNDNR, 2009), it is anticipated that there would be minimal impact on Trout Lake water levels under this scenario. In the unlikely circumstance in which no recharge of the CMP would occur over a 5-year period (i.e., drought conditions extend to 5 years), water levels in the CMP could drop to 1,260 feet msl. However, although CMP levels have risen dramatically since cessation of mining activity (from 1,250 feet in 1989 to over 1,310 feet at present), a review of MNDNR records indicate that there has been no discernible impact on Trout Lake water levels, which have remained fairly constant (between 1,287 and 1,289 feet) over the same time period (MNDNR, 2009). Therefore, it is expected that CMP water withdrawal during Mesaba Phases I and II would have minor impacts on Trout Lake water levels.

HAMP Complex, Upper and Lower Panasa Lakes, and Swan River

Initially for Phase I, water would only be pumped from the CMP until the water level is drawn down to 1,290 ft msl (the normal operating level). When the water level in the CMP reaches this elevation, pumping from the HAMP Complex (i.e., GMMP) to the CMP would begin. The addition of an enhanced ZLD system has reduced water demand and changed the water balance for the West Range Site. The average amount of water required from the HAMP Complex has been reduced from 3,500 gpm (as stated in the Draft EIS) to approximately 2,000 gpm for the combined Phases I and II. It is estimated that the GMMP and HAMP are hydrologically connected within the planned operating levels and that this rate of appropriation would be sustainable at current pit levels (additional hydrologic modeling and consultation by Excelsior with MNDNR would be conducted during the water appropriation permitting process to confirm these estimates).

The existing pumping system at the HAMP Complex (including the GMMP, Arcturus Mine Pit, and HAMP) would be maintained to allow pumping to its current permitted discharge point to Upper Lake Panasa and, if necessary, may be modified to pump water into the GMMP. The GMMP would typically be operated in the range of 1,220 to 1,230 feet msl. Excelsior and/or the MNDNR, through an approved mechanism derived during the permitting process, would have the capability to operate the existing pump in the HAMP to manage water levels in the complex during wet periods.

Water has been seasonally pumped out of the HAMP Complex to keep features of past mining operations from being flooded and thereby interfering with State Park tours. **MNDNR has pumped excess water from the HAMP at a rate of up to 6,200 gpm for about half of each year (spring to autumn) to prevent the historical mining infrastructure associated with Hill-Annex State Park from being flooded (MSI, 2008). Table 4.5-8 (added in Final EIS) lists the average annual discharge rates from the HAMP to the Panasa Lakes, as recorded by MNDNR. The average discharge between the years 2003 and 2006 (2,500 gpm) was needed to maintain the HAMP at the desired level.**

Table 4.5-8. Average Annual Discharge to Panasa Lakes

Year	Average Discharge (gpm)[1]	Approximate Elevation (ft)
1999	150	1,230.7[2]
2000	0	N/A
2001	0	N/A
2002	1,200	1,257.1[2]
2003	2,900	N/A
2004	2,600	N/A
2005	2,200	1,247[3]
2006	2,300	N/A

Table added in Final EIS;
N/A – Not Available
Sources: [1]MSI, 2008; [2]MNDNR, 2009; and [3]Excelsior, 2006

Water is pumped from the HAMP into the Panasa Lakes under an NPDES permit, where historically it was considered to have beneficial impacts by mitigating the effects of sewage effluent from the cities of Marble and Calumet. However, operation of a new wastewater treatment plant has mitigated these effects and it is assumed that the pumping of the HAMP, from a water quality standpoint, is not as beneficial to the Panasa Lakes as it may have been prior to construction of the new wastewater facility (MSI, 2008). As shown in Table 4.5-8, discharge rates from the HAMP during the years 1999 and 2002 were near zero or low without any complaints to MNDNR or MPCA regarding water quality in the Panasa Lakes (no water quality data available). Therefore, it is expected that if the HAMP discharge were eliminated from the Panasa Lakes, minor impacts to water quality the HAMP Complex and Panasa Lakes would occur.

As previously mentioned, because the GMMP and HAMP are hydrologically connected within the planned operating levels (the currently submerged land bridge elevation between GMMP and HAMP is approximately 1,215 ft (Excelsior, 2006), it is expected that 2,000 gpm would be available at the proposed pumping location (i.e., GMMP of the HAMP Complex). Minnesota Steel, a neighboring industrial user, has identified a potential need for 1,200 gpm for water augmentation during the later stages of its operations. Significantly higher flows are believed to be available if the water level in the HAMP is reduced below the now-submerged land bridge located between the GMMP and the HAMP. **Thus, the HAMP Complex could meet the needs of both facilities if water levels were maintained at lower elevations. At lower water levels, land bridges would be exposed, which would require pipelines or pumping between pits in the HAMP Complex to balance water levels.** Discussions would be required between Excelsior and the MNDNR to determine whether operation at greatly reduced water levels in the HAMP is advisable and, if so, under what conditions such operation would be desirable.

The Swan River would be impacted to the extent that instead of pumping water out of the HAMP to Upper Panasa Lake (Upper Panasa Lake discharges to Lower Panasa Lake and ultimately into the Swan River), which is MNDNR's current practice, water would be pumped to the CMP during Phases I and II. Based on USGS data during the period 1965-1990, the average flow of the Swan River was 29,000 gpm USGS, 2009). The average and peak pumping rates (2,000 and 5,000 gpm) that would occur during Phases I and II respectively represent 7 and 18 percent of the Swan River average flow. Note that significant mining has taken place within the watershed during the period of record, which could have commensurately caused unnaturally high or low flows to be measured in the river as a result of dewatering and stream augmentation practices conducted. Additionally, smaller quantities of water would likely be diverted from the HAMP

Complex if the CMP yields more water than estimated or if above-normal precipitation occurs. Thus, minor to moderate impacts to augmentation of the Swan River are expected. Updated discussions on the cumulative impacts to the Swan River watershed are included in Section 5.2.4.

Because of the complexities of analyzing water use impacts, water appropriation priorities cannot be confirmed at this time; however, the project proponent will participate in ongoing discussions with MNDNR and other stakeholders, including Minnesota Steel, to ensure that water use conflicts are resolved and impacts to water resources are minimized. Monitoring of water levels would occur during both phases and Excelsior would continue to refine its Water Management Plan and continue consultation with MNDNR to ensure limited impacts. Discussions would be required with MNDNR to understand the planning and operational priorities and under what operating conditions would be allowed for the Mesaba Energy Project. Use of the HAMP would be dependent upon the needs of the MNDNR to control mine pit water levels.

Lind Mine Pit and Prairie River

For Phase II, the LMP and the Prairie River (if required) would supplement the water supply. The LMP would be operated in the range of 1,190 to 1,250 feet msl during a typical year. The operating range in the LMP would allow for storage of water during non-pumping periods. Pumping would be unlikely to occur during the winter or if there is equipment failure or system maintenance needs. **Water usage and levels in the mine pits would be monitored in order to evaluate any immediate needs for temporary or emergency pumping and to minimize environmental impacts. Annual average evaporative losses would be 7,000 gpm total for Phases I and II. The LMP's annual average discharge to the Prairie River was estimated to be 1,800 gpm based on single flow measurements in summer and winter. Under a worst-case scenario, this annual discharge from the LMP to the Prairie River would not occur. The mean annual flow of the Prairie River at the Prairie Lake Dam is approximately 143,200 gpm (or approximately 319 cfs) based on data from Minnesota Power (1998-2004). Thus, the elimination of the LMP's discharge to the Prairie River represents 1.3 percent of the mean annual flow of the river. A worst-case analysis assumes that the annual average discharge from the LMP would be withdrawn at the time of low flow (represented by the 7Q10 flow). The 7Q10 flow in the Prairie River is estimated to be 9,870 gpm (or 22 cfs) based on Minnesota Power data. Under these circumstances, the river's normal low flow at that point of measurement would be reduced by approximately 18 percent. If necessary to protect river flows during such low flow events, the project proponent would curtail direct appropriations from the Prairie River and instead withdraw from stored capacity in other mine pits.**

Some loss of groundwater recharge to the Prairie River could also occur over the 3,000-foot distance the LMP and the Prairie River share in immediate proximity. However, such loss of recharge is expected to be minimal given that the Greenway Mine Pit is located on the river's opposite bank and shares close proximity for approximately 3,400 feet. This shared boundary with the Prairie River begins about 900 feet south of the northern 'shore' of the LMP. The difference in elevation between the Greenway Mine Pit (at an elevation of about 1,260 feet msl) and the Prairie River (at an elevation of about 1,257 feet msl) is such that any lowering of the Prairie River due to loss of recharge from the LMP would be expected to be mostly offset by the movement of groundwater from the Greenway Mine Pit to the Prairie River.

4.5.3.2 Process Water Discharges and Water Quality Criteria

With implementation of an enhanced ZLD system at the West Range Site (announced after publication of the Draft EIS), there would be no process and blowdown water discharges to any water bodies. Additionally, stormwater discharges (within a 24-hour, 100-year storm event) would be eliminated, as stormwater would be treated and reused within the plant, primarily for cooling water. As a result, proposed Outfalls 001 and 002 and much of the water quality concerns at the West Range Site as originally discussed in the Draft EIS are no longer relevant. Because of the

enhanced ZLD system, the original scope of the NPDES/SDS permit for the West Range Site has been reduced and Excelsior has revised its permit application for approval by MPCA, the agency responsible for the state's stormwater program. This section was revised to reflect the use of an enhanced ZLD system and the elimination of discharged pollutants. Water would be pumped into the CMP from various sources to offset water appropriation, which would increase phosphorus levels in the CMP. An updated phosphorus analysis for the West Range Site was added to this section.

The expected average annual flow rate and proposed permitted peak flow rate for each outfall for Phase I and II operations are summarized in Table 4.5-9 **(revised to reflect use of enhanced ZLD system and new water balance)**. The proposed peak discharge rates are typically based on modeled peak rates plus some additional capacity to provide operational flexibility.

Table 4.5-9. Discharge Flow Rates, West Range Site

	Phase I		Phases I & II	
	Average (gpm/MGD)	Peak (gpm/MGD)	Average (gpm/MGD)	Peak (gpm/MGD)
From HAMP to CMP (003)	2,000/2.9	**5,000/5.0**	**2,000/2.9**	**5,000/5.0**
From LMP to CMP (004)	0	0	**2,200/3.2**	**5,000/5.0**

Table has been revised to reflect use of enhanced ZLD system. Note, estimates regarding industrial discharges to receiving waters has been deleted.

[Text in the Draft EIS regarding industrial discharges to receiving waters and associated water quality impacts has been deleted.]

Water quality modeling for phosphorus concentrations was conducted based on the updated water balance (see Table 4.5-5 and Figures 4.5-2 and 4.5-3) and existing phosphorous levels (see Table 4.5-10 below – added in Final EIS) to analyze impacts to water quality in the CMP. As previously mentioned, water from three sources – the HAMP, the LMP, and the Prairie River – would be pumped into the CMP to offset pumping to the proposed facility.

Table 4.5-10. Current Phosphorus Levels, West Range Site

Water Body	Average (mg/L)	Maximum (mg/L)	Minimum (mg/L)	Samples (mg/L)
Canisteo Pit[1]	0.004	0.004	0.003	3
Lind Mine Pit[2]	0.004	0.004	0.003	3
Hill Annex Pit[1]	0.004	0.006	0.003	3
Prairie River[3]	0.036	0.055	0.021	41
Canisteo Groundwater[2]	0.004	0.004	0.003	3

Table added in Final EIS.
[1] ERA Laboratories Report, 12/6/2006
[2] Assumed equal to the current Canisteo Mine Pit water quality.
[3] MPCA Lake Station ID 31-0384 for Prairie Lake, 1981-2006 - (Barr, 2008a and Excelsior, 2009a)

The water quality modeling was based on a mass balance for the CMP assuming that the CMP is well mixed (a conservative assumption as the mine pit is more than 100 feet deep). Pumping rates used to model phosphorus levels in the CMP generally followed the rates presented in Table 4.5-5; however, for conservatism, the phosphorus modeling assumed that the Prairie River would flow directly into the CMP and a pumping rate of 1,800 gpm from the LMP to the CMP under the combined phase was used (representing groundwater inflow into the LMP) instead of the 2,200

gpm shown in Table 4.5-5. Modeling the Prairie River – which has the highest existing phosphorus concentrations compared to the other sources as shown in Table 4.5-10 – water as though it flows directly into the CMP results in more conservative phosphorus levels as dilution in the LMP would slow the mass transfer of phosphorus into the CMP.

The modeling predicted that at the end of the 30-year project life the concentration of phosphorous would increase from 0.0037 mg/L to 0.0057 mg/L (an increase of 0.002 mg/L [or 54 percent]). This increase appears to be significant because existing levels of phosphorous in the CMP are very low; however, this predicted concentration is still well below the state's standard of 1 mg/L and is expected to have minimal impact to biota in the CMP. Although the CMP is not recognized as a natural trout lake, a self-sustaining population of lake trout has been established as described in Section 3.8. Hence, the predicted concentration would still be below the strictest water quality standard for such a lake in northern Minnesota (i.e., 0.012 mg/L for natural trout lakes).

Assuming worst-case operating conditions where appropriation from the Prairie River would near the statutory maximum appropriation (approximately 2,500 gpm) and no water would be appropriated from the HAMP Complex, phosphorus concentrations within the CMP could surpass 0.012 mg/L after 20 years and approach 0.014 mg/L at 30 years of operation. Under these extreme circumstances, the maximum phosphorus levels would be slightly higher than the 0.012 mg/L standard (which is not applicable to CMP). If necessary, as a condition of a water appropriations permit, the proponent could restrict its appropriation of water from the Prairie River to ensure that the average concentration of phosphorus in the CMP would not exceed the standard of 0.012 mg/L. Furthermore, the findings of this analysis are assumed to be conservative, as it is based on the minimum average annual recharge rates assumed for the HAMP and CMP – likely recharge rates are assumed to be higher. If actual recharge rates are closer to the likely rates, appropriation of water from the Prairie River would not be required and phosphorus concentrations would not increase to levels as predicted by the modeling.

4.5.3.3 Domestic Wastewater Treatment

On average, approximately 30,000 gpd of domestic wastewater would be generated during the construction of the proposed Mesaba Generating Station and about 4,500 gpd would be generated from the operational staff at the Mesaba Generating Station. For planning purposes, the daily flows were increased to account for additional non-construction/non-operational persons at the station to 45,000 gpd during construction and 7,500 gpd during operation of the power station. The domestic wastewater would contain 200 to 250 mg/L BOD, 220 to 270 mg/L TSS and 6 to 8 mg/L total phosphorous (TP). During construction the projected daily flow of wastewater would be generated over a period of 10 to 14 hours.

Excelsior has evaluated two options for treating and disposing domestic wastewater produced during construction and operation for both Phases I and II. The first option involves constructing a WWTF to treat domestic wastewater on site. The second option, preferred by Excelsior, would involve connecting to the CBT WWTF at the Taconite pump station located approximately 2 miles south of the West Range Mesaba Generating Station.

Domestic Wastewater Alternative No. 1

The first alternative would consist of constructing a stabilization pond adjacent to and southwest of the Mesaba Generating Station WWTF with the capacity to treat 45,000 gallons of domestic wastewater per day (the maximum projected flow from Phases I and II). Once the Phase I Mesaba Generating Station is placed into operation, the WWTF would receive a maximum of 7,500 gallons of domestic wastewater per day due to the reduced staff required to operate the station relative to that required to construct it. Due to the decrease in domestic wastewater flow, part of the WWTF would be closed and abandoned in accordance with Minnesota Rules. Other modifications would be made to the WWTF at this time to link it to the Mesaba Generating Station's domestic wastewater collection system.

Once treated, effluent from the WWTF would be routed off site through an 8-inch diameter gravity sewer pipeline to Little Diamond Lake (located approximately 1.4 miles south-southeast of the Mesaba Generating Station). **[Text in the Draft EIS relating to the discharge of treated effluent via the blowdown outfalls to CMP and Holman Lake was deleted based on the use of an enhanced ZLD at the West Range Site that would eliminate the outfalls discussed in the Draft EIS.]** Alternative 1 would require a construction ROW 50 feet wide and a permanent ROW 30 feet wide resulting in a total impact of approximately 10 acres and 6 acres, respectively.

The MPCA's preliminary discharge limits for Little Diamond Lake are 25 mg/L BOD, 45 mg/L TSS, and 1 mg/L TP (see Minnesota Rule 7055.0211 Subparts 1, 3B, and 1a, respectively). The stabilization pond facility would be able to meet the BOD and TSS limits. However, to meet the limit for phosphorus, some chemical addition would be required before the effluent is discharged from the WWTF. To remove phosphorus, either ferric chloride or alum would be applied to the pond prior to discharging treated wastewaters. Alternative 1 would require a part-time licensed operator on-site to monitor discharges and assure that the WWTF meets the monitoring and discharge requirements specified in the NPDES permit.

Excelsior would be required to obtain a new NPDES permit to discharge treated domestic wastewaters to Little Diamond Lake. Although treatment to reduce phosphorus levels is available, present uncertainties associated with concerns over new or expanded discharges to waters impaired for phosphorus and DO make this alternative less likely of being approved without controversy. Treated wastewater effluent from the Mesaba Generating Station that would be discharged to Little Diamond Lake could increase the level of these nutrients and cause algae and other aquatic plant growth. Domestic wastewater discharged to Little Diamond Lake (part of the Swan River watershed), also would be subject to the water quality standards for DO and mercury for Swan River (as provided in Table 4.5-11).

Table 4.5-11. Water Quality Criteria Standards for the Swan River

Parameter	Class 2B	Comments
Dissolved Oxygen	5.0 mg/L as a daily minimum	Class 2B standard may be modified on a site-specific basis except that no site-specific standard shall be less than 5 mg/l as a daily average and 4 mg/l as a daily minimum.
Mercury	0.0069 µg/L	Class 2B standard shown is a chronic standard that is far more stringent than either the maximum standard or the final acute value
Applicable Water Quality Standard	Minn. R. 7050.0222 Subp.4	

Swan River

Every 2 years, the CWA requires states to publish an updated list of streams and lakes that are not meeting standards for their designated uses because of excess pollutants. The list, known as the 303(d) list, is based on whether or not the water body meets standards for its designated use. For Minnesota, the MPCA develops the list and submits it to EPA for approval. The most recent draft of the state's list of impaired waters (MPCA, 2006e) indicates that the entire length of the Swan River from Swan Lake to the Mississippi River is listed as impaired for DO and mercury. NPDES permit applications for new or expanded dischargers requesting to use the Swan River as a receiving water must prove their discharges would not cause or contribute to the impaired status under the CWA or the MPCA's Phosphorus Strategy (Minnesota Rule 7050.0211 Subpart 1a).

While there is currently no water quality standard for phosphorus, the MPCA has a current practice of limiting such discharges to 1.0 mg/L at the end-of-the-pipe. In practice, however, a discharger able to meet this limit may still be prohibited by the MPCA from obtaining a permit if the Agency has reason to

believe that measurable quantities of phosphorus would be released upstream of a receiving water impaired for DO. The proponents have taken care to avoid the use of phosphorus-containing chemicals to minimize the impact of the Agency's current practice in this regard.

Domestic Wastewater Alternative 2

The second option available to dispose of domestic wastewaters produced by the Mesaba Generating Station would be to connect the Station to the CBT wastewater collection and treatment system. The cities of Taconite, Bovey, and Coleraine have a joint wastewater commission that manages the POTW located in Coleraine, approximately 4 miles southwest of the West Range power plant footprint. The POTW receives wastewater from the three cities and discharges treated effluent to the Swan River. The system has a design capacity of 499,000 gpd and had an average flow of 334,000 gpd during the period from January 1 through May 31, 2005. During the wettest 30-day period, the average flow reached 444,000 gpd, with a peak day of 969,000 gpd. During the wettest period of the year, and under peak construction activities, the Coleraine POTW would be operating at its peak design capacity. **[Discussion in the Draft EIS at this point relating to the effects of wet weather flows in the sewer system has been relocated under Domestic Waster Impacts, below.]**

The CBT WWTF has a capacity available to treat the maximum projected wastewater flow of 30,000 gpd during construction and the 7,500 gpd expected from the operation of Phases I and II that has been projected for the project. The 12-inch sewer pipeline, pump station, and force main would also have ample capacity for these flow rates.

Besides the 12-inch gravity sewer pipeline (approximately 10,000 feet in length), a pump station, and 2,400-foot force main from the West Range IGCC power station would be constructed to convey wastewater to the City of Taconite's main pump station, located in the northeast corner of the city. Domestic Wastewater Alternative 2 would require a construction ROW 50 feet wide and a permanent ROW 30 feet wide resulting in a total impact of approximately 14 acres and 8 acres, respectively. Figure 3.5-1 illustrates the route for the domestic wastewater sewer system to connect to the City of Taconite's system.

Alternative 2 holds several advantages over Alternative 1, the on-site treatment option. First, the gravity sewer system that would be constructed for Alternative 2 would be an asset to the City of Taconite, would utilize the existing capacity of the WWTF and would generate some income for the operation of the WWTF. This sewer system would allow future connections to other residential, commercial or industrial establishments north and east of the City. Also, Excelsior would not be required to hire an operator to monitor the system, and potential concerns surrounding the addition of a new outfall discharging effluent from a domestic wastewater treatment system to public waters impaired for DO and nutrients would be avoided. Therefore, Alternative 2 is **Excelsior's preferred** approach.

Domestic Wastewater Impacts

There would be little net effect from the domestic wastewater discharged from the Mesaba Generating Station. The domestic wastewater would be conveyed to the CBT WWTF, treated at the facility and discharged under the facility's current NPDES permit. The NPDES permit was issued by MPCA and the limits therein were set to protect the Swan River water quality.

One issue concerning Taconite's collection system is the amount of I/I entering the system during periods of rainfall or high groundwater. At such times, excess flow can exceed the capacity of the main wastewater pump station in Taconite, creating a need to bypass untreated wastewater into a wetland upstream of the Swan River. Also, the CBT collection system just north of Trout Lake can become overwhelmed by incoming wastewater during wet weather conditions. At such times, overflow pumps are activated to transfer untreated wastewater into an adjacent holding tank. If the tank's capacity is exceeded, untreated wastewater can overflow into Trout Lake.

Therefore, in its commitment on January 21, 2008, Excelsior agreed to make significant capital improvements to the CBT WWTF when construction commences on the Mesaba Energy Project and to address excessive I/I rates exhibited by the Taconite collection system during periods of high rainfall or high groundwater. Excelsior proposes to help address this concern by expanding I/I studies for Taconite, helping fund efforts to fix major problems, and/or expanding the capacity of the overflow tank.

Also, although the CBT WWTF is equipped for addition of alum to flocculate dissolved phosphorus entering the system, no such additions are currently in practice. Excelsior proposes to fund the addition of such flocculants for as long as the Mesaba Project is operative and the disposal of the biosolids collected. This would significantly reduce phosphorus loading to the Swan River from the CBT WWTF. Finally, Excelsior proposes to fund studies to determine whether sand filters would be effective for reducing mercury concentrations in the CBT WWTF effluent.

4.5.3.4 Surface Water Resource Permits

For the West Range Site, construction, withdrawal, and discharges to surface water resources are protected and monitored by a series of existing and proposed permits. All new permits would contain conditions required to balance competing uses of water resources. The principal permits to be issued for such purposes are discussed below.

Existing Permits

The MNDNR currently holds a Water Appropriations Permit (Permit #042088) and a MPCA NPDES/SDS Permit (Permit #MN00 30198) for the withdrawal and discharge of water for the existing Hill Annex State Park dewatering operation. The ongoing data collection and cooperative study of the mine pit by Excelsior and the MNDNR would be covered under the existing permits.

The HAMP Complex is currently dewatered each year from the end of May to October (5.5 months per year). The withdrawal is permitted under a MNDNR Water Appropriation Permit and the discharge is permitted under a MPCA NPDES/SDS Permit. These permits are currently held by the MNDNR Parks and Recreation Division. An annual Water Use report is completed as required by the MNDNR Water Appropriation Permit. Water quality sampling for TSS and pH is completed and submitted to the MPCA along with water usage volumes on a monthly basis as stipulated in the NPDES/SDS Permit.

The MPCA NPDES/SDS Permit stipulates that the TSS average should be no more than 30 mg/L with a 60-mg/L instantaneous maximum. The Discharge Monitoring Reports indicate that the TSS level is typically less than 1 mg/L. The permit also stipulates that the pH be in the range of 6 to 9. The monitoring reports indicate that the discharge consistently is within the limits required by the MPCA NPDES/SDS permit.

Water pumped from the HAMP Complex flows overland through a series of wetlands and small streams and ultimately discharges into Upper Panasa Lake. The CMP does not currently have an outlet to surface waters.

New Permits

Different types of water-related permits would be required to construct and/or operate the West Range generating station and its associated facilities. This section identifies the types of permits that would be required and introduces the process that would be completed to obtain them. The permits that are issued would be premised on minimizing water-related impacts associated with the construction and operation of Phase I and Phase II. **[Text regarding industrial wastewater discharges, proposed outfalls, surface water quality standards, and impaired waters has been deleted as a result of Excelsior's proposed use of an enhanced ZLD system following publication of the Draft EIS.]**

MNDNR Water Appropriation Permit

An MNDNR Water Appropriation Permit for Non-Irrigation (FORM #A-02623-06) is required for appropriations from the CMP, HAMP, LMP, and the Prairie River. A separate permit application would be submitted for each water source with a request that one permit be issued for appropriation from all such sources. An annual Water Use Report is required by the MNDNR for all Water Appropriations Permits.

MNDNR Public Waters Work Permit

An MNDNR Public Waters Work Permit (FORM #NA-026620-03B) would be required for temporary and permanent impacts to public waters. An MNDNR Public Waters Work Permit would be required for work that takes place in any of the identified public waters. For stream crossings (see Section 4.5.3.5), the MNDNR must review and approve any proposed hydraulic changes to the stream.

The following proposed activities would require coverage under an MNDNR Public Waters Work Permit:

- Gas line crossing of the Swan River (2 locations)
- HVTL crossing of the Swan River (2 locations)
- HVTL crossing of the Lower Panasa Lake Outlet
- HVTL crossing of Snowball Creek
- HVTL crossing of Oxhide Creek
- HVTL crossing of Oxhide Lake
- HVTL crossing of Big Diamond Lake Outlet
- Process water orifice at the Prairie River

More detailed discussions of these water crossings are provided in Section 4.5.3.5.

The CMP and the HAMP are Waters of the State, but are not classified by the MNDNR as Public Waters. Since they are not Public Waters, an MNDNR Public Waters Work Permit would not be required for work within these water bodies.

MPCA NPDES/SDS Permit for Cooling Tower Blowdown

Excelsior has revised its NPDES/SDS permit application in light of the planned implementation of an enhanced ZLD system for eliminating process water and cooling tower blowdown discharges. The MPCA may set effluent limits at or below expected parameter concentrations during the NPDES/SDS permitting process. No residents live on the CMP or Holman Lake, so slight changes in water levels are not expected to be an issue; however, the recreational use of the CMP may be **affected as described in text added to Section 4.5.3.1 under Water Resources Management Plan.**

Cooling Water Intake Structures (Clean Water Act § 316(b))

See Sections 4.5.2.4 and 4.5.3.1 for a discussion of Cooling Water Intake Structure rules applicable to Phases I and II.

Construction Stormwater Permitting

As discussed in Section 4.5.2.5, an NPDES Construction Permit would be required for stormwater discharges associated with construction activity. A SWPPP would be required to address erosion and sediment control during and after construction for each NPDES permit. The SWPPP would address erosion prevention measures, sediment control measures, permanent stormwater management, dewatering, environmental inspection and maintenance, and final stabilization.

4.5.3.5 Utility and Transportation Water Crossings

Lakes and streams near the West Range Site are described in Section 3.5. Utility crossings over, under, or through water bodies listed as protected waters on the MNDNR PWI would require Licenses for Utility Crossings of Public Lands and Waters under Minn. Stat. § 84.415 and Minnesota Rules Chapter 6135. There are no water crossings associated with siting, placement, or construction of the Mesaba Generating Station footprint or on buffer land, the railroad alternatives, sewer and water line, and roads. The following subsections describe the water crossings within the HVTLs, gas pipelines, water supply, and process water discharge lines. Because of their relationships to impacts on wetlands, surface water crossings are included in tables in Section 4.7. **[Text regarding pipelines for cooling water blowdown has been deleted.]**

HTVL Routes

For the HVTL Alternative 1 Route, two river or stream crossings occur, one over the Swan River (perennial) and the other over a perennial stream between Big and Little Diamond Lakes. The perennial stream between Big and Little Diamond Lakes was the only water crossing field surveyed during the 2005 field season. The Swan River is identified as protected water by the MNDNR PWI. The total length of water crossings for the preferred HVTL route is estimated at 123 linear feet.

The HVTL Alternative 1A Route crosses six rivers or streams. Five of these crossings are over the Swan River (perennial) and one crossing is over a perennial stream between Big and Little Diamond Lakes. As with the preferred route, the stream between Big and Little Diamond Lakes was the only water crossing field surveyed, and Swan River is identified as protected water by the MNDNR PWI. The total length of water crossings for this alternative is estimated at 533 linear feet.

The Phase II Plan B Alternative Route (WRB-2A) would have a total of five water crossings: one crossing over the Swan River (perennial); one crossing of its perennial tributaries; and three crossings associated with Snowball and Oxhide Creeks (both perennial) and Oxhide Lake. The total length of water crossings for this route is estimated at 283 linear feet. The Swan River and its tributary, Snowball Creek, and Oxhide Lake are identified as protected waters by the MNDNR PWI. Lakes and wetlands designated as MNDNR Protected Waters or Wetlands receive a unique identification number, but streams and rivers do not. In this case, the PWI identification number for Oxhide Lake is 106P.

As these crossings would be overhead crossings, no adverse impacts are anticipated on the physical characteristics of the stream as no disturbances to stream bank, streambed or stream flow would occur. Removal of vegetation providing canopy or shade over the stream to accommodate these crossings would cause a decrease in stream shading. However, the linear feet of decreased stream shading is anticipated to be minimal and should not adversely affect stream temperatures. Section 4.7 summarizes surface water crossings associated with West Range HVTL alternatives.

Natural Gas Pipelines

There are four river or stream crossings associated with Natural Gas Pipeline Alternative 1. Two of these crossings are over the Swan River (perennial). The other crossings are over a tributary of the Swan River (perennial) and a perennial stream between Big and Little Diamond Lakes. The perennial stream between Big and Little Diamond Lakes was the only water crossing in this alternative that was field surveyed during the 2005 field season due to access limitations. The Swan River is the only water body identified as protected water by the MNDNR PWI.

For the Natural Gas Pipeline Alternative 2, four river or stream crossings are associated with the pipeline. Two of these crossings are over the Swan River (perennial). The other crossings are over the Prairie River (perennial) and a perennial stream between Big and Little Diamond Lakes. The perennial stream between Big and Little Diamond Lakes was the only water crossing in this alternative that was

field surveyed during the 2005 field season due to access limitations. The Swan River and Prairie River are both identified as protected waters by the MNDNR PWI.

There are four river or stream crossings associated with the Natural Gas Pipeline Alternative 3 Route. These crossings are over the Prairie River and one of its tributaries, a perennial stream draining to Holman Lake, and a perennial stream between Big and Little Diamond Lakes. The perennial stream between Big and Little Diamond Lakes was the only water crossing in this alternative that was field surveyed. The Prairie River and the perennial stream that drains to Holman Lake are both identified as protected waters by the MNDNR PWI.

As these crossings are anticipated to be directionally drilled, no adverse impacts are anticipated on the physical characteristics of the stream as no disturbances to stream bank, streambed or stream flow would occur. Removal of vegetation providing canopy or shade over the stream to accommodate the new utility corridors would cause a decrease in stream shading. However, the linear feet of decreased stream shading is anticipated to be minimal and should not adversely affect stream temperatures. Section 4.7 summarizes surface water crossings associated with West Range natural gas pipeline alternatives.

Process Water Supply Pipeline

The proposed process water supply pipelines do not cross any water bodies.

Potable Water and Sewer Pipelines

There are no water crossings associated with the potable water or sewer pipelines.

Railroad Lines

No water crossings associated with Rail Alternatives 1A **or 3B were** identified based on NWI, USGS, and MNDNR PWI mapping resources.

West Range Roads

There are no water crossings associated with the Access Roads at this site.

4.5.3.6 Water Crossing Impact Minimization

Water crossings for the natural gas pipeline would be directionally drilled under water bodies starting at approximately 100 feet from the edge of each bank. This would minimize impacts to wetlands associated with water crossings. Impacts from the Natural Gas Pipeline Alternative 1 corridor construction associated with water crossings include 2.32 acres in the temporary ROW and 1.62 acres in the permanent ROW. For the Natural Gas Pipeline Alternative 2, impacts include 1.34 acres in the temporary ROW and 0.94 acres in the permanent ROW, and the Natural Gas Pipeline Alternative 3 involves 2.18 acres in the temporary ROW and 1.53 acres in the permanent ROW. The remainder of the natural gas pipeline would include open trench installation. Where soils and vegetation may become disturbed in the construction areas, these areas would be restored by loosening the soils from compaction and reseeding with grasses and forbs native to the region.

4.5.3.7 Groundwater Resources

Implementation of the enhanced ZLD system would significantly reduce the water quality impacts at the West Range Site originally discussed in the Draft EIS. Therefore, it is expected that water quality impacts to water supply sources and wells would be minimal as a result of the Mesaba Generating Station. No high-capacity groundwater wells would be constructed for the facility's potable water supply or process water needs. The depth to groundwater and groundwater quality and flow direction of the aquifers at the site would not be altered or impacted by operation of the facility. Significant impacts to the local aquifers are not expected from this project. The facility would take precautions and implement the engineering controls necessary and required to prevent a release of

hazardous chemicals or substances that could potentially enter the groundwater and impact groundwater quality.

Some groundwater influence may be observed in the Biwabik Formation bedrock aquifer in the immediate vicinity of the CMP and HAMP Complex as water from these pits would be pumped for the facility's process water. As the level of the surface water in these pits is lowered over time, the groundwater levels in the aquifers immediately adjacent to the pit may decrease. Based on static and pumping level information gathered for the local public water supply wells (see Section 3.5.1.3), it is evident that the wells were drilled and produced sufficient quantities of groundwater when the local mines were dewatered and actively mined. Therefore, it is expected that the municipal wells would continue to be productive and function properly for local public water supplies. Since a groundwater high and divide exists on the site, the groundwater flow direction of the shallow sand and gravel aquifers is not expected to change because of the lowering of surface water levels in the CMP and HAMP when water from these pits would be pumped out for the facility's process water.

During construction of the facility, dewatering may be necessary that would temporarily lower the shallow water table aquifer in small localized areas. If the dewatering is expected to exceed 10,000 gpd or 1 million gallons per year, a Water Appropriation Permit would be obtained from the MNDNR.

4.5.4 Impacts on East Range Site and Corridors

For the East Range Site, the cooling tower blowdown that could otherwise be discharged to receiving waters would be processed through a reverse osmosis system to recover water that can be recycled within the plant. The brine wastewater from the **reverse osmosis** system would be processed in a Mechanical Vapor Recompression evaporator/crystallizer that would serve as the principal component of the ZLD system (further described below). Water recovered from the enhanced ZLD system would be recycled for make-up water where needed.

Water appropriations can be reduced by up to 900 gpm per phase using such recycling efforts. The auxiliary power required to operate the enhanced ZLD system is about 2 MW per phase. In addition, the TDS present in the East Range mine pit waters would produce significant quantities of additional solids that must be disposed in an industrial solid waste landfill (discussed in more detail in Section 4.16).

Although the ZLD system's power consumption and solids production would have a negative economic impact on the power generation costs, the enhanced ZLD system allows the Mesaba Generating Station to play a synergistic role with the industrial mining operations seeking to locate on the East Range industrial site. Unlike the West Range Site, the majority of the water available at the East Range is from other industrial activities in the area (from mine pit dewatering or industrial effluent) and the water is expected to be of lesser quality (higher dissolved solids, for example). However, since these other local industrial projects must cope with similar issues regarding stringent regulations for process water discharges in the Lake Superior Basin watershed, the Mesaba Generating Station equipped with the enhanced ZLD system to eliminate cooling tower blowdown may allow Phases I and II to utilize the process wastewaters released by these nearby projects as source water. This feature could integrate well with the proposed industrial mining facilities to be located on **former** CE properties by eliminating wastewaters that would otherwise represent new discharges to impaired waters downstream. Further, the MPCA must cope with the existing rules to license and permit such projects, realizing the socio-economic benefits they would bring.

In the following section, potential opportunities for reusing water (turning what might be considered a waste stream from the mining entities into a source of water for the Mesaba Generating Station) are identified.

4.5.4.1 Process Water Alternatives

Sources of water to meet the needs of Phases I and II on the East Range Site are identified in Table 4.5-12 below. The sustainable supply capability for each water source was estimated using information supplied by the MNDNR, previous engineering studies, and information supplied by local government units. The actual sustainable rates that could be realized would be dependent on several factors, including precipitation, evaporation, pit water level, and hydrogeological conditions.

Water levels in several of the pits are rising, but pose no current threat to public health and/or welfare unlike levels in the HAMP Complex and CMP located near the West Range Site. Unlike the CMP and HAMP Complex, there is no current need to control water levels in any of the pits proposed for use on the East Range Site. Therefore, water supplies from any of the individual East Range pits can be pumped as necessary to meet the demands of Phases I and II **without posing public health risks**. As noted for the West Range Mesaba Generating Station, the water management plan for the East Range Mesaba Generating Station would be subject to environmental review and permitting process approvals. **The base plan is that** Mine Pit 2WX would serve as the reservoir from which the plant would appropriate water to meet its needs. This is similar to the function the CMP serves in the West Range Water Resource Management Plan. A permanent pumping station would be placed within Mine Pit 2WX and would receive input from one or more of the pits identified in Table 4.5-12. In the event of high inflow rates into Colby Lake during spring runoff or during high precipitation events, water would be pumped from Colby Lake into Mine Pit 2WX. **New text was added below which discusses potential conflicts with Mine Pit 2WX and other water sources identified in the Draft EIS. The new text also discusses new water sources identified since publication of the Draft EIS. Table 4.5-12 has been revised to reflect these updates.**

Table 4.5-12. Water Supply Alternatives for the East Range Mesaba IGCC Power Plant

Process Water Source	Estimated Range of Flow (gpm)	Data Source	Average Annual Flow Potentially Available for Mesaba Generating Station (gpm)	Potential Conflicts
Mine Pit 6		1	1,800	**Minnesota Mining/Steel Dynamics proposing to dewater and mine therein; however, no permit acquired yet for use.**
Mine Pit 2WX		1	**0**	**Minnesota Mining/Steel Dynamics proposing to dewater and mine therein and has a permit for standby appropriation; thus, assuming no longer available.**
Mine Pit 2 West		1	900	
Mine Pit 2 East		1	100	
Mine Pit 3	150-450	2	300	
Mine Pit 9 (Donora Mine Pit)	130-380	2	260	
Stephens Mine Pit	190-590	2	390	
Knox Mine Pit	20-70	2	45	
Mine Pit 9S	90-270	2	180	

Table 4.5-12. Water Supply Alternatives for the East Range Mesaba IGCC Power Plant

Process Water Source	Estimated Range of Flow (gpm)	Data Source	Average Annual Flow Potentially Available for Mesaba Generating Station (gpm)	Potential Conflicts
Mine Pit 1 Effluent (Mesabi Nugget's Outfall SD001)	0-1000	3	1,000	
PolyMet Mining Dewatering Operations	2,000-8,000	4	**0**	**PolyMet/NorthMet would use for internal processes; thus, assuming no longer available.**
Mine Pit 5N	**800-850**	**5**	**800**	
Colby Lake	See Note 6	6	**5,600***	**PolyMet/NorthMet plans variable use of Colby Lake**
Total Resource Potentially Available for Mesaba Generating Station (gpm)			**11,375**	

[1] East Range Hydrology Report, MNDNR, Division of Lands and Minerals, Division of Waters, March 2004.
[2] Range of flow based on the surface drainage area to the pit and average yearly rates of runoff. This should be considered a first order approximation as the actual flow rates are likely much more dependent on groundwater components. The groundwater inflow/outflow component in this area can be highly variable as a result of fractures in the bedrock and/or highly pervious tailings dikes. Due to the complexity associated with the groundwater component, groundwater inflow/outflow has not been evaluated.
[3] MPCA NPDES Permit Issued to Mesabi Nugget. Mine Pit 1 effluent represents the wastewater discharged from Mesabi Nugget's permitted operation of Mine Pit 1 in accordance with terms of a NPDES Permit.
[4] North Met Mine Environmental Assessment Worksheet.
[5] **Excelsior meeting with PolyMet, Hoyt Lakes, MN, July 22, 2008.**
[6] MP–Cliffs-Erie **historic use via** Water Appropriation Permit No. 490135; Permitted withdrawal was 12,000 gpm average daily withdrawal over continuous 60-day average; 15,000 gpm peak; and 6,307.2 million gallons per year.
*Approximate average appropriation rate in CY2000 **(2,900 gpm was erroneously presented in the Draft EIS. The total CY2000 appropriation was 2,900 million gallons, which translates to an average appropriation rate of 5,600 gpm. See Table 4.5-13.)**

The total water available in these pits is considerable, having a combined surface area on the order of over 1,300 acres. Excelsior continues to refine its Water Resource Management Plan for the East Range Mesaba Generating Station; however, given the number and volume of water sources near the site, the flexibility of operating them over a wide range of water levels and the capability of supplementing such sources with water from Colby Lake during periods of high flow, the amount of water to sustain Phases I and II over the long term is **expected**. Since these mine pits are not classified as public or protected waters and not used for recreational purposes, the fluctuations in water levels would have a limited impact on these water resources.

Potential Water Use Conflicts

Since publication of the Draft EIS, Excelsior has consulted with MNDNR and representatives of potential users that may conflict with potential water sources at the East Range Site as originally identified in the Draft EIS. The original water management plan for the East Range Site's Mesaba Generating Station was proposed approximately 2 years before Steel Dynamics, Inc.'s (SD) December 3, 2007 announcement to purchase land immediately northwest of the project site. SD intends to reopen an existing taconite mine on the 6,000 acres of property purchased, conduct surface mining of iron deposits thereon, and construct a new facility for concentrating iron ore (SD's concentrating facility [Mesabi Nugget]) beginning in late 2009.

Mesabi Nugget holds a water appropriation permit for Pit 2WX as a "standby source," thus indicating that the 700 gpm identified in the Draft EIS may not be available and is not assumed

available for appropriation. In the event that mining does occur in Mine Pit 2WX, another mine pit (e.g., Stephens Mine Pit) could serve as the reservoir for the Mesaba Generating Station.

Additionally, discussions between Excelsior and PolyMet Mining Corporation (PolyMet) have revealed that the water use plan for the copper and nickel-mining project (located on about 23 square miles of property three miles north of the East Range Site) has changed since publication of the Draft EIS. PolyMet's NorthMet intends to use groundwater and stormwater runoff from dewatering activities as their primary source of process water and eliminate their discharge to local surface waters. Therefore, the 4,000-gpm source of water from PolyMet dewatering activities is no longer assumed to be available for the Mesaba Generating Station.

Table 4.5-12 notes these potential conflicts. Although the potential conflicts result in the uncertainty of particular water sources, other potential sources have come to light, as Excelsior has continued ongoing discussions with MNDNR and other industrial users, and it is expected that the wide range of water sources could still provide enough water for the Mesaba Generating Station, as discussed below.

Other Potential Water Sources

Although the initial water management plan did not envision taconite-mining operations recommencing for many years, the Mesaba Generating Station's design incorporated elements believed to provide future synergies with potential industrial users, such as Mesabi Nugget and PolyMet. The enhanced ZLD system was initially designed to allow for maximum integration with nearby existing mining/processing operations – the system would be capable of using industrial discharges from such operations for the Mesaba Generating Station's cooling, while also providing wastewater treatment for industrial users and, thus, eliminating such discharges to the Lake Superior Basin. Utilizing the enhanced ZLD system could also eliminate the need for industrial users to deal with conditions applied to NPDES permits resulting from variances for pollutants.

For example, Mesabi Nugget is presently under construction in accordance with plans to ensure compliance with its NPDES permit. However, Mesabi Nugget's NPDES permit included variances for four pollutants and mercury treatment by a technology not demonstrated at the scale proposed. In accordance with Minnesota Rules 7052.0280 subpart 5, an NPDES permit containing a variance from water quality standards or criteria must include as a condition a schedule of compliance activities for attaining such standards and/or criteria. Relevant excerpts from Mesabi Nugget's NPDES/SDS permit (MN0067687) are as follows:

- **The effluent from the second MNC Mercury Filter unit will be piped through Outfall SD001 for direct discharge to Second Creek at an average and maximum rate of 1.5 MGD (or 1,065 gpm) and 5.8 MGD (or 4,000 gpm) respectively. Second Creek, a tributary to the Partridge River, is a Class 2B, 3B, 4A, 4B, 5 and 6 water under Minn. R. Ch. 7050.0430 and an Outstanding International Resource Water according to Minn. R. Ch. 7052.**
- **Effluent monitoring of the SD001 discharge, including low-level monitoring for mercury, is required. In addition, low-level monitoring for mercury is required at a number of internal points in the wastewater treatment system to assess the efficacy of the treatment system for mercury removal.**
- **A variance from the Class 3B water quality standard for hardness and the Class 4A water quality standards for specific conductance, TDS, and bicarbonates is included in this permit.**
- **With granting of a variance, the Permittee shall investigate and implement on an ongoing basis actions and technologies to improve effluent quality and to establish a downward trend towards meeting the water quality standards for TDS, specific conductance, and**

bicarbonates (must submit a Source Minimization and Alternate Treatment Technology Evaluation Plan no later than 3 years following issuance of this permit).

- **Stormwater from the plant area and the raw material/product storage areas will be collected and routed to sedimentation basins for solids settling and then to the wastewater treatment system for treatment prior to discharge through Outfall SD001.**

Compliance with Mesabi Nugget's NPDES permit could be achieved by allowing its wastewater discharge to be a source of appropriation for the Mesaba Generating Station. Therefore, the 1,065 gpm average discharge from Outfall SD001 (as well as any stormwater collected on site) could be a source of water for the Mesaba Generating Station and provide pollution prevention concepts that could provide beneficial water quality impacts.

Based on the following assumptions (and the Mesabi Nugget Outfall SD001), it is expected that quantities of water in excess of 5,700 gpm (the majority of the 7,000 gpm annual average needed to support the Mesaba Generating Station) would be available through a combination of resources that includes wastewater discharges, mine pits and/or the resulting quantities of groundwater derived from dewatering operations at the East Range Site (and taking into account Mesabi Nugget and NorthMet's current water requirements), as follows:

- **The pumping of groundwater and mine pit waters (where applicable) will be required to dewater areas SD expects to mine, thus, providing a potential source of water supply.**
- **Based on SD's overall mine plan (specifies SD's year-to-year activities throughout the life of its expected mining operations), Excelsior could coordinate with SD on their overall mine plan to identify when and where on their property the company would expect to begin dewatering activities and the period of time such activities would be ongoing in a particular location,**
- **Potential water may be available in mine pits on and off SD's property and not currently within SD's mine plan – the extent of which would be determined in consultation with SD, NorthMet, and MDNR.**
- **Groundwater and water from mine pits being pumped for purposes of dewatering land for mining would, in part, be made available to the IGCC Power Station.**
- **Quantities of water generated by dewatering mine pits would likely exceed the amount of water indicated in Tables 3.6-5 and 4.5-12 in the Joint Application and Draft EIS, respectively. Where applicable, the amount of water available from the various mine pits listed in the tables noted was assumed equal to the overflow predicted by the MDNR in their "East Range Hydrology Report" (published in March 2004). It is assumed that due to relative differences in head between the mine pit water level and surrounding groundwater levels, the flows listed in the tables are conservative and average flow rates are actually greater.**
- **Excelsior (using the permitted mine plan and in cooperation/coordination with SD), NorthMet and the MDNR, could anticipate which sources of water on site would be accessible via floating pumps, where to place pipelines connecting such sources to the IGCC Power Station, how to plan for transitions between use of mine pit waters via floating pump assemblies and pumping systems used to dewater the same areas, and how existing pits on site could best be sequenced for use as storage reservoirs for the IGCC Power Station.**

Minn. Stat. 103G.261, which dictates water allocation priorities, would be used by the MDNR in concert with stakeholder input to guide appropriations of water for the IGCC Power Station, Mesabi Nugget, SD, and NorthMet.

Water Appropriation from Colby Lake: Potential User Conflicts and Impacts

As discussed in the previous section, it is expected that 5,700 gpm of the 7,000 gpm average annual demand of the Mesaba Generating Station would be available from mining operations and existing mine pits and the remaining balance – 1,300 gpm – would be met from Colby Lake.

Currently, Minnesota Power and Cliffs Erie hold the former LTV Steel Mining Company (LTVSMC) water appropriations permit (Minnesota Water Appropriation Permit No. 49-135), which allows an annual average water appropriation rate of 12,000 gpm from Colby Lake. MNDNR records indicate that LTVSMC averaged a pumping rate of approximately 10,000 gpm and had a short-term permit limit of 15,000 gpm in the past (MNDNR, 2008). These permit holders and PolyMet have submitted a request to MDNR to replace Cliffs Erie with PolyMet on the permit. However, the MNDNR considers this permit to be a remnant-mining permit and invalid given the present circumstances. Ultimately, after negotiations with all stakeholders, separate new permits would be considered for each entity having proposed water appropriations from Colby Lake.

In response to the Draft EIS, MNDNR provided comments to MDOC on January 9, 2008, which stated that PolyMet/NorthMet's water appropriation from Colby Lake would average approximately 4,000 gpm and be as high as 8,000 gpm during drought conditions. Therefore, the combined demand on Colby Lake from PolyMet and the Mesaba Generating Station during normal periods would total approximately 5,300 gpm on an annual average, which would be below the historical 10,000-gpm annual average appropriation rate (see Section 5.2.4.2 for an updated discussion on cumulative impacts to water resources at the East Range Site). While this does not guarantee what appropriations would be granted in the future, the past usage does provide insight into the potential availability of water and indicates that historical effects from that level of water usage were not significant.

The worst-case instantaneous peak demand from Colby Lake would require 8,000 gpm for PolyMet and 4,300 gpm for the Mesaba Generating Station, totaling 12,300 gpm. Again, in comparison, this demand is below the historical 15,000-gpm peak appropriation rate in LTVSMC's permit. Although peak appropriations by NorthMet may overlap peak periods of appropriation by the Mesaba Generating Station, such overlaps would be expected to be intermittent in nature, i.e., during the hottest times of day during the hottest days of the year when: (1) peak electric demand generally occurs; and (2) evaporation in the cooling towers is at its peak. Depending on final water appropriation plans and consultation with MNDNR, NorthMet and the Mesaba Generating Station could implement a water management plan that would be developed to cope with any water use contingencies.

Minnesota Power is required to augment lake levels by pumping water from Whitewater Reservoir when Colby Lake reaches an established minimum allowable level. Thus, it is expected that Minnesota Power would maintain Colby Lake water levels using water from the Whitewater Reservoir. Generally, it is estimated that long-term average appropriations from Colby Lake would have minor adverse impacts to fish populations, boat access and property values, as the combined appropriation is not expected to reach historical levels of appropriation. However, fluctuation would occur in the Whitewater Reservoir, which would cause similar impacts, but to a greater extent, depending on the level of fluctuation.

During historical periods when maximum appropriations from Colby Lake occurred, transfers of water from the reservoir caused short-term water level fluctuations therein of approximately 5 to 10 feet. Such water fluctuations could have adverse effects on fish populations; however, fish populations and sizes have generally increased since stocking began, even while LTVSMC operated during most of that time. Water losses through leaky dikes in Whitewater Reservoir are estimated to be about 9,000 gpm when the water levels in the reservoir are at high levels. An option for mitigating such fluctuations would be to repair its leaky dikes, allowing for water in the reservoir

system be more effectively stored. This would allow both Colby Lake and Whitewater Reservoir to be maintained at higher levels, and may allow Whitewater Reservoir levels to be controlled through the overflow outlet to the St. Louis River, rather than leaving the lake through leakage and required pumping into Colby Lake. Excelsior would conduct further hydrologic modeling and investigations into limiting losses of water from Whitewater Reservoir as part of the water appropriation permit process to demonstrate that Phase I and Phase II of the Mesaba Energy Project would not result in significant adverse impacts to regional water resources. Any credit ultimately ascribed to recovering waters leaking from Whitewater Reservoir would be required to be supported by in-depth studies conducted in conjunction with input from the MNDNR.

East Range Site Water Management Plan

Prior to obtaining a water appropriation permit for the mine pits, access to riparian land would be required before a water permit could be issued. Although the project proponent is not in a position to acquire riparian land at this stage of the project, it is expected that Excelsior would negotiate easements necessary to access all required water sources on mutually agreeable terms with other potential users (e.g., SD/Mesabi Nugget). The water supply pipeline routes are required project facilities for the Mesaba Power Station and are included in the site permit application. If the East Range Site is designated by the Minnesota PUC, Minn. Statute 216B, Subd. 2(a)(3) does grant the power of eminent domain to innovative energy projects (of which the Mesaba Energy Project has been designated) which would secure the required riparian rights to serve the facility. While this approach to acquiring control of riparian land would be a last resort and is an unlikely scenario, it demonstrates the possibility that such access could be obtained for the project.

Although there are some uncertainties regarding exact sources of process water supply for the East Range Site, the preceding discussion indicates that the range of water sources would be adequate to serve the Mesaba Generating Station's annual water demand. With the use of the enhanced ZLD system, Excelsior hopes to identify potential opportunities to work with other industrial users while also providing benefits to the regional water quality and would continue discussions with MNDNR during the water appropriation permit process. The specific implementation of overall water management among the facilities would require detailed study, negotiation, and ongoing consultation with MNDNR and potential industrial users; however, specifics of such a plan cannot be accomplished until a site is selected for the Mesaba Energy Project and mining plans are more fully developed at the East Range Site.

Process Water Discharges and Water Quality Criteria

The East Range Site is located within the Lake Superior Basin watershed and the standards that apply to discharges of BCCs in the Basin effectively preclude wastewater discharges from Phases I and II. The principal reason for this prohibition is that mercury (a BCC) is found in the source waters for the East Range Site at concentrations nearly equal to the water quality criteria standard applied to end-of-the-pipe discharges.

The water quality standard for mercury applied to surface waters in the Lake Superior Basin watershed is 1.3 ng/L. Dischargers to surface waters in the watershed must meet this standard at the end of the discharge pipe (that is, there is no allowance for a mixing zone within which the concentration of mercury is allowed to equilibrate). The background concentration of mercury in the East Range source waters is on the order of 0.5 to 0.9 ng/L, which would result in cooling tower blowdown concentrations of mercury in the range of 1.5 to 9.0 ng/L (assuming that 3 to 10 COC were used in the cooling tower, respectively). Since this range of mercury concentrations present in the cooling tower blowdown discharge would exceed water quality standards, all wastewaters (other than domestic wastewaters) would be processed through a ZLD system such that there would be no process-related wastewaters, including non-contact cooling tower blowdown, discharged from the generating station.

Elimination of cooling tower blowdown – the only process wastewater stream to be generated by the Mesaba Generating Station – would be accomplished via a second ZLD system serving the power block and gasification island cooling towers. The ZLD treatment system for the Station's cooling tower blowdown would consist of three steps to optimize energy consumption: a clarifier for suspended solids removal, a reverse osmosis system to concentrate the dissolved solids, and a brine concentrator/crystallizer to remove water from the dissolved solids.

The most effective solution for dealing with the mercury discharge issue on the East Range Site is to totally eliminate the discharge of cooling tower blowdown. This can be done by enlarging the ZLD system to handle all of the Mesaba Generating Station's non-domestic wastewater streams. In this configuration, the Mesaba Generating Station would be designed to evaporate whatever water cannot be reused in the plant processes and leave only a solid stream of salts for disposal at a licensed treatment/disposal facility. This scheme would significantly increase the cost of the Mesaba Generating Station but would allow for the utilization of the East Range Site.

Alternatives for Managing Cooling Tower Blowdown

Discharge of cooling tower blowdown to any receiving waters in the Lake Superior Basin watershed is likely infeasible in the absence of using an existing permit having sufficient discharge rights and whose operating authority could be transferred to the power plant. Excelsior is not aware of the existence of any such permits.

The Hoyt Lakes POTW was considered as an alternative, but was determined not to have sufficient existing capacity to manage the quantities of cooling tower blowdown that would be produced. In addition, an expansion of the existing system could not be completed without a major non-degradation study. These options, in addition to the unproven prospect of treating the Mesaba Generating Station's cooling tower blowdown to remove mercury, were deemed less likely to be approved than the ZLD system described above.

Expanding the capacity of the ZLD system would leave domestic wastewater as the only effluent discharge from the Mesaba Generating Station on the East Range Site. The alternatives for dealing with this waste stream are identified in the following section.

4.5.4.2 Domestic Wastewater Treatment

The two primary options available for wastewater treatment and disposal for the East Range Mesaba Generating Station include constructing a WWTF to treat domestic wastewaters on site or connecting to the existing Hoyt Lakes wastewater system.

Alternative 1: On-Site Wastewater Treatment

There are many styles of WWTF, but most are categorized as pond systems or mechanical plants (usually activated sludge). A stabilization pond facility would require chemical application to meet the limit for phosphorus. An activated sludge facility can remove phosphorus biologically, which is dramatically cheaper than chemical removal.

This alternative would consist of constructing a stabilization pond facility with the capacity to treat **45,000** gpd at a location near the facility. The stabilization pond facility would consist of three earthen-dike basins that provide a total detention time of 210 days. The basins would require a total area of 12 acres. A 12-inch effluent gravity sewer would be constructed to convey treated effluent to the mine drainage stream running northeast to southwest through the project site. The effluent stream would discharge into Colby Lake. The length of this sewer pipe would be approximately 1,200 feet to reach the stream.

A disadvantage of this alternative is that the treatment facility would require a capacity of **45,000** gpd to meet construction demands, but would receive only about 25 percent of this design flow after the

construction of the project is complete. Thus, part of the facility would have to be abandoned and other modifications made to the facility at the completion of Phase II. Another potential concern with the on-site WWTF is that effluent from the system would discharge into Colby Lake, which is the source for the Hoyt Lakes drinking water treatment plant.

The project would be required to obtain an NPDES permit for this discharge and a part-time licensed WWTF operator would be required to manage the treatment system. This staffing requirement would increase annual operating costs. The MPCA has designated Colby Lake and the Partridge River as impaired for mercury and fish consumption (see listings of impaired waters approved by the U.S. EPA and the new 2006 list drafted by the MPCA on the MPCA's web site at http://www.pca.state.mn.us/water/tmdl/index.html#tmdl). However, neither Colby Lake nor the Partridge River are listed as impaired for nutrients or DO. As well, the St. Louis River (of which the Partridge River is a tributary) from its headwaters to its discharge into Lake Superior is not listed as impaired for nutrients or DO. Finally, Lake Superior is not listed as impaired for either nutrients or DO. Therefore, the MPCA's Phosphorus Strategy applies and would require that the proposed WWTF meet a limit of 1 milligram per liter total phosphorus.

For the relatively small treatment facility needed for the volume of wastewater produced by the project, the capital cost and operations and maintenance (O&M) costs for an activated sludge facility would far exceed the cost savings recognized from biological phosphorus removal. Due to the high capital and O&M costs, an activated sludge facility was eliminated as an option.

Alternative 2: Connect to the Hoyt Lakes Wastewater System

The East Range Mesaba Generating Station is located approximately 1.6 miles north of CR 110, the main road entering the City of Hoyt Lakes. The City of Hoyt Lakes owns, operates, and maintains a WWTF comprised of a wastewater collection system and wastewater treatment units. The WWTF receives wastewater from the residential, commercial, and industrial establishments within the city and discharges treated effluent to Whitewater Lake. The system has a design capacity of 680,000 gpd and receives an average flow of approximately 300,000 gpd.

The second alternative for the disposal of domestic wastewater**, which is Excelsior's preferred alternative,** is to connect to the City of Hoyt Lakes' wastewater collection and treatment system. This alternative would require the construction of approximately 9,500 feet of a 12-inch gravity sewer pipeline, a pump station, and about 2,500 feet of a 4-inch force main. The wastewater piping would parallel the existing high voltage power line easement along the west side of the proposed property boundary, south to Colby Lake. A pump station would be located on the north side of Colby Lake. The force main would be directionally drilled beneath Colby Lake and then connected to the existing city gravity sewer near MP on the north end of Colby Lake Road. The 12-inch sewer pipeline would have ample capacity to convey the estimated wastewater flow of 30,000 gpd during construction. The existing Hoyt Lakes WWTF has capacity available to treat the estimated flow from the proposed project.

There are several advantages to this option when compared to on-site treatment. One advantage is ownership of the sewer lines constructed for the project could be turned over to the City of Hoyt Lakes for operation and maintenance. Thus, the only annual operating and maintenance costs for this option would be the sewer use charges from the city. A WWTF operator would not be required to monitor the system.

One disadvantage is that the sewer system has to cross Colby Lake, which would increase the cost and would require a MNDNR permit. The lake is about 10 feet deep where the crossing would be constructed and the sewer is expected to be placed about 15 feet below the lake bottom. If rock is encountered at the lake crossing, then microtunneling would be required in lieu of directional drilling which would increase construction costs. Soil borings would be required to confirm rock elevations along the proposed pipe alignment and at the location of the proposed treatment.

Wastewater Impacts

There would be little net effect from the domestic wastewater discharged from the Mesaba Generating Station. The domestic wastewater would be conveyed to the Hoyt Lakes WWTF, treated at the facility, and discharged under the facility's current NPDES permit. The NPDES permit was issued by MPCA and the limits therein were set to protect the water quality in Whitewater Lake.

Both of the alternatives would require piping, which would have to traverse forested areas, and hilly terrain, which does not preclude either alternative. However, the environmental impact of discharging to Colby Lake, the City's water supply, may preclude the first alternative. The existing Hoyt Lakes POTW has a permit to discharge into Whitewater Lake and that system would not require modification to add the anticipated wastewater flow from Phases I and II.

Construction of a 12-inch gravity sewer pipeline from the generating station Footprint to the City of Hoyt Lakes collection system has tangible advantages over the option of an on-site treatment facility and is Excelsior's preferred approach to handle domestic wastewaters from Phases I and II.

4.5.4.3 Water Withdrawals and Permits

Unlike the CMP and HAMP, there would be 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 could be pumped as necessary to meet demands of the project **without posing public health risks**. Existing MNDNR water appropriation permits for East Range surface waters are shown in Table 4.5-13 **(corrected for Final EIS)**.

Table 4.5-13. Existing Water Appropriation Permits for Surface Waters around East Range Site

Permitee	Resource	Permitted		Reported Pumping (Million Gallons)				
		GPM	MG/Y	2000	2001	2002	2003	2004
MP & CE	Colby Lake	12,000	6,307	2,945.7	69.2			
MP	Colby Lake	100,500	50,000	71.4	60.4	63.4	96.1	117.2
MP	Colby Lake	100,500	50,000	23,851.7	24,061.7	24,261.9	24,132.9	22,458.9
MP	Colby Lake	100,500	50,000	21,734.0	24,133.9	24,185.4	24,132.9	23,541.8
MP	Colby Lake	1,005,000	50,000	51.1	4.0	3.4	0.0	21.1
MP	Colby Lake	1,005,000	50,000	4.3	41.6	28.8	0.1	0.4
MP	Colby Lake	1,005,000	50,000	17.3	0.1			
MP	Colby Lake	1,005,000	50,000	474.0	516.4	523.6	525.5	525.1
City of Hoyt Lakes	Colby Lake	1,050	160	123.1	116.4	120.4	122.8	120.4
City of Hoyt Lakes	Partridge River		4	2.4	1.8	1.7	2.2	1.5
CE		3,600	1,155	1,055.4				
CE		3,600	1,155					
CE		3,600	1,155					
CE		1,500	551					
CE		20,000	10,512					
CE		20,000	10,512					
CE		20,000	10,512	1,860.2				
CE		20,000	10,512					

Table 4.5-13. Existing Water Appropriation Permits for Surface Waters around East Range Site

Permitee	Resource	Permitted		Reported Pumping (Million Gallons)				
		GPM	MG/Y	2000	2001	2002	2003	2004
IRRRB	Embarrass Mine Pit	600	50		4.9	22.0	26.3	48.3
City of Aurora		1,020	160	73.7	74.7	81.8	106.5	93.4
CE		5,000	788					
CE		12,000	3,049	316.9				
CE		12,000	3,049					
CE		12,000	3,049					
CE		3,000	1,050					
CE		3,000	1,050	1,807.2				
IRRRB	Wynne Lake	1,800	50	70.7	67.2	56.8	54.9	55.9
IRRRB	Wynne Lake	600	29	51.4	41.3	36.0	37.9	29.0
United Taconite LLC	St. Louis River	7,000	4,010	2,835.6	3,18.0	3,811.7	2,550.8	2,400.0

Table corrected for Final EIS.
GPM = gallons per minute; MG/Y = million gallons per year; MP = Minnesota Power; CE = Cliffs Erie; IRRRB = Iron Range Resources and Rehabilitation Board

The types of permits required for the East Range Site mirror the permits required for the West Range Site.

MNDNR Water Appropriations Permit

A MNDNR Water Appropriations Permit for Non-Irrigation (FORM #A-02623-06) would be required for water appropriations. A separate permit application would be completed for each water source, but the applications and supporting data would be submitted in one package. The MNDNR would issue one permit to Excelsior that covers all of the water sources. An annual Water Use Report would be required by the MNDNR for all Water Appropriations Permits.

MNDNR Public Waters Work Permit

A MNDNR Public Waters Work Permit (FORM #NA-026620-03B) would be required for temporary and permanent impacts to Public Waters. A MNDNR Public Waters Work Permit would be required for work that takes place in any of the identified public waters. For stream crossings (see Section 4.5.4.4), the MNDNR must review and approve any proposed hydraulic changes to the stream.

The following proposed water crossings would require coverage under a MNDNR Public Waters Work Permit:

East Range HVTL

- Embarrass River (two crossings)
- Cedar Island Lake
- Norcund River
- Colby Lake
- Whitewater Lake
- Partridge River (two crossings)
- St. Louis River (three crossings)
- Two River (two crossings)

East Range Gas Pipeline

- Two River
- Unnamed Creek
- Elbow Lake
- Maryt Lake
- Lost Lake
- Forth Lake
- Esquagama Lake
- Unnamed Tributary to St. Louis River
- Colby Lake
- Whitewater Lake
- Partridge River
- First Creek

East Range Rail Line Alternative 1

- Unnamed Creek

East Range Rail Line Alternative 2

- Unnamed Creek
- Colby Lake

MPCA NPDES/SDS Permit

MPCA NPDES Permits would be required for stormwater discharges associated with industrial activity and construction activities. No discharges of cooling tower blowdown would occur; therefore, no NPDES permit for this discharge would be required. Sanitary discharges would be routed to the Hoyt Lakes POTW and would require a permit from the local authority. Such non-industrial discharges do not require an NPDES pre-treatment permit.

Cooling Water Intake Structures (Clean Water Act § 316(b))

These rules are not expected to be applicable to the East Range water resources as there are no established fisheries in any of the abandoned mine pits.

Industrial Stormwater Permitting

Discharge of stormwater associated with industrial activities from the project area to waters of the U.S. and State would be permitted as part of the NPDES/SDS Permit.

Construction Stormwater Permitting

Permitting requirements would mirror those for the West Range Site.

4.5.4.4 Utility and Transportation Water Crossings

Utility crossings over, under, or through water bodies listed as protected waters on the MNDNR PWI for the East Range Site would require Licenses for Utility Crossings of Public Lands and Waters under Minnesota Statutes § 84.415 and Minnesota Rules Chapter 6135. There would be no water crossings associated with siting, placement, or construction on the generating station footprint or on buffer land and roads. The following subsections describe the water crossings within the HVTLs, gas pipelines, water supply, process water discharge lines, sewer and water line, and rail lines. Because of their relationships to impacts on wetlands, surface water crossings are included in tables in Section 4.7.

HTVL Routes

There are a total of 21 crossings of streams or other water bodies associated with the 38L HVTL Route and 20 crossings associated with the 39L/37L HVTL Route. The longest crossing for either route would be over Colby Lake, with a linear crossing of approximately 540 linear feet. Colby Lake, an unnamed pond, and nine other rivers and streams are identified as protected waters by the MNDNR PWI. The total length of water crossings for the 38L HVTL Route is estimated at 1,194 linear feet, whereas the total length of water crossings for the 39L/37L HVTL Route is estimated at 1,760 linear feet.

As these crossings would be overhead crossings, no adverse impacts are anticipated on the physical characteristics of the stream as no disturbances to stream bank, streambed or stream flow would occur. Removal of vegetation providing canopy or shade over the stream to accommodate these crossings would cause a decrease in stream shading. However, the linear footage of decreased stream shading is anticipated to be minimal and should not adversely affect stream temperatures. Section 4.7 summarizes surface water crossings associated with East Range HVTL alternatives.

Natural Gas Pipelines

There are 19 crossings of streams or other water bodies associated with the proposed natural gas pipeline route. The largest water crossing is at Colby Lake, with a linear crossing of approximately 430 feet. The total length of water crossings for this pipeline is estimated at 792 linear feet. Colby Lake and 12 rivers and streams are designated as protected waters by the MNDNR PWI.

As these crossings are anticipated to be directionally drilled, no adverse impacts are anticipated on the physical characteristics of the stream, as no disturbances to stream bank, streambed or stream flow would occur. Removal of vegetation providing canopy or shade over the stream to accommodate the new utility corridors would cause a decrease in stream shading. However, the linear footage of decreased stream shading is anticipated to be minimal and should not adversely affect stream temperatures. Section 4.7 summarizes surface water crossings associated with the East Range natural gas pipeline.

Process Water Supply Pipelines

There are two crossings of streams or other water bodies associated with the process water supply pipeline from Area 6 and Stephens Mine to Area 2WX. The largest water crossing is over Second Creek, with a linear crossing of approximately 30 feet. The total length of water crossings for this alternative is estimated at 33 linear feet. Both Stephens Creek and Second Creek are designated as protected water by the MNDNR PWI.

There is one crossing of a stream or other water body associated with process water supply pipeline from Area 9 South to Area 6. Total length of water crossing for this pipeline is estimated at 3 linear feet. First Creek is designated as protected water by the MNDNR PWI. For Area 9 North (Donora Mine) to Area 6, there is one crossing. The total length of water crossing for this pipeline is estimated at 3 linear feet. Section 4.7 summarizes surface water crossings associated with East Range process water pipelines.

Potable Water and Sewer Pipelines

There is one crossing of a water body associated with the potable water and sewer pipelines. The total length of water crossing for this pipeline is estimated at 460 linear feet through Colby Lake.

This crossing will be directionally drilled under the Lake. BMPs at the drilling locations would reduce or prevent impacts to water quality, and the shoreline would be restored to its original contours and stabilized. Section 4.7 summarizes surface water crossings associated with the East Range potable water and sewer pipelines.

Rail Lines

There are two crossings of streams or other water bodies associated with Rail Line Alternative 1. A tributary to Colby Lake is crossed twice by the center loop for the rail line. The total length of water

crossings for Alternative 1 is estimated at 6 linear feet. Rail Line Alternative 2 would involve two crossings of streams or other water bodies; with a total length estimated at 6 linear feet. Both Wyman Creek and the tributary to Colby Lake are designated as protected waters by the MNDNR PWI. While only 6 linear feet of streams would be crossed for either alternative, the disturbed areas within the rights of way could extent up to several hundred feet on either side of the crossing (See Section 4.7, Wetlands).

Appropriate crossing structures would be used to minimize the rail footprint impact on these streams. Short-term impacts during construction include decreased water quality from waterborne sediments. Permanent impacts from the construction of the rail line in the streambeds would be minimized by the use of culverts under the railroad bed. No long-term adverse impacts are anticipated on these streams. Section 4.7 summarizes surface water crossings associated with East Range rail line alternatives.

East Range Roads

There are no stream crossings associated with the roads.

4.5.4.5 Water Crossing Impact Minimization

The following section describes some mitigation measures that may reduce the impacts associated with the water crossings during construction.

HVTL Routes

There are 21 crossings of streams or water bodies associated with HVTL Alternative 1 that would require crossing of 1,194 linear feet of water, and 20 crossings associated with HVTL Alternative 2 that would require crossing of 1,760 linear feet of water. Placement of the power poles supporting the HVTL would be designed to avoid direct impacts to streams, rivers, or other bodies of water within the project area. The average expanse between poles would be approximately 650 feet for HVTL Alternative 1 and 530 feet for HVTL Alternative 2, but in sensitive or otherwise important areas that should be avoided, the expanse between power poles may be shortened to whatever length necessary or lengthened to approximately 1,000 feet. As a result, impacts within the bed of any water bodies would be avoided.

Natural Gas Pipelines

The East Range Natural Gas Pipeline Alternative 1 would cross approximately 792 linear feet of streams and bodies of water, not including adjacent wetland habitat. For water crossings, the natural gas pipeline would be directionally drilled under water bodies starting at approximately 100 feet from the edge of each bank. This would minimize impacts to wetlands associated with water crossings. The remainder of the natural gas pipeline would include open trench installation.

4.5.4.6 Groundwater Resources

No high-capacity groundwater wells would be constructed for the facility's potable water supply or process water needs. The depth to groundwater and groundwater quality and flow direction of the aquifers at the site would not be altered or impacted by operation of the facility. Adverse impacts to the local aquifers are not expected from this project. The facility would take precautions and implement the engineering controls necessary and required to prevent a release of hazardous chemicals or substances that could potentially enter the groundwater and impact groundwater quality.

Public water supply systems of local municipalities may be sensitive to potential contaminant sources and may be hydrologically connected to affected surface water bodies (mine pits). However, as there would be no wastewater discharges associated with the East Range Site (other than domestic wastewater discharged to the local POTW), there would be no potential for contaminated sources affecting surface water bodies.

4.5.5 Impacts of the No Action Alternative

Under the No Action Alternative, the proposed project would not be built. As a result, no project-related development would occur, and consequently, there would be no impact or change in baseline conditions relating to surface water resources.

The primary impact of the No Action Alternative **at the West Range Site** is that the potential **to aid the state in maintaining water levels in mine pits that are currently being pumped (HAMP) or may potentially overflow (CMP) would not occur. Also, I/I studies and planned improvements at the CBT WWTF would not be funded and benefits to water quality of Swan River watershed would not occur. At the East Range Site, beneficial water quality impacts from synergistic use of wastewaters from other industrial users at the East Range Site would not occur—without use of the enhanced ZLD system, treatment of industrial wastewaters from nearby users (e.g., PolyMet) would not be provided.**