4.5.6 Summary of Impacts

Basis for Impact	No Action	West Range	East Range
Affect the capacity and availability of surface water resources for existing and future uses**, including changes in water levels and irreversible consumption of water that could impact uses of water (e.g., recreation)**	No impact on capacity and availability of surface water resources.	Water Resource Management Plan developed to ensure capacity and availability of existing and future withdrawals. Use of the CMP may **limit** its current use as a recreation facility. The pumping of the HAMP would **aid the state in maintaining water levels for the** benefit **of** the park. **Fluctuation of water levels and evaporative losses in waterbodies are expected to result in minor impacts to fish populations and recreational use.** **During Phase I, annual process water demand would not adversely affect water sources. During Phase II, water demand would lower water levels in HAMP Complex and may cause exposure of land bridges. Use of HAMP would require consultation with MNDNR to determine agency's operating priorities and to ensure minimal impacts to water resources. Elimination of LMP's discharge to the Prairie River represents 1.3 percent of river's average annual flow during normal operating conditions for Phase II. During dry seasons, Prairie River's normal low flow could be reduced by approximately 18 percent. If necessary, to protect river flows during such events, Excelsior would curtail direct appropriations from the river and instead withdraw from stored capacity in other mine pits.**	Water Resource Management Plan developed to ensure capacity and availability of existing and future withdrawals. **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. Excelsior would conduct further hydrologic modeling and investigations into limiting losses of water from Whitewater Reservoir as part of the water appropriation permit process. 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.**
Conflict with established water rights or allocations	No conflict with water rights.	No conflict with water rights.	No conflict with water rights.
Cause surface waters to exceed water quality criteria or standards established in accordance with the CWA, state regulations, or permits	No impact on water quality.	**No discharges directly to surface waters**. **Beneficial impacts to water quality by providing funding for I/I studies and planned improvements at the CBT WWTF.**	No discharges directly to surface waters. **May provide benefit by using other industrial users' wastewaters and, thus, treating and improving water quality in Lake Superior Basin watershed.**

Basis for Impact	No Action	West Range	East Range
Conflict with regional water quality management plans or goals	No conflict with regional water quality management plans.	No conflict with regional water quality management plans.	No conflict with regional water quality management plans.
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.	No effect on groundwater resources.	Lowering the water levels in the mine pits would influence the groundwater levels adjacent to the pits. However, as most groundwater wells near the pits were viable prior to the cessation of mining activities and the mine pits would not be completely dewatered, there should not be a net deficit in aquifer volume or groundwater availability.	Lowering the water levels in the mine pits would influence the groundwater levels adjacent to the pits. However, as most groundwater wells near the pits were viable prior to the cessation of mining activities and the mine pits would not be completely dewatered, there should not be a net deficit in aquifer volume or groundwater availability.
Violate any Federal, state, or regional water quality standards or discharge limitations.	No new discharges would occur.	**No direct discharges of wastewater to receiving waters would occur**. **At the end of the 30-year project life, concentration of phosphorous would increase from 0.0037 mg/L to 0.0057 mg/L; however, this predicted concentration is below the state's standard of 1 mg/L and is expected to have minimal impact to biota in the CMP.** Domestic wastewater discharges to the local POTW would be compatible and within the POTWs capacity to effectively treat the wastewater.	No direct discharges of wastewater to receiving waters would occur. Domestic wastewater discharges to the local POTW would be compatible and within the POTWs capacity to effectively treat the wastewater.
Degrade groundwater quality.	No effect on groundwater quality.	**No effect on groundwater quality**.	No effect on groundwater quality.
Conflict with regional aquifer management plans or goals.	No effect on aquifer management plans or goals.	No effect on aquifer management plans or goals.	No effect on aquifer management plans or goals.
Cause change in stormwater discharges affecting drainage patterns, flooding and/or erosion and sedimentation	No impact on stormwater discharges.	Stormwater discharges from Power Plant site would be managed under a SWPPP. Implementation of BMPs and structural controls would limit sedimentation and erosion impacts.	Stormwater discharges from Power Plant site would be managed under a SWPPP. Implementation of BMPs and structural controls would limit sedimentation and erosion impacts.
Conflict with applicable stormwater management plans or ordinances	No conflict with stormwater management plans.	No conflict with stormwater management plans.	No conflict with stormwater management plans.
Cause changes to Federal and/or state listed protected water bodies	No impact to Federal or state listed protected water bodies.	No impact to Federal or state listed protected water bodies.	No impact to Federal or state listed protected water bodies.

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4.6 FLOODPLAINS

4.6.1 Approach to Impacts Analysis

4.6.1.1 Region of Influence

The region of influence for floodplains includes the potential locations for the Mesaba Generating Station footprint as well as the roads, rail lines, HVTL lines, process water lines, process water blowdown lines, and utility lines (i.e. potable water, gravity sewer, and natural gas), that would be necessary to support Mesaba Energy Project operations.

4.6.1.2 Method of Analysis

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

- Filling of a floodplain in a manner that would expose people or structures to flooding.
- Construction in a floodplain in a manner that would violate National Flood Insurance Program requirements or result in changes that would increase the flood elevation level associated with a 100-year flood event by more than one foot or would increase an existing floodway.
- Construction in a floodplain in a manner that would violate State of Minnesota regulations by causing an increase of an existing 1-percent annual chance flood elevation by more than 0.5 foot.

DOE has completed a floodplain assessment for the project (see Appendix F2) as required by 10 CFR Part 1022.

4.6.2 Common Impacts of the Proposed Action

Neither of the proposed locations for the Mesaba Generating Station is located within the 100-year floodplain, however, some of the utility corridors cross the 100-year floodplain of individual drainage ways. Common impacts to floodplains along the transportation and utility corridors would be in the form of natural gas pipeline crossing 100-year floodplains. Directional drilling beneath the floodplains would be the preferred method of avoiding and minimizing impacts, where feasible. In areas where directional drilling is not feasible, open cut trenching would be the means for crossing the floodplain. Therefore, temporary impacts would be associated with the construction and placement of the natural gas pipelines.

During Phase II construction at either 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 offsite construction staging and laydown areas on 85 acres of land selected from potential sites as described in Section 2.3. None of the candidate sites for Phase II staging and laydown activities is located within or would otherwise affect a 100-year floodplain.

4.6.3 Impacts on West Range Site and Corridors

The West Range IGCC power plant site and buffer land would be located approximately one mile northeast of the nearest 100-year floodplain, which is adjacent to the Prairie River. The following sections describe the floodplain impacts and requirements for the construction and operation of the West Range Site and associated structures (i.e., utility and transportation infrastructure).

4.6.3.1 Impacts of Construction

There would be no anticipated adverse impacts to floodplains for the West Range Site with respect to the placement of the HVTL alternatives, the process water blowdown alternative pipelines, Segments 2 and 3 of the process water supply pipelines, potable water and sewer pipelines, or the transportation corridors, as these structures would be situated outside of the boundaries of any 100-year floodplain areas.

Proposed utilities that could potentially affect floodplains due to their siting within or near 100-year floodplains include the Natural Gas Pipeline Alternatives 1, 2, and 3 (see Figure 3.6-1). Process water supply pipeline – Segment 1 (Lind Pit to Canisteo Pit), would pass near a floodplain, but construction of the pipeline is expected to be outside the 100-year floodplain boundary.

Each of the three potential alternatives for the locations of gas lines would cross at least one 100-year floodplain area. Natural Gas Pipeline Alternative 1 would cross the Swan River and a 100-year floodplain southeast of Trout Lake Township. Natural Gas Pipeline Alternative 2 would cross both the Swan River (in Trout Lake Township) and the Prairie River (in Grand Rapids Township) and adjacent 100-year floodplains. Natural Gas Pipeline Alternative 3 would cross the Prairie River and adjacent 100-year floodplains in Grand Rapids Township at the same location where Alternative 2 would cross. **In the event that Excelsior would negotiate favorable terms with the Nashwauk PUC for natural gas supply from its proposed pipeline permitted in 2008 as described in Section 2.3.1.4, Excelsior would not construct a separate pipeline for the Mesaba Energy Project. In this case, the impacts described above for Alternative 1 would be attributable to the Nashwauk Natural Gas Pipeline Project.**

During the construction phase of the Mesaba Energy Project there may be some temporary impacts to the floodplain areas caused by the installation of necessary pipelines. However, these impacts would be minimized through the use of appropriate engineering procedures and BMPs, which would ensure that river and stream flows be maintained during construction. For example, the natural gas pipelines would be directionally drilled beneath these and all other water body crossings at approximately 100 feet from the edge of each water body. This method would ensure that no permanent impacts would occur to floodplains from the placement of structures within water bodies that could divert or otherwise impede stream flows. It is anticipated that impacts would be temporary. Upon completion of construction activities within the floodway, the construction equipment and stockpiles would be removed, and contours would be restored to their original grade and seeded, stabilized or planted with plants native to the region.

Segment 1 of the process water supply pipeline (Lind Pit to Canisteo Pit) could be in close proximity to the 100-year floodplain adjacent to the Prairie River. There would be no anticipated adverse impacts associated with this pipeline because it would be placed outside of the floodplain area and, most importantly, it would not cross any rivers or streams associated with the neighboring floodplain area, therefore, there would be no alterations to existing stream flow conditions.

Because route selection and construction for utilities and transportation corridors 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 these features.

4.6.3.2 Impacts of Operation

At the West Range Site, the IGCC power plant and buffer land lie outside the 100-year and 500-year floodplains; therefore, no impacts to floodplains would be expected. Operational impacts along the transportation and utility corridors would consist of periodic landscape maintenance, in the form of mowing to prevent woody vegetation interfering with the HVTL and the permanent ROW for the buried pipelines. The potential exists for an HVTL structure/tower to be installed within a floodplain, depending upon the width of the floodplain and the maximum distance allowed between HVTL towers. Placement of an HTVL structure/tower would be avoided unless there were no other feasible options. HTVL structure/towers required to be located within the floodplain would have limited impact on the floodplain; their small footprint would not increase the level of the flood elevation or impede the course of the flood.

4.6.4 Impacts on East Range Site and Corridors

The IGCC power plant and buffer land at the East Range Site would be situated approximately 1.3 miles northeast of the nearest 100-year floodplain (Partridge River). The following subsections describe

the potential for impacts on floodplains resulting from the construction of the transmission, pipeline, and transportation corridors associated with the East Range Mesaba Generating Station location.

4.6.4.1 Impacts of Construction

There would be no anticipated adverse impacts to floodplains for the East Range Site with respect to the placement of the power plant site, process water supply pipelines, potable water and sewer pipelines, or the transportation corridors because these structures would be situated outside of the boundaries of any 100-year floodplain areas.

Proposed utilities that could potentially affect floodplains due to their potential placement within or near 100-year floodplains include HVTL Alternatives 1 and 2 and the Natural Gas Pipeline Alternative 1 (see Figure 3.6-2).

The HVTL Alternative 1 would cross the Partridge River, Cedar Island Lake, the East Two River, and 100-year floodplains adjacent to each of these surface waters. The HVTL Alternative 2 would cross the Partridge River, the Embarrass River, the East Two River, and 100-year floodplains adjacent to each of these surface waters.

Each of the potential HVTL alignments would utilize existing HVTL corridors with negligible alterations required to the rights-of-way. HVTL Alternative 1 would utilize the existing 38L and HVTL Alternative 2 would use a combination of the existing 39L and 37L. Due to the use of existing lines there would not be any new structures constructed that could cause any alterations to floodway patterns associated with either of these HVTL alignments and, therefore, no impacts to floodplains would be anticipated.

The Natural Gas Pipeline Alternative 1 would cross 100-year floodplains along the Partridge River and an area between Fourth Lake and Esquagama Lake. As previously mentioned in the discussion of the West Range Site (Section 4.6.4.1), the construction of pipelines may cause some moderate, temporary impacts to floodplains, however these impacts would be minimized through the use of appropriate engineering procedures and BMPs to maintain existing river and stream flows. Following construction activities, efforts would be taken to restore floodway contours as closely as possible to their original condition as well as the ROWs. Therefore, no permanent impacts to floodplains would be anticipated.

Because route selection and construction for utilities and transportation corridors 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 these features.

4.6.4.2 Impacts of Operation

The East Range Site lies outside the 100-year and 500-year floodplain; therefore, no impacts to flood plains are expected. Operational impacts along the transportation and utility corridors would probably consist of periodic landscape maintenance in the form of mowing to prevent woody vegetation interfering with the HVTL and the permanent ROW for the buried pipelines. The only other potential impact would be an HVTL structure or tower that would be installed within a floodplain, due to the width of the floodplain and the maximum distance between HVTL towers. These towers would not be installed in the floodplain unless there were no other feasible options. If the towers were installed in the floodplain, limited impacts would occur due to the towers small footprint and unlikeliness to increase the level of flood elevation or impede the course of a flood.

4.6.5 Impacts of the No Action Alternative

Under the No Action Alternative, the Mesaba Energy Project would not be constructed or operated. As a result, no construction activities would occur in or near floodplains and there would be no impact or change in baseline conditions relating to the potential for future flooding. While not an existing floodplain, there is the possibility that the CMP may begin to overflow in the near future and cause local

flooding in the Coleraine and Bovey areas unless another project is approved to reduce the level of water in the CMP.

4.6.6 Summary of Impacts

Basis for Impact	No Action	West Range	East Range
Filling of a floodplain in a manner that would expose people or structures to flooding.	No filling of floodplains.	No filling of floodplains is expected with either the IGCC footprint or any of the utility corridors.	No filling of floodplains is expected with either the IGCC footprint or any of the utility corridors.
Construction in the floodplain that would violate the National Flood Insurance Program by more than 1 foot or increase the floodway.	No violation to the National Flood Insurance Program.	No violation would occur. Temporary impacts associated with Natural Gas Pipeline Alternatives 1, 2, 3 as a result of trenching, soil stockpiling, and storage of equipment where pipelines would cross floodplains. However, impacts would be mitigated through best management practices, and land contours would be restored after construction. No permanent impacts on flood elevations would occur, because pipelines would be below surface. **No distinguishable differences in impacts for a Phase I only outcome.**	No violation would occur. Temporary impacts associated with HVTL Alternatives 1, 2 where corridors would cross floodplains. No permanent impacts on flood elevations due to small footprint of towers. Construction of Natural Gas Pipeline could affect floodplain temporarily as a result of trenching, soil stockpiling, and storage of equipment where pipeline would cross floodplains. However, impacts would be mitigated through best management practices, and land contours would be restored after construction. No permanent impacts on flood elevations would occur, because pipelines would be below surface.. **No distinguishable differences in impacts for a Phase I only outcome.**
Construction in the floodplain that would violate the Minnesota regulations by causing an increase of the existing 1 percent annual chance flood elevation by more than 0.5 feet.	No violations to the Minnesota flood regulations.	No violation would occur. No permanent impacts on flood elevations.	No violation would occur. No permanent impacts on flood elevations.

4.6.7 Floodplain Mitigation Issues

For each of the floodplain crossings, an assessment would be conducted, per Minnesota Rules, to determine if the crossing would result in an increase of the existing 1 percent annual chance of flood elevation (100-year recurrence interval) by more than 0.5 feet. Based on the type of construction that could occur in a floodplain (the only permanent aboveground structure would be HVTL towers that would have a minimal impact on floodplain levels), it is not expected that any flood elevations (100-year recurrence interval) would increase by 0.5 feet or more. However, if this increase were to occur, then the MNDNR (the state floodplain administrator) and FEMA would become involved. In addition, all affected communities and applicable agencies at the West Range Site, including Itasca County, Minnesota Department of Transportation (Mn/DOT), and MNDNR, would have to be contacted by the project

proponent during the design phases of the project to ensure all flood control requirements are met. Likewise, at the East Range Site, St. Louis County, City of Hoyt Lakes, Mn/DOT, and MNDNR would be contacted by the project proponent during the design phases of the project to ensure all flood control requirements are met. It is up to each community's discretion to require flood control measures that go beyond the Federal and state requirements.

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4.7 WETLANDS

4.7.1 Approach to Impacts Analysis

DOE has completed a wetlands assessment for the project (Appendix F2) as required by 10 CFR Part 1022. Appendix F2 describes the process by which all practicable measures were employed to avoid and minimize potential impacts to wetlands and other resource areas. Section 4.7.6 summarizes the potential wetland impacts of the alternatives analyzed in this Final EIS.

Wetland impacts associated with the West Range and East Range Sites and related transportation and utility corridors were identified by superimposing field-delineated wetlands onto geo-rectified aerial photographs and satellite imagery displaying the proposed power station infrastructures and ROWs. The NWI mapping was used to supplement and identify potential wetlands and "other waters" in areas where access was not granted. GIS applications were then used to determine area calculations of **delineated and** potential wetlands **that** would potentially be impacted by the Mesaba Energy Project.

4.7.1.1 Region of Influence

The region of influence for wetland resources included the proposed footprints for the West Range Site and East Range Site and associated infrastructure (i.e., utility and transportation corridors) ROWs for each alternative site.

4.7.1.2 Method of Analysis

Impacts to wetlands and "other waters" of the United States were identified by overlaying the surveyed wetlands and wetlands shown by the NWI maps over graphic illustrations depicting the proposed West and East Range Mesaba Generating Station footprints and their associated transportation and utility corridors. Wetland impacts were characterized as the direct loss of wetlands due to the placement of dredge or fill material, and as **type conversion** impacts, relating to the altering or conversion of wetland function due to the removal of vegetation. **These type conversion impacts could be temporary (e.g., where an emergent or scrub-shrub [woody vegetation less than 20 feet tall] wetland is disturbed and allowed to regenerate) or permanent (e.g., a wetland forest is cleared and allowed to regenerate as an emergent or scrub-shrub wetlands).**

The acreages of wetland areas affected by the Proposed Action at the West and East Range Sites and related infrastructures were calculated using GIS. The types of wetland affected by the Proposed Action were identified based on field observations or by NWI mapping **(sometimes supplemented by soils mapping and aerial photographs)**.

Activities that involve dredging material from waters of the United States, including wetlands, or the placement of fill in wetlands, are considered to have an adverse impact. Dredged material is defined as material that is dredged or excavated from waters of the United States, including wetlands. Fill material is defined as material placed in waters of the U.S., where the material has the effect of either (1) replacing any portion of such waters with dry land or (2) changing the bottom elevation of any portion of such waters.

Activities that involve removal or conversion of wetland vegetation, but do not include the grubbing of stumps or roots or the disturbance of soils, could affect wetland resources. A direct loss of wetlands would not occur in this case; however, if a change in the wetland function would occur through conversion of wetland type (i.e., forested wetland conversion to emergent wetland) the result would be an adverse impact. Permanent impacts to wetlands can be quantified by determining areas that would not experience fill but would be anticipated to experience removal and routine maintenance of vegetation. Activities that would indirectly alter the hydrology of a wetland, such as increased impervious surface adjacent to wetland areas or alteration and/or diversions of surface water flows to or from the wetlands,

are also considered to cause impacts. In this case, a change in the hydrological regime would either increase the amount of existing wetlands or cause existing wetlands to convert to upland communities. The degree and magnitude of these impacts on the functional capacity of the wetlands would be less quantifiable than activities that result in the direct placement of fill materials.

4.7.2 Common Impacts of the Proposed Action

Impacts that would be common to the West Range Site and the East Range Site and associated utility and infrastructure corridors as well as minimization measures to avoid impacts are discussed in the following sections (Sections 4.7.2.1 and 4.7.2.5). Potential impacts specific to the West Range Site or the East Range Site and associated utility and infrastructure corridors are discussed in Sections 4.7.3 (West Range Site) and 4.7.4 (East Range Site).

4.7.2.1 Impacts of Construction

Plant Footprint Construction

The Mesaba Generating Station footprint at the West and East Range Sites would be designed to minimize unavoidable wetland impacts to the extent practicable during the preliminary design of the facility. Wetland impact avoidance and minimization would be refined throughout the final design process for this facility and other elements of the project. Compensatory wetland mitigation would be proposed in areas where unavoidable wetland encroachment would occur; this would be addressed during the wetland permitting phase for the Proposed Action and submitted to the regulatory agencies for review.

Potential common impacts among the alternatives that are not directly quantifiable include the change of local hydrology, resulting in increased surface runoff in some areas, while decreasing surface runoff in other areas of the project area. Seasonal groundwater recharge functions could also be lost in some wetland areas, but would continue to occur in adjacent undisturbed upland and wetland areas. Other forms of impacts could be manifested by the permanent loss of wildlife habitat, or wildlife habitat conversion (i.e., forested wetlands converted to wet meadows). In some areas, the Proposed Action could adversely affect flood flow attenuation and produce increased surface water velocities, resulting in localized erosion and potential increased flooding. For example, dense basal vegetation generally functions in obstructing the speed of surface runoff and minimizes potential flooding to the areas downstream of the project area. Similarly, isolated wetlands minimize potential flooding by storing and retaining surface water. The loss of vegetation would result in a net loss of habitat for various wildlife species, and a temporary loss in sediment stabilization/retention and nutrient transformation functions would occur.

Rail Line Construction

The rail alternatives are the only utility or transportation corridors that have designed engineering construction limits. Consequently, all wetland impacts within the construction limits would be considered permanent because grading requirements would permanently alter the wetland hydrology and plant communities. The placement of fill in the ROWs would be necessary to establish the appropriate grade for the areas adjacent to the railroad bed.

The construction of the rail alternatives would permanently alter the hydrology and eliminate the wetland hydrologic regime and plant communities in areas bordering the rail line and the interior rail loop, resulting in habitat fragmentation. This would result in fragmented habitat for wildlife that depends on the forest interior for food and shelter. Habitat conversion would also occur along some portions of the rail line and could contribute to increased temporary erosion, flooding and habitat degradation. BMPs such as sediment ponds, hay bales, or silt fencing would reduce the magnitude of the temporary impacts.

HVTL Tower Construction

The common primary wetland impacts within the ROW of the HVTLs would include the permanent loss of wetlands due to placement of fill through concrete footers placed at the base of HVTL towers. The design criteria for the tower footers including the size of power pole footprints would have a 28-foot base and would be the same for all the HVTL alternatives. The linear distances between the poles would vary from about 500 to 800 feet apart with a possible maximum linear distance of 1,000 feet between poles to avoid and minimize impacts to wetlands.

Placement of the poles supporting the HVTLs would be designed to avoid direct impacts to wetlands or "other waters" of the United States occurring within the proposed ROW. Since the HVTLs would be suspended from tower to tower, there would be no direct impacts resulting from the HVTL crossings and impacts to vegetation and soils would be avoided. Wetland impacts could be further minimized by adjusting the pole placement to avoid wetland areas. BMPs would be employed during construction in wetlands and streams to avoid concrete leachate entering these resources from HVTL footers. Wetlands would be avoided to the extent feasible during the installation of the HVTL; unavoidable wetland impacts would be limited to areas where utility poles would be placed within wetland habitat. With the exception of the unavoidable impacts of the footings, other construction-related impacts to wetlands would be minor and temporary. BMPs such as erosion and sediment control measures, including hay bales and placement of heavy equipment operating within the wetlands during construction on mats, would be used to minimize adverse impacts. Construction of HTVLs would also occur during the winter months to minimize impacts to wetlands and nesting migratory birds.

Aerial stream crossings by the HVTLs would also occur with the Proposed Action; however, these lines would be suspended and have no impact to surface waters.

Pipelines and Access Roads Construction

The majority of the impacts to wetlands relating to the pipelines would be temporary and minor. Temporary impacts would include impacts associated with access to construction laydown and staging areas and construction activities. Impacts would be temporary in nature; wetland soils excavated during construction would be stockpiled for reuse and the area would be restored to its original grade and seeded or planted with native plants after construction. Permanent impacts related to the pipelines would occur in forested and scrub-shrub wetland areas within the permanent ROW that would require routine maintenance of vegetation. This loss of vegetation also affects wildlife habitat. Primary wetland impacts would result from the placement of fill to create access roads. This would result in a permanent loss of wetland communities along with secondary impacts of permanently altering the wetland hydrologic regime and plant communities in areas bordering the access roads.

The proposed pipelines and access roads could also affect streams and other surface water resources. Wetlands situated immediately adjacent to "other waters" of the United States and affected by pipeline alternatives that border areas where the pipeline emerges would be impacted from the construction of the pipelines. Impacts to wetlands adjacent to the water crossings were based on a 100-foot (30-meter) temporary ROW including a 70-foot (21-meter) permanent ROW. Stream impacts could be avoided using directional drilling under the existing water resources, including wetlands. The proposed directional drilling would be implemented for all of the natural gas alternatives beginning at points about 100 feet landward from the wetland/upland edge of the wetland resource.

Impacts to wildlife habitat, flood flow attenuation, and sediment stabilization functions would likely occur because of the pipeline construction. However, BMPs, such as sediment ponds, hay bales or silt fencing, or sediment retention/detention ponds would reduce the temporary impacts to functional capacity for both wetlands and other waters. After installing the pipelines, the disturbed areas would be restored to their original grade and seeded or planted with native plants.

ROW Clearing and Maintenance

Common type-conversion wetland impacts, identified as the conversion from one wetland type into another (primarily forested and scrub shrub wetland conversion into emergent or open water systems), would occur within the 100-foot wide utility and transportation ROWs. The potential for conversion would occur due to the removal of woody vegetation and proposed continual maintenance of vegetation with the 100-foot ROW, which does not involve the removal of below ground biomass (roots) or disturbance of soil,. Initially, wetlands would be converted from one vegetative class into another; scheduled maintenance of the permanent ROW would result in the permanent conversion of the cover types. Consequently, the types and magnitude of wetland functions would change. Typical examples of changed wetland functions could include wildlife habitat, flood flow attenuation, and sediment stabilization and retention functions. Areas affected by the removal of vegetation could also be subjected to increased thermal variations during the summer and winter. During the summer months, the ground surface would be subject to increased temperatures from the loss of shade trees; the area could experience decreased temperatures during the winter months due to increased wind velocities.

4.7.2.2 Impacts of Operation

The majority of impacts to wetlands would be consequences related to construction activities. Impacts to wetlands during operations would generally be limited to the potential for spilled materials to affect a wetland area. General freight shipped on the rail line and access roads could include petroleum, coal or other commodities. Spills of oil or hazardous substances carried as general freight could potentially affect surface waters, including wetlands. If a spill occurred, the potential for contamination to enter flowing surface water would present the greatest risk of a large contaminant migration until spill containment and remediation takes place. The Mesaba Energy Project would comply with existing regulatory requirements regarding remediation for potential spills and the probability of spills is low.

4.7.3 Impacts on West Range Site and Corridors

The following sections describe the wetland impacts specific to the West Range Site and its associated utility and transportation infrastructure.

4.7.3.1 Impacts of Construction

Based upon comments received on the Draft EIS and additional analyses performed, Section 4.7.3.1 in the Draft EIS was deleted in its entirety and replaced with new text and tables. The major changes incorporated in the new section include:

- **A new location of the Mesaba Generating Station and rail loop was analyzed for the West Range;**
- **All fill calculations were done assuming 3:1 side slopes for the fill;**
- **Type conversion impacts were separated into temporary and permanent impacts;**
- **Impacts are described with respect to wetlands as classified by Eggers and Reed, 1997; and**
- **Selected results of the MnRAM analysis (full results in Appendix F3) are included.**

The DOE Wetlands Assessment in Appendix F2 evaluated additional siting and alignment alternatives for the power plant, transportation, and infrastructure components based on comments and recommendations from the USACE and other agencies. This section compares the practicable alternatives resulting from that analysis. Appendix F2 contains additional graphics depicting the impacts described below.

The proposed project includes actions throughout the West Range Site and Corridors, i.e., those within the Mesaba Generating Station Footprint and Buffer Land and the linear corridors along which the power transmission, gas pipeline, and other associated facilities traverse. Section 2.3.1

describes the project elements at the West Range Site. The following sections describe the impacts to wetlands that would result from the construction of each project element. Impacts to wetlands are described as wetland fill, temporary wetland disturbance, and wetland type-conversion resulting from vegetation removal. Section 4.7.6 contains a summary of potential impacts at the West Range Sites and Corridors as well as for the East Range Sites and Corridors.

Mesaba Generating Station Footprint

The Mesaba Generating Station Footprint is located near the center of the West Range site in a topographic saddle and between two large wetland complexes. As a result of the analysis completed in Appendix F2, the Final EIS compares two alternative locations: Excelsior's original preferred location as contained in the Draft EIS (the Central – Draft EIS in Appendix F2, Figure F2-6) and Excelsior's new preferred location in which the plant footprint would be shifted 280 ft to the northwest along the same axis (the Central – Final EIS, Figure 4.7-1 and Figure F2-7). Table 4.7-1 is a summary of impacts to wetlands for each plant phase for the Draft EIS and Final EIS footprints, including grading associated with each plant footprint.

Table 4.7-1. Comparison of Wetland Impacts (acres), New Preferred and Original Plant Site

Site Footprint	Phase I[1]	Phase II	Total
Central - Final EIS	13.62	17.74	31.36
Central - Draft EIS[2]	20.96	13.62	34.58

[1] Impacts due to grading limits for the entire Mesaba Generating Station Footprint are included in the Phase 1 impacts.
[2] The footprints for Phase I and Phase II in the original site plan shown in the Draft EIS are the reverse of the Final EIS.

The new footprint placement minimizes wetland fill within the plant footprint and maintains hydrologic connectivity and the existing flow pattern from northeast to southwest within Wetland A1, thereby avoiding potential indirect impacts affecting 7.3 acres of shrub carr. Construction of the new preferred Mesaba Generating Station footprint would affect about 31 acres of wetland habitat, 3 acres less than the original footprint. The impact footprint includes the plant footprint and grading of the adjacent area at a 3:1 slope to meet the natural grade of the surrounding area. Impacts to wetlands from the Mesaba Generating Station Footprint, including areas of grading limits, are summarized in Tables 4.7-2 (Central – Draft EIS) and 4.7-3 (Central – Final EIS) and shown in Figure 4.7-1.

The IGCC power plant would be constructed in two phases. Mesaba Phase I is expected to be constructed between 2010 and 2014. Construction of Mesaba Phase II is expected to begin in 2012.

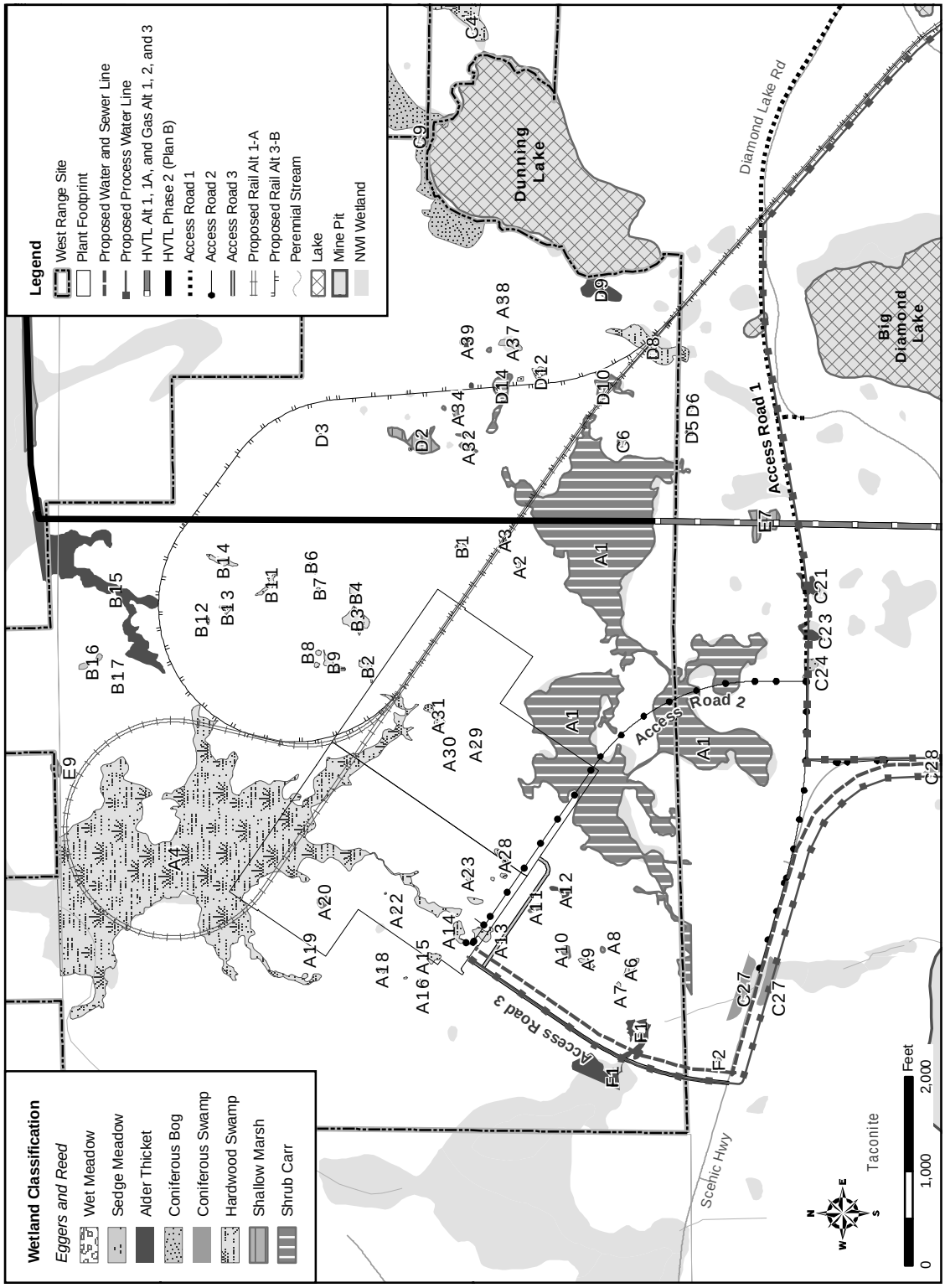

Figure 4.7-1. West Range Eggers and Reed Wetland Classifications

Table 4.7-2. Wetland Fill (acres), Mesaba Generating Station (Central – Draft EIS Footprint) at West Range Site

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Wetland Fill[2]		
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality	Phase I	Phase II	Total
A1	PEMB/PSS1/PFO4	Type 3/6/8	Shallow Marsh/Shrub Carr/Coniferous Bog	High	Moderate	1.05	11.51	12.56
A4	PFO1C/F	Type 7	Hardwood Swamp	Moderate	High	18.08	1.51	19.59
A13	PFO1B	Type 7	Hardwood Swamp	High	High	0.40	—	0.40
A14	PFO1B	Type 7	Hardwood Swamp	High	High	0.45	—	0.45
A20	PFO1C	Type 7	Hardwood Swamp	High	High	0.19	—	0.19
A21	PEMC/PFO1C	Type 3/7	Shallow Marsh/ Hardwood Swamp	High	High	0.01	—	0.01
A23	PEMC/PFO1C	Type 3/7	Shallow Marsh/ Hardwood Swamp	High	High	0.24	—	0.24
A25	PFO1C	Type 7	Hardwood Swamp	High	High	0.18	—	0.18
A26	PFO1C	Type 7	Hardwood Swamp	High	High	0.03	—	0.03
A27	PFO1C	Type 7	Hardwood Swamp	High	High	0.07	—	0.07
A28	PEMC/PFO1C	Type 3/7	Sedge Meadow/ Hardwood Swamp	High	High	0.22	—	0.22
A29	PEMC/PFO1C	Type 3/7	Sedge Meadow/ Hardwood Swamp	High	High	—	0.08	0.08
A30	PEMC	Type 3	Shallow Marsh	High	High	—	0.04	0.04
A31	PFO1C	Type 7	Hardwood Swamp	High	High	—	0.48	0.48
B2	PFO1A	Type 7	Hardwood Swamp	High	High	0.04	—	0.04
					Total	**20.96**	**13.62**	**34.58**

[1] Complete MnRAM 3.1 Functions and Values Assessment data are included in Appendix F3.
[2] Impacts due to grading limits for the entire plant site are included in the Phase 1 impacts.

Table 4.7-3. Wetland Fill (acres), Mesaba Generating Station (Central – Final EIS Footprint) at West Range Site

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Wetland Fill[2]		
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality	Phase I	Phase II	Total
A1	PEMB/PSS1/PFO4	Type 3/6/8	Shallow Marsh/Shrub Carr/Coniferous Bog	High	Moderate	7.31	—	7.31
A4	PFO1C/F	Type 7	Hardwood Swamp	Moderate	High	5.36	16.00	21.36
A13	PFO1B	Type 7	Hardwood Swamp	High	High	0.06	0.29	0.35
A14	PFO1B	Type 7	Hardwood Swamp	High	High	—	0.44	0.44
A15	PEMC/PFO1C	Type 3/7	Shallow Marsh/ Hardwood Swamp	High	High	0.01	0.21	0.22
A20	PFO1C	Type 7	Hardwood Swamp	High	High	—	0.19	0.19
A21	PEMC/PFO1C	Type 3/7	Shallow Marsh/ Hardwood Swamp	High	High	—	0.01	0.01
A22	PEMC/PFO1C	Type 3/7	Shallow Marsh/ Hardwood Swamp	High	High	—	0.04	0.04
A23	PEMC/PFO1C	Type 3/7	Shallow Marsh/ Hardwood Swamp	High	High	—	0.24	0.24
A25	PFO1C	Type 7	Hardwood Swamp	High	High	—	0.18	0.18
A26	PFO1C	Type 7	Hardwood Swamp	High	High	—	0.03	0.03
A27	PFO1C	Type 7	Hardwood Swamp	High	High	—	0.07	0.07
A28	PEMC/PFO1C	Type 3/7	Sedge Meadow/ Hardwood Swamp	High	High	0.18	0.04	0.22
A29	PEMC/PFO1C	Type 3/7	Sedge Meadow/ Hardwood Swamp	High	High	0.08	—	0.08
A30	PEMC	Type 3	Shallow Marsh	High	High	0.04	—	0.04
A31	PFO1C	Type 7	Hardwood Swamp	High	High	0.48	—	0.48
B2	PFO1A	Type 7	Hardwood Swamp	High	High	0.10	—	0.10
					Total	**13.62**	**17.74**	**31.36**

[1] Complete MnRAM 3.1 Functions and Values Assessment data are included in Appendix F3.
[2] Impacts due to grading limits for the entire plant site are included in the Phase 1 impacts.

HVTL Alternatives (West Range Site)

Section 2.3.1.5 (Chapter 2) describes the alternatives consider by Excelsior for HVTL service at the West Range Site. Figure 2.3-4 illustrates the alternative corridors.

HVTL Alternative 1

Excelsior's preferred corridor for interconnecting the Mesaba Generating Station with the Blackberry Substation is HVTL Alternative 1 (WRA-1 or WRB-1 alignment). In the event that PUC were to approve this ROW, and MISO were to approve the use of 345-kV circuits (Excelsior's Plan A) to the Blackberry Substation, this is the only HVTL corridor that would be affected for the Mesaba Generating Station Phases I and II. In the event that MISO were to require the use of 230-kV circuits (Excelsior's Plan B), this corridor would likely be developed for HVTL use in either Phase I or Phase II of generating station operation. Therefore, this ROW is the most likely corridor to be developed for the project. The only portion of the HVTL alignment that was accessible for wetland delineation is the segment north of US 169. Wetland impacts along the remainder of the alignment were estimated from the NWI.

Wetland impacts along the HVTL alignment would include wetland fill for power pole placement, temporary impacts to scrub-shrub habitat in temporary workspaces (areas within the construction ROW but outside the permanent ROW), and conversion of scrub-shrub and forested habitat within the permanent ROW.

Wetland Fill

Wetland fill would be limited to those areas where power poles would be placed within wetlands. Each pole would require an estimated 28 square feet of fill. It is assumed that power poles will be placed evenly, every 800 feet along the alignment. Using this assumption, 15 power poles would be placed within wetland habitat and would result in about 0.01 acre of wetland fill, as summarized in Table 4.7-4.

Table 4.7-4. Wetland Impacts (acres), HVTL Alternative 1 (West Range Site)

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Wetland Fill		Temporary Scrub-Shrub Wetland Impacts[2]	Permanent Wetland Type Conversion[3]
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality	# Poles	Area		
A1	PEMB/PSS1/ PFO4	Type 3/6/8	Shallow Marsh/Shrub Carr/Coniferous Bog	High	Moderate	1	0.0006	0.56 (2.14 already clear)	1.77
E5	PEMH	Type 8	Coniferous Bog	High	Moderate	—	—	0 (already clear)	0 (already clear)
NWI[4]	n/a	Type 6	Assumed Alder Thicket	Unknown	Unknown	4	0.0026	1.77	7.63
NWI[4]	n/a	Type 7	Assumed Hardwood Swamp	Unknown	Unknown	4	0.0026	—	6.84
NWI[4]	n/a	Type 8	Assumed Coniferous Bog	Unknown	Unknown	6	0.0039	—	19.92
					Total	**15**	**0.01**	**2.33**	**36.16**

[1] Complete MnRAM 3.1 Functions and Values Assessment data are included in Appendix F3.
[2] Temporary removal of scrub-shrub vegetation outside the 100-foot permanent ROW. Natural revegetation will be allowed following completion of construction.
[3] Permanent conversion of scrub-shrub vegetation within 100-foot permanent ROW and scrub-shrub and forested vegetation within the 150-foot construction ROW.
[4] NWI (National Wetlands Inventory) basins are those areas that have not been field investigated. Cowardin classifications are taken from the NWI. Circular 39 and Eggers and Reed classifications are assumed from the Cowardin classification, aerial photograph interpretations, and known characteristics of delineated wetlands.
n/a = not available

Wetland Type Conversion (Tree and Shrub Clearing)

Construction across greenfield areas and establishment of new ROWs would require clearing of vegetation in upland and wetland areas. Impacts to wetland vegetation would be of two types, temporary impacts to scrub-shrub habitat in temporary workspaces outside the permanent ROW and permanent conversion of scrub-shrub habitat within the permanent ROW and forested habitat within the permanent ROW. Temporary conversion would include removal of scrub-shrub vegetation in the temporary construction ROW but outside the permanent ROW. These areas would be allowed to revegetate following construction. Permanent conversion would include removal of scrub-shrub vegetation within the permanent ROW and removal of forest vegetation within the construction ROW. The permanent ROW would be maintained free of woody vegetation, resulting in conversion of scrub-shrub and forested wetland to emergent wetland habitat. Although forested wetland cleared outside of the permanent ROW but within the construction, ROW would still be allowed to revegetate, it is considered a permanent type conversion because of the length of time that regeneration would require. Table 4.7-4 also summarizes wetland type conversion that would result from construction of HVTL Alternative 1 (WRA-1 alignment). Construction of HVTL Alternative 1 would temporarily disturb 2.33 acres of shrub-scrub wetlands, which would be expected to naturally reestablish after completion of construction. Thus, these impacts are considered temporary. The construction would create permanent impacts by removal of 36.16 acres of shrub-scrub and forested wetland within the permanent ROW, or by clearing of forested wetlands in the temporary ROW that would not be able to reestablish for many years.

Water Crossings

There are two water crossings associated with the HVTL alignment. These crossings include a perennial stream between Big and Little Diamond Lakes and the Swan River. Wetland impacts

within the bed of either water body would be avoided. The total length of water crossings for the HVTL WRA-1 alignment is estimated at 123 linear feet. Table 4.7-5 provides a summary of the length of each water crossing for the HVTL alignment. Water bodies designated as "MNDNR PWI" are listed on the Public Waters Inventory and would require a license to be crossed.

Table 4.7-5. Water Crossings for HVTL Alternative 1 (West Range Site)

Water Crossing Location	Milepost (mile + linear ft)	MNDNR PWI	Length of Crossing (linear ft)
Perennial stream between Big & Little Diamond Lakes (Basin E1)	0+3980	No	3
Swan River	3+1630	Yes	120
		Total	**123**

HVTL Alternative 1A

In the event that PUC were to approve this ROW instead of HVTL Alternative 1, and MISO were to approve the use of 345-kV circuits (Excelsior's Plan A) to the Blackberry Substation, this is the only HVTL corridor that would be affected for the Mesaba Generating Station Phases I and II. In the event that MISO were to require the use of 230-kV circuits (Excelsior's Plan B), this corridor would likely be developed for HVTL use in either Phase I or Phase II of generating station operation. Therefore, this ROW is the second most likely corridor to be developed for the project. Alternative 1A (WRA-1A or WRB-1A alignment) would share about 3.3 miles of ROW in common with Alterative 1 and parallel about 2 miles of Twin Lakes Road.

Wetland Fill

Wetland fill required for Alternative 1A was determined using the same assumptions as HVTL Alternative 1. Table 4.7-6 indicates that the impacts of the alignment would be comparable to HVTL Alternative 1.

Table 4.7-6. Wetland Impacts (acres), HVTL Alternative 1A (West Range Site)

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Wetland Fill		Temporary Scrub-Shrub Wetland Impacts[2]	Permanent Wetland Type Conversion[3]
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality	# Poles	Area		
A1	PEMB/PS S1B/PFO4	Type 3/6/8	Shallow Marsh, Shrub Carr, Coniferous Bog	High	Moderate	—	—	1.10	2.30
E5	PEMH	Type 8	Coniferous Bog	High	Moderate	—	—	—	0 (already cleared)
E1	PEMC	Type 3	Shallow Marsh	High	Moderate	1	0.0006	—	—
E2	PEMB	Type 2	Wet Meadow	High	Moderate	1	0.0006	—	—
E4	PEMC	Type 3	Shallow Marsh	Moderate	Moderate	1	0.0006	—	—
NWI[4]	n/a	Type 5	Assumed Shallow Open Water	Unknown	Unknown	1	0.0006	—	—
NWI[4]	n/a	Type 6	Assumed Aspen Thicket	Unknown	Unknown	2	0.0012	2.80	8.26
NWI[4]	n/a	Type 7	Assumed Hardwood Swamp	Unknown	Unknown	3	0.0019	—	4.15
NWI[4]	n/a	Type 8	Assumed Coniferous Bog	Unknown	Unknown	7	0.0045	—	12.93
					Total	**16**	**0.01**	**3.90**	**25.34**

[1] Complete MnRAM 3.1 Functions and Values Assessment data are included in Appendix F3.
[2] Temporary removal of scrub-shrub vegetation outside the 100-foot permanent ROW. Natural revegetation will be allowed following completion of construction.
[3] Permanent conversion of scrub-shrub vegetation within 100-foot permanent ROW and scrub-shrub and forested vegetation within the 150-foot construction ROW.
[4] NWI basins are those areas that have not been field investigated. Cowardin classifications are taken from the NWI. Circular 39 and Eggers and Reed classifications are assumed from the Cowardin classification, aerial photograph interpretations, and known characteristics of delineated wetlands.
n/a = not available

Wetland Type Conversion (Tree and Shrub Clearing)

Impacts resulting from clearing for construction resulting in temporary and permanent conversions of wetlands would be as described for HVTL Alternative 1. Table 4.7-6 summarizes the wetland type conversion that would result from construction of HVTL Alternative 1A (WRA-1 alignment). Construction of HVTL Alternative 1A would temporarily disturb 3.90 acres of shrub-scrub wetlands, which would be expected to naturally reestablish after completion of construction. The construction would permanently remove 25.34 acres of shrub-scrub and forested wetland by permanent removal within the permanent ROW, or by clearing of forested wetlands in the temporary ROW that would not be able to reestablish for many years.

Water Crossings

Six water crossings would occur for HVTL Alternative 1A as listed in Table 4.7-7. The alignment shared with HVTL Alternative 1 would have the same two water crossings. Four additional water crossings over the Swan River would occur along the southern portion of the HVTL Alternative 1A alignment. The total length of water crossings for HVTL Alternative 1A would be about 533 linear feet. Water bodies designated as "MNDNR PWI" are listed on the Public Waters Inventory and would require a license to be crossed.

Table 4.7-7. Water Crossings for HVTL Alternative 1A (West Range Site)

Water Crossing Location	Milepost (mile + linear ft)	MNDNR PWI	Length of Crossing (linear ft)
Perennial stream between Big & Little Diamond Lakes (Basin E1)	0+3980	No	3
Swan River	3+1630	Yes	60
Swan River	3+2960	Yes	60
Swan River	3+3575	Yes	50
Swan River	3+4400	Yes	270
Swan River	4+360	Yes	90
		Total	**533**

HVTL Alternative Phase II Plan B

The alignment for HVTL Alternative Phase II Plan B (WRB-2A) would use the existing MP 45L/28L and MP 62L/63L corridors as shown in Figure 2.3-4. Excelsior would only use this alignment to support Mesaba Generating Station Phase II in the event that MISO were to require the use of 230-kV circuits (Excelsior's Plan B), and the PUC were not to approve the use of both corridors discussed previously (HVTL Alternatives 1 and 1A). Therefore, this alignment is the least likely to be affected by the Mesaba Energy Project. Because this alignment would use an existing, cleared, and maintained HVTL ROW, construction would have negligible potential for additional direct or indirect wetland impacts (estimated at 0.03 acre in aggregate for placement of HVTL towers).

The Phase II Plan B Alternative (WRB-2A alignment) would include five water crossings, all of which would involve protected waters listed in the MNDNR Protected Water Inventory. These crossings include the Swan River and one of its tributaries, as well as Snowball Creek, Oxhide Creek, and Oxhide Lake. As listed in Table 4.7-8, the total length of water crossings for the Phase II Plan B Alternative would be about 283 linear feet. Water bodies designated as "MNDNR PWI" are listed on the Public Waters Inventory and would require a license to be crossed.

Table 4.7-8. Water Crossings for HVTL Alternative Plan B Phase II (West Range Site)

Water Crossing Location	Milepost	MNDNR PWI	Length of Crossing (linear ft)
Swan River	14+0	Yes	190
Tributary of Swan River, outlet of Lower Panasa Lake	12+4640	Yes	3
Snowball Creek	11	Yes	10
Oxhide Lake	8+2220	Yes, PWI 106P	70
Oxhide Creek	9+2880	Yes	10
		Total	**283**

Natural Gas Pipeline Alternatives (West Range Site)

Section 2.3.1.4 describes Natural Gas Pipeline alternatives and Figure 2.3-4 (Chapter 2) shows the alignments.

The natural gas pipeline would be constructed below grade within a 70-foot permanent ROW. Construction of the pipeline would result in temporary impacts to wetlands existing within the 100-foot construction ROW. Wetland fill impacts would be avoided by restoring wetland habitat after

construction. Wetland impacts along the pipeline alignment would include temporary impacts to emergent wetlands within the construction corridor, temporary disturbance of scrub-shrub habitat in temporary workspaces (areas within the construction ROW but outside the permanent ROW), and permanent conversion of scrub-shrub and forested habitat within the permanent ROW where prior disturbance has not removed woody vegetation. Although vegetation outside of the permanent ROW would be allowed to revegetate, impacts to forested wetlands even outside the permanent ROW are considered permanent because of the length of time required for restoration of forested habitat.

Excelsior would determine the location of the temporary construction and permanent ROWs during final design, once the final pipeline alignment is approved. During pipeline design, Excelsior would make adjustments to avoid and minimize wetland habitat.

Natural Gas Pipeline Alternative 1

As explained in Section 2.3.1.4, Minnesota PUC approved a permit for construction of the Nashwauk Natural Gas Pipeline after the Mesaba Draft EIS was published. Excelsior has stated its intent to negotiate with the Nashwauk PUC for purchase of natural gas from the Nashwauk pipeline, which will be constructed along the same corridor as the alignment for Natural Gas Pipeline Alternative 1 proposed for the Mesaba Energy Project. In the event that Excelsior would reach favorable terms for the purchase of natural gas from Nashwauk PUC, the construction of a separate natural gas pipeline for the Mesaba Generating Station would not be necessary, and the impacts described for Alternative 1 would not be directly attributable to the Mesaba Energy Project.

Wetland Impacts

Temporary emergent wetland impacts are impacts to wetland Types 1-5 within the 150-foot temporary construction ROW. Material excavated from the trench would be deposited to one side of the trench or the other (sidecast). Preference would be given to sidecasting outside of wetland areas where practicable. Following pipe installation, soil would be returned to the trench in reverse of the removal (i.e., topsoil would be replaced on the surface). Disturbed wetland (and upland areas) would be reseeded with a native seed mix appropriate to the adjacent vegetative community. Indirect drainage effects to wetlands from groundwater collected and conveyed along the backfilled pipeline trench would be avoided by installation of anti-seepage collars on the pipe in strategic locations. Table 4.7-9 summarizes temporary emergent impacts during construction for Natural Gas Pipeline Alternative 1.

If the Nashwauk Public Utilities Commission natural gas pipeline were not constructed and/or Excelsior's Natural Gas Pipeline Alternative 1 was constructed first, about 11.14 miles of the pipeline would be constructed in new greenfield ROW. Construction across greenfield areas and establishment of new ROW would require clearing of trees and shrubs in upland and wetland areas. Table 4.7-9 provides a summary of wetland type conversion that would result from construction of Natural Gas Pipeline Alternative 1.

Table 4.7-9. Wetland Impacts (acres), Natural Gas Pipeline Alternative 1 (West Range Site)

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Temporary Emergent Impacts	Temporary Scrub-Shrub Impacts[2]	Permanent Scrub-Shrub and Forested Conversion[3]
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality			
A1	PEMB/PSS 1B/PFO4	Type 3/6/8	Shallow Marsh, Shrub Carr, Coniferous Bog	High	Moderate	—	0.01	1.50
E1	PEMC	Type 3	Shallow Marsh	High	Moderate	0.43	—	—
E2	PEMB	Type 2	Wet Meadow	High	Moderate	0.23	—	—
E4	PEMC	Type 3	Shallow Marsh	Moderate	Moderate	0.08	—	—
E5	PEMH	Type 8	Coniferous Bog	High	Moderate	—	—	0.13
E6	PEMC	Type 3	Shallow Marsh	High	Moderate	0.17	—	—
E7	PEMC	Type 3	Shallow Marsh	High	High	0.33	—	—
NWI[4]	n/a	Type 1	Assumed Floodplain Forest	Unknown	Unknown	0.70	—	—
NWI[4]	n/a	Type 2	Assumed Wet Meadow	Unknown	Unknown	1.75	—	—
NWI[4]	n/a	Type 3	Assumed Shallow Marsh	Unknown	Unknown	0.21	—	—
NWI[4]	n/a	Type 6	Assumed Alder Thicket	Unknown	Unknown	—	0.83	3.00
NWI[4]	n/a	Type 7	Assumed Hardwood Swamp	Unknown	Unknown	—	—	9.16
NWI[4]	n/a	Type 8	Assumed Coniferous Bog	Unknown	Unknown	—	—	2.59
					Total	**3.90**	**0.84**	**16.38**

[1] Complete MnRAM 3.1 Functions and Values Assessment data can be found in Appendix F3.
[2] Temporary removal of scrub-shrub vegetation outside the 70-foot permanent ROW. Natural revegetation will be allowed following completion of construction.
[3] Permanent conversion of scrub-shrub vegetation within 70-foot permanent ROW and scrub-shrub and forested vegetation within the 100-foot construction ROW.
[4] NWI basins are those areas that have not been field investigated. Cowardin classifications are taken from the NWI. Circular 39 and Eggers and Reed classifications are assumed from the Cowardin classification, aerial photograph interpretations, and known characteristics of delineated wetlands.
n/a = not available

Water Crossings

Four water crossings would be associated with Natural Gas Pipeline Alternative 1, as shown in Table 4.7-10. The Natural Gas Pipeline would be directionally drilled under water bodies starting about 100 feet from the edge of each water body. This would minimize impacts to wetlands associated with water crossings. Temporary wetland impacts are limited to those areas on either side of the water body where the pipeline emerges and open cut trenching begins. Water bodies designated as "MNDNR PWI" are listed on the Public Waters Inventory and would require a license to be crossed.

Table 4.7-10. Water Crossings for Natural Gas Pipeline Alternative 1 (West Range Site)

Water Crossing Location	Milepost (mile + linear ft)	MNDNR PWI	Length of Crossing (linear ft)
Swan River	4+2170	Yes	60
Tributary of Swan River	5+1460	No	10
Swan River	9+4560	Yes	60
Perennial stream between Big & Little Diamond Lakes	12+2000	No	3
		Total	**133**

Natural Gas Pipeline Alternative 2

Wetland Impacts

Construction methods, ROWs, and the types of impacts on wetlands for Natural Gas Pipeline Alternative 2 would be as described for Alternative 1. Table 4.7-11 provides a summary of temporary wetland impacts and permanent type conversion impacts by wetland type that would result from construction of Alternative 2.

Table 4.7-11. Wetland Impacts (acres), Natural Gas Pipeline Alternative 2 (West Range Site)

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Temporary Emergent Impact[2]	Temporary Scrub-Shrub Impacts[3]	Permanent Scrub-Shrub and Forested Conversion[3,4]
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality			
A1	PEMB/PSS 1B/PFO4	Type 3/6/8	Shallow Marsh, Shrub Carr, Coniferous Bog	High	Moderate	—	0.01	1.50
E1	PEMC	Type 3	Shallow Marsh	High	Moderate	0.43	—	—
E2	PEMB	Type 2	Wet Meadow	High	Moderate	0.23	—	—
E4	PEMC	Type 3	Shallow Marsh	Moderate	Moderate	0.08	—	—
E5	PEMH	Type 8	Coniferous Bog	High	Moderate	—	—	0.13
E6	PEMC	Type 3	Shallow Marsh	High	Moderate	0.17	—	—
E7	PEMC	Type 3	Shallow Marsh	High	High	0.33	—	—
NWI[5]	n/a	Type 2	Assumed Wet Meadow	Unknown	Unknown	0.17	—	—
NWI[5]	n/a	Type 3	Assumed Shallow Marsh	Unknown	Unknown	0.05	—	—
NWI[5]	n/a	Type 6	Assumed Aspen Thicket	Unknown	Unknown	—	0.01	6.09
NWI[5]	n/a	Type 7	Assumed Hardwood Swamp	Unknown	Unknown	—	—	1.82
NWI[5]	n/a	Type 8	Assumed Coniferous Bog	Unknown	Unknown	—	—	1.44
Total						**1.46**	**0.02**	**10.98**

[1] Complete MnRAM 3.1 Functions and Values Assessment data can be found in Appendix F3.
[2] Temporary Emergent Impacts are wetland impacts to wetland Types 1-5 within the 150-foot temporary construction ROW.
[3] Temporary removal of scrub-shrub vegetation outside the 70-foot permanent ROW. Natural revegetation will be allowed following completion of construction.
[4] Permanent conversion of scrub-shrub vegetation within 70-foot permanent ROW and scrub-shrub and forested vegetation within the 100-foot construction ROW.
[5] NWI basins are those areas that have not been field investigated. Cowardin classifications are taken from the NWI. Circular 39 and Eggers and Reed classifications are assumed from the Cowardin classification, aerial photograph interpretations, and known characteristics of delineated wetlands.
n/a = not available

Water Crossings

Four water crossings would be associated with Natural Gas Pipeline Alternative 2 as listed in Table 4.7-12. Water crossings for Natural Gas Pipeline Alternative 2 would be directionally drilled as described for the Natural Gas Pipeline Alternative 1. Water bodies designated as "MNDNR PWI" are listed on the Public Waters Inventory and would require a license to be crossed.

Table 4.7-12. Water Crossings for Natural Gas Pipeline Alternative 2 (West Range Site)

Water Crossing Location	Milepost (mile + linear ft)	MNDNR PWI	Length of Crossing (linear ft)
Prairie River	0+1980	Yes	210
Swan River	5+4330	Yes	50
Swan River	10+4180	Yes	50
Perennial stream between Big & Little Diamond Lakes	13+1690	No	3
		Total	**313**

Natural Gas Pipeline – Alternative 3

Wetland Impacts

Construction methods, ROWs, and the types of impacts on wetlands for Natural Gas Pipeline Alternative 3 would be as described for Alternative 1. Table 4.7-13 provides a summary of temporary wetland impacts and permanent type conversion impacts by wetland type that would result from construction of Alternative 3.

Table 4.7-13. Wetland Impacts (acres), Natural Gas Pipeline Alternative 3 (West Range Site)

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Temporary Emergent Impact[2]	Temporary Scrub-Shrub Impacts[3]	Permanent Scrub-Shrub and Forested Conversion[3,4]
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality			
A1	PEMB/PS S1B/PFO4	Type 3/6/8	Shallow Marsh, Shrub Carr, Coniferous Bog	High	Moderate	—	0.01	1.50
E1	PEMC	Type 3	Shallow Marsh	High	Moderate	0.43	—	—
E2	PEMB	Type 2	Wet Meadow	High	Moderate	0.23	—	—
E4	PEMC	Type 3	Shallow Marsh	Moderate	Moderate	0.08	—	—
E5	PEMH	Type 8	Coniferous Bog	High	Moderate	—	—	0.13
E6	PEMC	Type 3	Shallow Marsh	High	Moderate	0.21	—	—
E7	PEMC	Type 3	Shallow Marsh	High	High	0.33	—	—

Table 4.7-13. Wetland Impacts (acres), Natural Gas Pipeline Alternative 3 (West Range Site)

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Temporary Emergent Impact[2]	Temporary Scrub-Shrub Impacts[3]	Permanent Scrub-Shrub and Forested Conversion[3,4]
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality			
NWI[5]	n/a	Type 2	Assumed Wet Meadow	Unknown	Unknown	6.36	—	—
NWI[5]	n/a	Type 3	Assumed Shallow Marsh	Unknown	Unknown	0.29	—	—
NWI[5]	n/a	Type 6	Assumed Aspen Thicket	Unknown	Unknown	—	0.32	0.97
NWI[5]	n/a	Type 7	Assumed Hardwood Swamp	Unknown	Unknown	—	—	0.46
NWI[5]	n/a	Type 8	Assumed Coniferous Bog	Unknown	Unknown	—	—	1.20
					Total	**7.93**	**0.33**	**4.26**

[1] Complete MnRAM 3.1 Functions and Values Assessment data can be found in Appendix F3.
[2] Temporary Emergent Impacts are wetland impacts to wetland Types 1-5 within the 150-foot temporary construction ROW.
[3] Temporary removal of scrub-shrub vegetation outside the 70-foot permanent ROW. Natural revegetation will be allowed following completion of construction.
[4] Permanent conversion of scrub-shrub vegetation within 70-foot permanent ROW and scrub-shrub and forested vegetation within the 100-foot construction ROW.
[5] NWI basins are those areas that have not been field investigated. Cowardin classifications are taken from the NWI. Circular 39 and Eggers and Reed classifications are assumed from the Cowardin classification, aerial photograph interpretations, and known characteristics of delineated wetlands.
n/a = not available

Water Crossings

Four water crossings would be associated with Natural Gas Pipeline Alternative 3 as listed in Table 4.7-14. Water crossings for Natural Gas Pipeline Alternative 3 would be directionally drilled as described for the Natural Gas Pipeline Alternative 1. Water bodies designated as "MNDNR PWI" are listed on the Public Waters Inventory and would require a license to be crossed.

Table 4.7-14. Water Crossings for Natural Gas Pipeline Alternative 3 (West Range Site)

Water Crossing Location	Milepost	MNDNR PWI	Length of Crossing (linear ft)
Prairie River	0+2300	Yes	210
Tributary of Prairie River	2+880	No	20
Perennial stream, drains to Holman Lake	9+3200	Yes	3
Perennial stream between Big & Little Diamond Lakes	11	No	3
		Total	**236**

Process Water Supply Pipelines (West Range Site)

Process Water Supply Pipeline Segments 1, 2, and 3 would all be included in the process water supply plan for the West Range Site (see Section 4.5) and would all be constructed during Phase I of the Mesaba Energy Project. Section 2.3.1.3 discusses the alignments, as shown in Figure 2.3-3 (Chapter 2). Process Water Pipelines would be located so they share permanently maintained ROW with other utilities as much as possible. For example, Segment 3 of the Proposed Process Water Pipeline would parallel the Proposed Rail Line, Site Access Road, CR-7, and a portion of Segment 2. Segment 2 of the Proposed Process Water Pipeline would parallel the Site Access Road, Sanitary Sewer Pipeline, Potable Water Pipeline, and a portion of Segment 3.

The pipelines would be constructed below grade within a 100-foot permanent ROW. Construction of the process water utilities would result in temporary impacts to wetlands existing within the 150-foot construction ROW. Wetland fill impacts would be avoided by restoring wetland habitat after construction. Wetland impacts along the pipeline alignments would include temporary impacts to emergent wetlands within the construction corridor, temporary disturbance of scrub-shrub habitat in temporary workspaces (areas within the construction ROW but outside the permanent ROW), and permanent conversion of scrub-shrub and forested habitat within the permanent ROW where prior disturbance has not removed woody vegetation. Although vegetation outside of the permanent ROW would be allowed to regenerate, impacts to forested wetlands even outside the permanent ROW are considered permanent because of the length of time required for restoration of forested habitat. Table 4.7-15 provides a summary of wetland impacts resulting from construction of Process Water Pipelines.

Table 4.7-15. Wetland Impacts (acres), Process Water Supply Pipelines (West Range Site)

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Temporary Emergent Wetland Impacts[2]	Temporary Scrub-Shrub Wetland Impacts[3]	Permanent Wetland Type Conversion[4]
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality			
Lind Mine Pit to the Canisteo Mine Pit (Segment 1) Total Length: 2.18 miles Greenfield ROW: 0.17 miles								
—	—	—	—	—	—	—	—	—
Canisteo Mine Pit to the West Range Site (Segment 2) Total Length: 2.15 miles Greenfield ROW: 0.73 miles								
C10	PSS1A	Type 6	Alder Thicket	High	Moderate	—	0.12	0.04
C27	PFO1C	Type 7	Coniferous Swamp	High	Moderate	—	—	0.93
C28	PFO1C	Type 7	Coniferous Swamp	High	Moderate	—	—	1.05
F1	PSS1C	Type 6	Alder Thicket	High	High	—	0.06	0.08
					Segment 2 Subtotal	—	**0.18**	**2.10**

Table 4.7-15. Wetland Impacts (acres), Process Water Supply Pipelines (West Range Site)

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Temporary Emergent Wetland Impacts[2]	Temporary Scrub-Shrub Wetland Impacts[3]	Permanent Wetland Type Conversion[4]
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality			
Gross-Marble Mine Pit to Canisteo Mine Pit (Segment 3) Total Length: 4.83 miles Greenfield ROW: 2.23 miles								
C10	C10	PSS1A	Type 6	Alder Thicket	High	—	0.84	0.76
C19	PEMH	Type 5	Shallow Open Water	High	Moderate	0.64	—	—
C21	PSS1C	Type 6	Alder Thicket	Moderate	Moderate	—	0.08	0.16
C22	PSS1C	Type 6	Alder Thicket	High	Moderate	—	0.02	—
C23	PSS1C	Type 6	Alder Thicket	Moderate	Moderate	—	0.08	0.18
C24	PFO2B	Type 8	Coniferous Bog	Moderate	Moderate	—	—	0.14
C28	PFO1C	Type 7	Coniferous Swamp	High	Moderate	—	—	0.05
NWI[5]	PUBF	Type 4	n/a	n/a	n/a	0.62	—	—
NWI[5]	PSS/EM5B	Type 6	n/a	n/a	n/a	—	0.13	0.13
NWI[5]	PFO/SSB	Type 7	n/a	n/a	n/a	—	—	0.46
NWI[5]	PFOB	Type 8	n/a	n/a	n/a	—	—	0.49
					Segment 3 Subtotal	**1.26**	**1.15**	**2.37**
					Grand Total	**1.26**	**1.33**	**4.47**

[1] Complete MnRAM 3.1 Functions and Values Assessment data can be found in Appendix F3.
[2] Temporary disturbance of emergent wetland habitat within the 150-foot construction ROW.
[3] Temporary removal of scrub-shrub vegetation outside the 100-foot permanent ROW. Natural revegetation will be allowed following completion of construction.
[4] Permanent conversion of scrub-shrub vegetation within 100-foot permanent ROW and scrub-shrub and forested vegetation within the 150-foot construction ROW.
[5] NWI basins are those areas that have not been field investigated. Cowardin classifications are taken from the NWI. Circular 39 and Eggers and Reed classifications are assumed from the Cowardin classification, aerial photograph interpretations, and known characteristics of delineated wetlands.
n/a = not available

Cooling Tower Blowdown Outfalls (West Range Site)

The Draft EIS included process water blowdown pipelines that would have resulted in the following type-conversion impacts during construction:

- **Permanent**
  - **0.09 acre of forested wetlands to emergent wetlands;**
  - **2.95 acres of shrub-scrub wetlands to emergent wetlands;**
- **Temporary**
  - **1.57 acres of shrub-scrub wetlands.**

Excelsior's decision to use an enhanced ZLD system at the West Range Site as discussed in Section 2.3.1.3 eliminated the need for construction of Cooling Tower Blowdown Outfalls. Therefore these impacts to wetlands have been avoided for the Final EIS.

Potable Water and Sewer Pipelines (West Range Site)

The Potable Water and Sewer Pipelines would be constructed below grade within a 40-foot permanent ROW. The permanent ROW and the 100-foot construction ROW are located within the same impact corridor as Process Water Pipeline Segment 2 and Access Road 3 as described in

Section 2.3.1.3 and shown in Figure 2.3-3. Therefore, construction of the potable water and sanitary sewer pipelines would not result in any additional wetland impacts.

Rail Line Alternatives (West Range Site)

Excelsior's original preferred rail line (Rail Alternative 1A), which pairs with the Central – Draft EIS plant location, would pass by the plant footprint and loop around a wetland complex as shown in Figure 4.7-1. This rail loop would result in about 18 acres of wetland fill. The impacts to wetlands, summarized in Table 4.7-16, include all wetlands within the construction limits of the proposed rail line based on a 3:1 slope along the railroad embankments. Rail Alternative 1A would also create potential indirect impacts by isolating wetlands within the loop (58 acres).

Table 4.7-16. Wetland Fill (acres), Rail Alternative 1A (West Range Site)

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Wetland Fill
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality	
A1	PEMB/PSS1/PFO4	Type 3/6/8	Shallow Marsh/Shrub Carr/Coniferous Bog	High	Moderate	3.15
A3	PFO1C	Type 7	Hardwood Swamp	High	High	0.10
A4	PFO1C/F	Type 7	Hardwood Swamp	Moderate	High	12.65
C12	PSSC1	Type 6	Alder Thicket	High	Moderate	0.62
C13	PSS1C/PFOC1	Type 6/7	Alder Thicket/ Hardwood Swamp	High	Moderate	0.22
C15	PSS1C	Type 6	Alder Thicket	High	Moderate	0.07
D8	PEMC/PFO1C/PFO 4B	Type 3/7/8	Shallow Marsh/Hardwood Swamp/Coniferous Bog	High	Moderate	0.32
D10	PEMC/PSSA1C	Type 3/6	Sedge Meadow/ Shrub Carr	High	High	0.51
NWI[2]	n/a	Type 6	Assumed Alder Thicket	n/a	n/a	0.30
					Total	**17.94**
Center Loop						**Isolated Wetlands**
A4	PFO1C/F	Type 7	Hardwood Swamp	Moderate	High	**58.30**

[1] Complete MnRAM 3.1 Functions and Values Assessment data are included in Appendix F3.
[2] NWI basins are those areas that have not been field investigated. Cowardin classifications are taken from the NWI. Circular 39 and Eggers and Reed classifications are assumed from the Cowardin classification, aerial photograph interpretations, and known characteristics of delineated wetlands.
n/a - not available

Excelsior's new preferred rail line (Rail Alternative 3B), which pairs with the Central – Final EIS plant location, would intersect the northeastern perimeter of the plant footprint and loop around the hill in the northeastern portion of the site as shown in Figure 4.7-1. This rail loop would result in less than 6 acres of wetland fill. The impacts to wetlands, summarized in Table 4.7-17, include all wetlands within the construction limits of the proposed rail line based on a 3:1 slope along the railroad embankments.

Although rail yard operations would be less than optimal, because the rail line would not adjoin the footprints of both phases (as would Alternative 1A), this rail alternative reduces the area of wetland fill from 18 acres to less than 6 acres and avoids potential indirect impacts to 58 acres of wetlands.

Table 4.7-17. Wetland Fill (acres), Rail Alternative 3B (West Range Site)

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Wetland Fill
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality	
A1	PEMB/PSS1/PFO4	Type 3/6/8	Shallow Marsh/Shrub Carr/Coniferous Bog	High	Moderate	2.05
A3	PFO1C	Type 7	Hardwood Swamp	High	High	0.10
A4	PFO1C/F	Type 7	Hardwood Swamp	Moderate	High	0.27
A40	PEMC/PSS1C	Type 3/6	Shallow Marsh/ Alder Thicket	High	High	0.06
B15	PEMB/PSS1C/ PFO1A	Type 2/6/7	Wet Meadow/ Alder Thicket	High	High	0.14
C12	PSSC1	Type 6	Alder Thicket	High	Moderate	0.62
C13	PSS1C/PFOC1	Type 6/7	Alder Thicket/ Hardwood Swamp	High	Moderate	0.22
C15	PSS1C	Type 6	Alder Thicket	High	Moderate	0.08
D8	PEMC/PFO1C/ PFO4B	Type 3/7/8	Shallow Marsh/Hardwood Swamp/Coniferous Bog	High	Moderate	0.56
D10	PEMC/PSSA1C	Type 3/6	Sedge Meadow/ Shrub Carr	High	High	0.38
D12	PEMC/PFO1C	Type 3/7	Sedge Meadow/ Hardwood Swamp	High	High	0.01
D13	PEMC/PFO1C	Type 3/7	Sedge Meadow/ Hardwood Swamp	High	High	0.04
D14	PSS1C/PFO1C	Type 6/7	Shrub Carr/ Hardwood Swamp	High	High	0.61
NWI[2]	PSSB	Type 6	Assumed Alder Thicket	n/a	n/a	0.29
NWI[2]	PSSB	Type 6	Assumed Alder Thicket	n/a	n/a	0.16
NWI[2]	PSSB	Type 6	Assumed Alder Thicket	n/a	n/a	0.14
					Total	**5.73**

[1] Complete MnRAM 3.1 Functions and Values Assessment data are included in Appendix F3.
[2] NWI basins are those areas that have not been field investigated. Cowardin classifications are taken from the NWI. Circular 39 and Eggers and Reed classifications are assumed from the Cowardin classification, aerial photograph interpretations, and known characteristics of delineated wetlands.
n/a - not available

Access Road Alignments (West Range Site)

Excelsior planned Access Road 2 as proposed in the Draft EIS (Figure 4.7-1) with the intention of intersecting a new CR 7 realignment proposed by Itasca County. The realignment of CR 7 (Figure 4.7-1), identified as Access Road 1 in the Draft EIS, would extend eastward off the existing CR 7 just south of West Range Site, run east between Dunning Lake and Big Diamond Lake, and then turn south between Arcturus Mine and Big Diamond Lake to intersect with US 169.

Because of changes in highway funding priorities by the state, Itasca County does not expect to construct the CR 7 realignment in time to be available for use by the Mesaba Generating Station. Therefore, Excelsior investigated additional options for road access to the West Range Site after publication of the Draft EIS. During this investigation, DOE coordinated with Excelsior to ensure that the new access road alignment would reduce potential impacts on wetlands. These efforts resulted in the identification of Access Road 3, which would connect the Mesaba Generating Station

footprint with CR 7 near the southwest corner of the West Range Site as shown in Figure 4.7-1. This road alignment provides the shortest access to CR 7 and minimizes impacts to wetlands.

Wetland Fill

Wetland fill impacts for access road construction were calculated assuming fill across the width of the 120-foot wide permanent ROW. Table 4.7-18 provides a summary of wetland fill within the construction limits of the proposed roadway for the Draft EIS (Access Roads 1 and 2) and Table 4.7-19 provides the same summary for the proposed roadway in this Final EIS (Access Road 3).

Table 4.7-18. Wetland Fill (acres), Access Roads 1 and 2 (West Range Site)

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Wetland Fill
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality	
A1	PEMB/PSS1/ PFO4	Type 3/6/8	Shallow Marsh/Shrub Carr/Coniferous Bog	High	Moderate	3.44
A13	PFO1B	Type 7	Hardwood Swamp	High	High	0.24
A14	PFO1B	Type 7	Hardwood Swamp	High	High	0.14
A27	PFO1C	Type 7	Hardwood Swamp	High	High	—
C21	PSS1C	Type 6	Alder Thicket	High	Moderate	0.33
C22	PSS1C	Type 6	Alder Thicket	High	Moderate	0.09
C23	PSS1C/ PFO1C	Type 6/7	Alder Thicket/Hardwood Swamp	High	Moderate	0.36
C24	PFO2B	Type 8	Coniferous Bog	High	Moderate	0.34
C26	PFO1C	Type 7	Coniferous Swamp	High	High	—
C27	PFO1C	Type 7	Coniferous Swamp	High	Moderate	0.01
NWI[2]	n/a	Type 4	Assumed Deep Marsh	n/a	n/a	0.43
NWI[2]	n/a	Type 6	Assumed Alder Thicket	n/a	n/a	—
NWI[2]	n/a	Type 7	Assumed Hardwood Swamp	n/a	n/a	0.19
NWI[2]	n/a	Type 8	Assumed Coniferous Bog	n/a	n/a	0.10
					Total	**5.67**

[1] Complete MnRAM 3.1 Functions and Values Assessment data are included in Appendix F3.
[2] NWI basins are those areas that have not been field investigated. Cowardin classifications are taken from the NWI. Circular 39 and Eggers and Reed classifications are assumed from the Cowardin classification, aerial photograph interpretations, and known characteristics of delineated wetlands.
n/a = not available

Table 4.7-19. Wetland Fill (acres), Access Road 3 (West Range Site)

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Wetland Fill
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality	
A11	PEMC	Type 3	Shallow Marsh	Moderate	High	0.004
F1	PSS1C	Type 6	Alder Thicket	High	High	0.19
					Total	**0.194**

[1] Complete MnRAM 3.1 Functions and Values Assessment data are included in Appendix F3.

Temporary Wetland Impacts

Temporary impacts to wetlands associated with Access Road 3 construction assume a 200-foot wide construction ROW. This ROW would be shared with several process water pipelines and the potable water and sanitary sewer pipelines for a portion of its length. The total temporary wetland impacts are 0.2 acres, which includes 0.08 acres of Type 3 shallow marsh and 0.13 acres of Type 6 alder thicket.

4.7.3.2 Impacts of Operation

The impacts to wetlands at the West Range Site would be the same as those presented as common operational impacts in Section 4.7.2.2.

4.7.4 Impacts on East Range Site and Corridors

The following sections describe the wetland impacts specific to the East Range Site and associated utility and transportation corridors. Impacts that would be common at both the alternative sites are discussed in Section 4.7.2.

4.7.4.1 Impacts of Construction

Based upon comments received on the Draft EIS and additional analyses performed, Section 4.7.4.1 in the Draft EIS was deleted in its entirety and replaced with new text and tables. The major changes incorporated in the new section include:

- **The proposed Access Road looped alignment was replaced with a single, direct route;**
- **All fill calculations were done assuming 3:1 side slopes for the fill;**
- **Type conversion impacts were separated into temporary and permanent impacts;**
- **Impacts are described with respect to wetlands as classified by Eggers and Reed, 1997; and**
- **Selected results of the MnRAM analysis (full results in Appendix F3) are included.**

The proposed project includes actions throughout the East Range Site and Corridors, i.e., those within the Mesaba Generating Station Footprint and Buffer Land and the linear corridors along which the power transmission, gas pipeline, and other associated facilities traverse. Section 2.3.2 describes the project elements at the East Range Site. The following sections describe the impacts to wetlands that would result from the construction of each project element. Impacts to wetlands are described as wetland fill, temporary wetland disturbance, and wetland type-conversion resulting from vegetation removal. Section 4.7.6 contains a summary of potential impacts at the East Range Sites and Corridors as well as for the West Range Sites and Corridors. Appendix F2 contains additional graphics depicting the impacts described below.

Mesaba Generating Station Footprint

As positioned in Figure 4.7-2 the Mesaba Generating Station Footprint would affect 17.15 acres of wetland habitat. The impact area includes the plant footprint and the 3:1 grading at its boundaries required to achieve the natural grade of the surrounding area. Table 4.7-20 summarizes wetland impacts resulting from the placement, alignment, and grading of the plant footprint, including areas within the grading limits. Figure 4.7-2 shows the locations of the wetlands affected.

Table 4.7-20. Wetland Fill (acres), Mesaba Generating Station (East Range Site)

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Wetland Fill[2]		
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality	Phase I	Phase II	Total
A	PEMC	Type 2	Sedge Meadow	High	Moderate	0.05	0.003	0.05
B	PFOC	Type 7	Coniferous Swamp	High	Moderate	5.53	—	5.53
C3	PFO2B	Type 7	Coniferous Swamp	High	Moderate	0.66	1.42	2.08
C4	PEMH	Type 4	Deep Marsh	High	Moderate	1.89	1.38	3.27
C5	PEMB	Type 2	Fresh Wet Meadow	High	Moderate	1.74	0.004	1.74
C6	PFO1B	Type 7	Hardwood Swamp	High	Moderate	3.38	—	3.38
C9	PSS1B	Type 6	Shrub Swamp	High	Moderate	0.19	0.90	1.09
					Total	**13.44**	**3.71**	**17.15**

[1] Complete MnRAM 3.1 Functions and Values Assessment data are included in Appendix F3.
[2] Impacts due to grading limits for the entire plant site are included in the Phase 1 impacts.

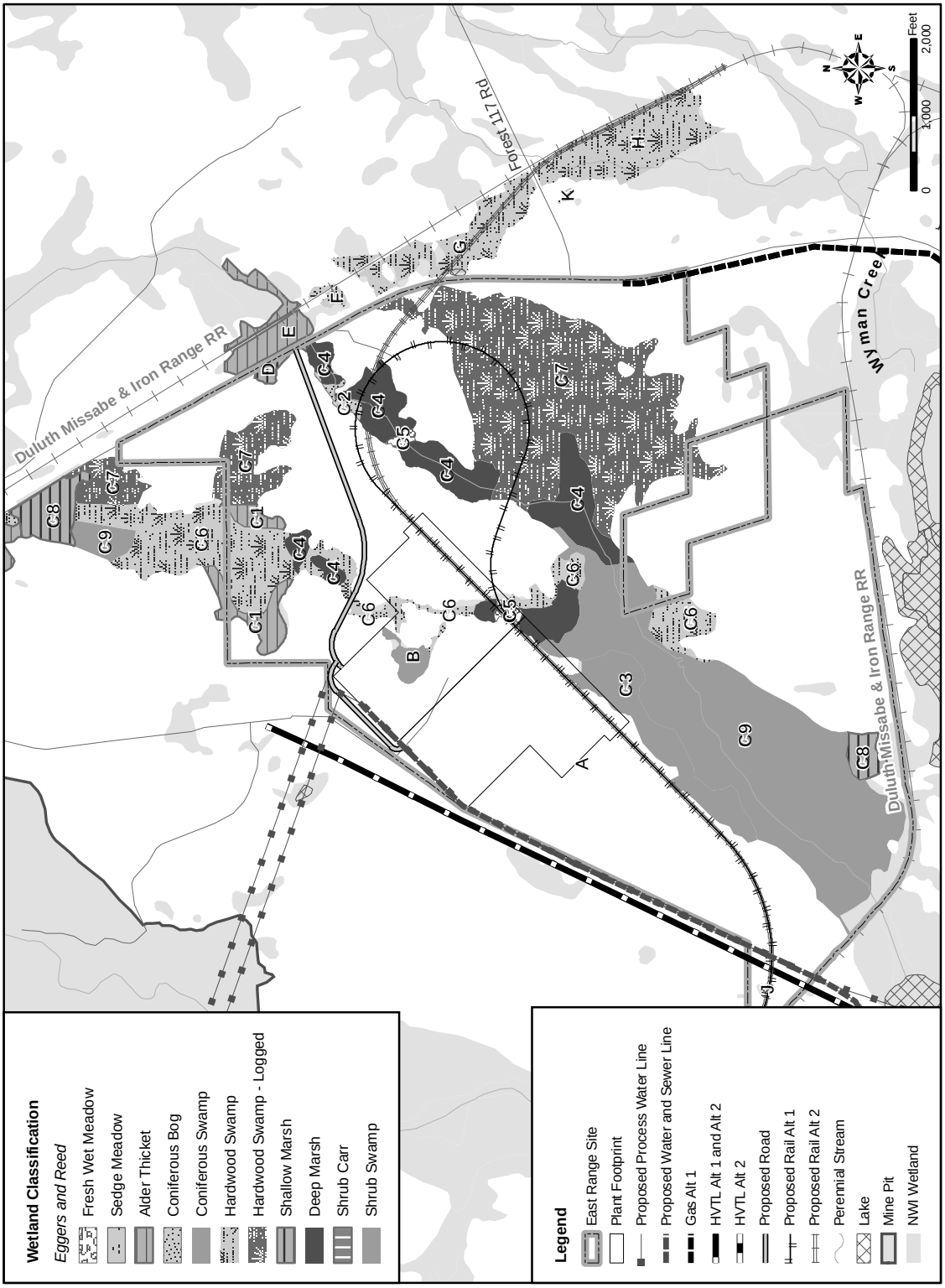

Figure 4.7-2. East Range Eggers and Reed Wetland Classifications

HVTL Alternatives (East Range Site)

Excelsior's transmission plan for the Mesaba Generating Station at the East Range Site consists of constructing two new 345kV HVTLs within three existing ROWs (MP 37L, 38L, and 39L) to link the generating station with the Forbes Substation. Both of Excelsior's HTVL Alternatives would follow the same two routes; however, construction-staging requirements would necessitate the widening of one of the corridors by 30 feet. Hence, Alternative 1 would require clearing of a 30-foot additional ROW along the MP 38L corridor, and Alternative 2 would require clearing of a 30-foot additional ROW along the MP 37L/39L corridor. Section 2.3.2.5 (Chapter 2) describes these alternatives, and Figure 2.3-8 illustrates the corridors. Both HVTL corridors would be required for Phase I operation of the Mesaba Energy Project.

Wetland impacts along the HVTL alignments would include wetland fill for power pole placement, temporary impacts to scrub-shrub habitat in temporary workspaces (areas within the construction ROW but outside the permanent ROW), and conversion of scrub-shrub and forested habitat within the additional 30-foot permanent ROW.

Wetland Fill

Wetland fill would be limited to those areas where power poles would be placed within wetlands. Each pole would require an estimated 28 ft^3 of fill. Wetland impacts were calculated for the HVTL alignment assuming that power poles would be placed every 800 feet. Using this assumption, a total of 139 power poles (73 for MP 38L and 66 for MP 37L/39L) would be placed in wetland areas, resulting in 0.09 acres of permanent wetland impacts along the 68.42-mile alignment (33.58 miles for MP 38L and 34.84 for MP 37L/39L). Table 4.7-21 summarizes the wetland fill impacts, which would be the same for both HVTL Alternatives 1 and 2.

Table 4.7-21. Wetland Fill (acres), HVTL Alternatives (East Range Site)

Basin ID[1]	Wetland Classification			Selected MnRAM Functions[2]		Wetland Fill	
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality	# Poles	Area
MP 38 Line							
NWI	Various	Type 2	Assumed Wet Meadow	—	—	3	0.0019
NWI	Various	Type 5	Assumed Shallow Open Water	—	—	1	0.0006
NWI	Various	Type 6	Assumed Alder Thicket	—	—	33	0.0211
NWI	Various	Type 7	Assumed Hardwood Swamp	—	—	5	0.0030
NWI	Various	Type 8	Assumed Coniferous Bog	—	—	30	0.0189
NWI	Riverine	n/a	n/a	—	—	1	0.0006
					Total	**73**	**0.0461**

Table 4.7-21. Wetland Fill (acres), HVTL Alternatives (East Range Site)

Basin ID[1]	Wetland Classification			Selected MnRAM Functions[2]		Wetland Fill	
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality	# Poles	Area
MP 37/39 Lines							
NWI	Various	Type 2	Assumed Wet Meadow	—	—	1	0.0006
NWI	Various	Type 5	Assumed Shallow Open Water	—	—	3	0.0019
NWI	Various	Type 6	Assumed Alder Thicket	—	—	19	0.0123
NWI	Various	Type 7	Assumed Hardwood Swamp	—	—	13	0.0084
NWI	Various	Type 8	Assumed Coniferous Bog	—	—	30	0.0194
					Total	**66**	**0.0426**
					Combined Total	**139**	**0.0887**

[1] NWI basins are those areas that have not been field investigated. Cowardin classifications are taken from the NWI. Circular 39 and Eggers and Reed classifications are assumed from the Cowardin classification, aerial photograph interpretations, and known characteristics of delineated wetlands.
[2] MnRAM assessments were only completed for wetlands field delineated, and are not available for wetland impacts based off the NWI.
n/a = not applicable

Wetland Type Conversion (Tree and Shrub Clearing)

The majority of HVTL construction for the Mesaba Energy Project would occur within existing 100-foot HVTL ROWs, which would avoid the need for clearing of trees and shrubs. Tree clearing would be required on the additional 30 feet of new ROW and on the new ROW to the Syl Laskin Substation. The proposed new 30-foot ROW would parallel the existing 100-foot HVTL ROW and would alter wooded or shrub wetland habitat. Construction of the new 100-foot ROW between the East Range Mesaba Generating Station and the Syl Laskin Substation would require clearing of shrub swamp. Impacts to wetland vegetation would be of two types—temporary affects to scrub-shrub habitat in temporary workspaces outside the permanent ROW and permanent conversion of scrub-shrub habitat and forested habitat within the permanent ROW. These respective impacts would be as described for HVTL Alternative 1 at the West Range Site.

Table 4.7-22 summarizes wetland type conversion that would result from construction for the respective HVTL alternatives. Type conversion impacts from HVTL Alternative 1 would be based on the addition of a 30-foot ROW along the existing ROW of the MP 38L corridor. Type conversion impacts from Excelsior's preferred HVTL Alternative 2 would be based on the addition of a 30-foot ROW along the existing ROWs of the MP 37L/39L corridor. Both alternatives would include the same new ROW between the Syl Laskin Substation and the Mesaba Generating Station, as well as the new ROW linking the 37L corridor with the 39L corridor near Eveleth.

Table 4.7-22. Wetland Conversion (acres), HVTL Alternatives (East Range Site)

Basin ID[1]	Wetland Classification			Temporary Scrub-Shrub Impacts[2]	Permanent Scrub-Shrub and Forested Conversion[3]
	Cowardin	Circular 39	Eggers and Reed		
Alternative 1 - MP 38 Line (Existing ROWs, Plant Access, plus 30-foot additional ROW on MP 38L)					
NWI	Various	Type 1	Assumed Floodplain Forest	0 (no shrubs)	0 (no trees/shrubs)
NWI	Various	Type 2	Assumed Wet Meadow	0 (no shrubs)	0 (no trees/shrubs)
NWI	Various	Type 5	Assumed Shallow Open Water	0 (no shrubs)	0 (no trees/shrubs)
NWI	Various	Type 6	Assumed Alder Thicket	0 (no wetlands)	24.27
NWI	Various	Type 7	Assumed Hardwood Swamp	0 (no shrubs)	9.15
NWI	Various	Type 8	Assumed Coniferous Bog	0 (no shrubs)	29.03
NWI	Riverine	n/a	n/a	0 (no shrubs)	0 (already cleared)
			Total	**0**	**62.45**
Alternative 2 - MP 37/39 Line (Existing ROWs, Plant Access plus 30-foot additional ROW on MP 37L/39L)					
NWI	Various	Type 1	Assumed Floodplain Forest	0 (no shrubs)	0 (no trees/shrubs)
NWI	Various	Type 2	Assumed Wet Meadow	0 (no shrubs)	0 (no trees/shrubs)
NWI	Various	Type 5	Assumed Shallow Open Water	0 (no shrubs)	0 (no trees/shrubs)
NWI	Various	Type 6	Assumed Alder Thicket	0.20	19.21
NWI	Various	Type 7	Assumed Hardwood Swamp	0 (no shrubs)	10.99
NWI	Various	Type 8	Assumed Coniferous Bog	0 (no shrubs)	29.42
NWI	Riverine	n/a	n/a	0 (no shrubs)	0 (no wetlands)
			Total	**0.20**	**59.62**

[1] NWI basins are those areas that have not been field investigated. Cowardin classifications are taken from the NWI. Circular 39 and Eggers and Reed classifications are assumed from the Cowardin classification, aerial photograph interpretations, and known characteristics of delineated wetlands.
[2] Temporary removal of scrub-shrub vegetation outside the 100-foot permanent ROW. Natural revegetation would be allowed following completion of construction.
[3] Permanent conversion of scrub-shrub vegetation within 100-foot permanent ROW and scrub-shrub and forested vegetation within the 150-foot construction ROW.
n/a = not applicable

Water Crossings

There would be 21 crossings of streams or water bodies associated with **MP 38L corridor** (HVTL Alternative 1) **for a total length of water crossings estimated at 1,194 linear feet. There would be 20 water crossings in the MP 37L/39L corridors (HVTL Alternative 2) for a total length estimated at 1,760 linear feet. Table 4.7-23 summarizes the length of each water crossing. Water bodies designated as "MNDNR PWI" are listed on the Public Waters Inventory and would require a license to be crossed.**

Table 4.7-23. Water Crossings for HVTL Alternatives (East Range Site)

Water Crossing Location	Milepost	MNDNR PWI	Length of Crossing (linear ft)
HVTL Alternative 1 - MP 38 Line Corridor			
Colby Lake	1+4670	Yes—249P	540
Partridge River	5+1190	Yes	110
Perennial Tributary to St. Louis River	6+3680	No	3
Perennial Tributary to St. Louis River	6+4590	Yes	3
Perennial Tributary to St. Louis River	8+1215	No	3
Perennial Tributary to St. Louis River	8+2420	No	3
Unnamed Pond	9+0480	Yes—430W	180
Perennial Stream between North and South Cedar Island Lake	11+1780	Yes	60
Perennial Stream South of Forge Lake	13+1850	No	95
Perennial Tributary to Esquagama Lake	15+0670	Yes	3
Perennial Ditch to Esquagama Lake	15+3590	No	3
Perennial Tributary to Embarrass River	16+3900	No	60
Intermittent Stream to Embarrass River	16+4900	No	3
Ely Creek	22+0090	Yes	3
Perennial Stream south of Half Moon Lake	23+4750	No	3
Intermittent Stream north of Long Lake Creek	26+4020	No	3
Long Lake Creek	27+0360	Yes	3
Perennial Stream north of St. Louis River	29+3250	Yes	3
Elbow Creek	30+1230	Yes	15
Perennial Stream north of Elbow Creek	30+4100	No	3
Two River (in 3 places due to meander)	31+2840	Yes	95
		Total MP 38 Line	**1194**
HVTL Alternative 2- MP 37/39 Line Corridor			
Colby Lake	1+4670	Yes—249P	540
Partridge River	5+3020	Yes	250
Perennial Tributary to St. Louis River	7+1110	Yes	80
Perennial Tributary to St. Louis River	8+2300	Yes	3
Perennial Tributary to St. Louis River	8+2980	No	3
Perennial Drainage Ditch to wetland	12+1410	No	6
Embarrass River	15+1140	No	3
Embarrass River	15+1490	Yes	70
Deep Lake	19+2260	Yes—666P	690
Perennial Stream west of Deep Lake (2 crossings in meander)	19+4840	No	6
Perennial Stream west of Deep Lake	20+1540	No	3
Unnamed Intermittent Stream	22+4080	Yes	3
Perennial Ditch to Mine Dump	25+0960	No	3
Perennial Stream to Mine Dump	25+1960	No	3

Table 4.7-23. Water Crossings for HVTL Alternatives (East Range Site)

Water Crossing Location	Milepost	MNDNR PWI	Length of Crossing (linear ft)
Elbow Creek	28+5130	Yes	15
Perennial Ditch to East Two River	30+2190	No	3
Perennial Stream to East Two River	31+1910	No	3
East Two River	32+0810	Yes	70
Unnamed Perennial Stream	33+0340	No	3
Perennial Ditch to Two River	34+4960	No	3
		Total MP 37/39 Line	**1760**

Natural Gas Pipeline (East Range Site)

Section 2.3.2.4 describes proposed Natural Gas Pipeline and Figure 2.3-8 (Chapter 2) shows the alignment.

Wetland Impacts

The Natural Gas Pipeline would be constructed below grade within an existing NNG ROW. Construction methods, ROWs, and the types of impacts on wetlands for Natural Gas Pipeline would be as described for Natural Gas Pipeline Alternative 1 for the West Range Site. Construction and installation of the proposed natural gas pipeline would disturb an estimated total of 24.79 acres of wetland along the entire 28.8 miles of existing ROW as summarized in Table 4.7-24. This area assumes that open cut trenching would be employed for construction, which would require use of the entire width of the ROW.

Table 4.7-24. Wetland Impacts (acres), Natural Gas Pipeline (East Range Site)

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Temporary Emergent Wetland Impacts[2]	Temporary Scrub-Shrub Wetland Impacts[3]	Permanent Wetland Type Conversion[4]
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality			
C2	PFO2B	Type 8	Coniferous Bog	High	Moderate	—	—	0.06
C4	PEMH	Type 4	Deep Marsh	High	Moderate	0.68	—	—
C6	PFO1B	Type 7	Hardwood Swamp	High	Moderate	—	—	0.41
C7	PSS1B	Type 6	Hardwood Swamp - Logged	High	Moderate	—	0.33	—
C8	PEMC	Type 3	Shallow Marsh	High	Moderate	0.003	—	—
NWI[5]	Various	Type 2	Assumed Wet Meadow	—	—	1.81	—	—
NWI[5]	Various	Type 5	Assumed Shallow Open Water	—	—	(0.34)[6]	—	—
NWI[5]	Various	Type 6	Assumed Alder Thicket	—	—	8.71	Already clear	—
NWI[5]	Various	Type 7	Assumed Hardwood Swamp	—	—	3.60	—	Already clear
NWI[5]	Various	Type 8	Assumed Coniferous Bog	—	—	9.10	—	Already clear
NWI[5]	Riverine	n/a	n/a	—	—	0.09	—	—
					Total	**23.99**	**0.33**	**0.47**

[1] MnRAM 3.1 Functional Assessments were completed only for wetlands field delineated.
[2] Temporary disturbance of emergent wetland habitat within the 100-foot construction ROW. This includes impacts to previously cleared Type 6, 7, and 8 NWI wetlands.
[3] Temporary removal of scrub-shrub vegetation outside the 70-foot permanent ROW. Natural revegetation would be allowed following completion of construction.
[4] Permanent conversion of scrub-shrub vegetation within 70-foot permanent ROW and scrub-shrub and forested vegetation within the 100-foot construction ROW.
[5] NWI basins are those areas that have not been field investigated. Cowardin classifications are taken from the NWI. Circular 39 and Eggers and Reed classifications are assumed from the Cowardin classification, aerial photograph interpretations, and known characteristics of delineated wetlands.
[6] Impacts to open water would be avoided by directionally drilling pipeline under the water body.
n/a = not applicable

Water Crossings

The East Range Natural Gas Pipeline would require crossing about 792 linear feet of streams and bodies of water (Table 4.7-25), not including adjacent wetland habitat. Colby Lake (249P) and 12 streams and rivers impacted by the Natural Gas Pipeline construction are protected by the MNDNR.

Table 4.7-25. Water Crossings for Natural Gas Pipeline (East Range Site)

Water Crossing Location	Milepost	MNDNR PWI	Length of Crossing (linear ft)
Elbow Creek	1+3580	Yes	20
Unnamed Perennial Stream	4+1010	No	3
Perennial Stream from Mud to Horseshoe Lake	5+2840	Yes	3
Perennial Ditch from Airport to Ely Creek	8+0550	No	3
Perennial Ditch from Airport to Ely Creek	8+1030	No	3
Ely Creek	9+3530	Yes	3
Perennial Ditch from Leaf Lake	12+2370	No	3
Perennial Stream to Esquagama Lake	13+4720	Yes	15
Perennial Stream to Esquagama Lake	14+1790	Yes	15
Perennial Ditch to Esquagama Lake	15+0710	No	3
Perennial Stream from Fourth Lake to Esquagama Lake	15+3620	Yes	90
Perennial Stream to St. Louis River	19+3500	No	3
Perennial Stream to St. Louis River	19+4350	Yes	3
Perennial Stream to St. Louis River	21+1880	Yes	15
Perennial Stream to St. Louis River	21+3380	No	15
Partridge River	24+0960	Yes	100
Colby Lake	25+1490	Yes	430
Partridge River	27+3230	Yes	50
Wyman Creek	28+0950	Yes	15
		Total	**792**

Process Water Supply Pipelines (East Range Site)

All Process Water Supply Pipeline segments would be included in the process water supply plan for the East Range Site (see Section 4.5) and all would be constructed during Phase I of the Mesaba Energy Project. Section 2.3.2.3 discusses the alignments, as shown in Figure 2.3-7 (Chapter 2). Construction methods, ROWs, and the types of impacts on wetlands for Process Water Supply Pipelines would be as described for Process Water Supply Pipelines for the West Range Site. The impacted acreages in Table 4.7-26 were calculated using the same assumptions as described for the West Range Site. Only the Process Water Pipeline segments constructed from Area 2WX to the power plant footprint and Area 6 and Stephens Mine to Area 2WX contain shrub scrub or forested wetland habitat. Since publication of the Draft EIS, Excelsior has consulted with MNDNR and representatives of potential water users that may conflict with potential water sources at the East Range Site as originally identified in the Draft EIS. See Section 4.5.4.1, which has been updated and discusses potential conflicts and new water sources identified since publication of the Draft EIS.

Table 4.7-26. Wetland Impacts (acres), Process Water Supply Pipelines (East Range Site)

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Temporary Emergent Wetland Impacts[2]	Temporary Scrub-Shrub Wetland Impacts[3]	Permanent Wetland Type Conversion[4]
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality			
Area 2WX to Station Footprint - Total Length: 2.18 miles								
NWI[5]	Various	Type 3	Assumed Shallow Marsh	—	—	0.38	—	—
NWI[5]	Various	Type 7	Assumed Hardwood Swamp	—	—	—	—	0.75
NWI[5]	Various	Type 8	Assumed Coniferous Bog	—	—	—	—	0.32
Segment Subtotal						0.38	0	1.07
Area 2WX to Area 2W - Total Length: 0.51 miles								
—	—	—	—	—	—	—	—	—
Segment Subtotal						—	—	—
Area 2W to Area 2E - Total Length: 0.14 miles								
—	—	—	—	—	—	—	—	—
Segment Subtotal						—	—	—
Area 3 to Area 2E - Total Length: 0.55 miles								
NWI[5]	Various	Type 4	Assumed Deep Marsh	—	—	0.41	—	—
Segment Subtotal						0.41	—	—
Knox Mine to Area 2WX - Total Length: 0.16 miles								
—	—	—	—	—	—	—	—	—
Segment Subtotal						—	—	—
Area 6 and Stephens Mine to Area 2WX - Total Length: 2.15 miles								
NWI[5]	Various	Type 6	Assumed Alder Thicket	—	—	—	0.19	0.26
Segment Subtotal						—	0.19	0.26
Area 9 South to Area 6 - Total Length: 0.50 miles								
NWI[5]	Various	Type 5	Assumed Shallow Open Water	—	—	(0.54)[6]	—	—
Segment Subtotal						—	—	—
Area 9 North (Donora Mine) to Area 6 - Total Length: 0.95 miles								
—	—	—	—	—	—	—	—	—
Segment Subtotal						—	—	—
Grand Total						**0.79**	**0.19**	**1.33**

[1] MnRAM 3.1 Functional Assessments were completed only for wetlands field delineated.
[2] Temporary disturbance of emergent wetland habitat within the 150-foot construction ROW.
[3] Temporary removal of scrub-shrub vegetation outside the 100-foot permanent ROW. Natural revegetation would be allowed following completion of construction.
[4] Permanent conversion of scrub-shrub vegetation within 100-foot permanent ROW and scrub-shrub and forested vegetation within the 150-foot construction ROW.
[5] NWI basins are those areas that have not been field investigated. Cowardin classifications are taken from the NWI. Circular 39 and Eggers and Reed classifications are assumed from the Cowardin classification, aerial photograph interpretations, and known characteristics of delineated wetlands.
[6] Impacts to open water would be avoided by directionally drilling pipeline under the water body.

Several segments of the East Range Process Water Supply Pipeline system would cross streams (**Table 4.7-27**).

Table 4.7-27. Water Crossings for Process Water Supply Pipeline (East Range Site)

Water Crossing Location	MNDNR PWI	Length of Crossing (linear ft)
Area 6 and Stephens Mine to Area 2WX		
Stephens Creek	Yes	3
Second Creek	Yes	30
Area 9 South to Area 6		
First Creek	Yes	3
Area 9 North to Area 6		
First Creek	Yes	3
	Total	**39**

Potable Water and Sanitary Sewer

The Potable Water and Sewer Pipelines are described in Section 2.3.2.3 and shown in Figure 2.3-7. Based on the NWI, up to 1.12 acres of Colby Lake lie within the construction limit and would be affected during construction. No other NWI wetlands are identified within the 100-foot wide construction ROW; however, field verification would be required for confirmation. Construction of the Potable Water and Sewer Pipelines would require crossing about 460 linear feet of Colby Lake. This segment of the pipelines would be directionally drilled to avoid impacts to the lake and lakeshore. Table 4.7-28 shows impacts due to crossing.

Table 4.7-28. Water Crossings for Potable Water and Sewer Pipelines (East Range Site)

Water Crossing Location	Milepost	MNDNR PWI	Length of Crossing (linear ft)
Colby Lake	1+3720	Yes—249 P	460
	Total	**460**	

Rail Line Alternatives (East Range Site)

Excelsior's alternatives for rail service to the East Range Site are described in Section 2.3.2.2 and shown in Figure 4.7-2. Excelsior's preferred alignment is Rail Line Alternative 1. Table 4.7-29 summarizes the wetland impacts of this rail line alternative and includes all wetlands within the construction limits of the proposed rail line based on a 3:1 slope along the railroad embankments. The rail line would affect 13.38 acres of wetland, and an additional 51.26 acres of two remnant wetlands would be enclosed within the rail loop. The wetland complex is supported by surface flow via a tributary to Colby Lake from off site to the north. Rail Line Alternative 1 would cross this tributary in two locations where culverts would be installed to maintain current flow volumes. Culverts would be installed in other locations throughout the rail loop to maintain hydrologic connectivity throughout the wetland.

Table 4.7-29. Wetland Fill (acres), Rail Alternative 1 (East Range Site)

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Permanent Impact Area
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality	
C2	PFO2B	Type 8	Coniferous Bog	High	Moderate	0.91
C3	PFO2B	Type 7	Coniferous Swamp	High	Moderate	0.45
C4	PEMH	Type 4	Deep Marsh	High	Moderate	2.67
C6	PFO1B	Type 7	Hardwood Swamp	High	Moderate	0.44
C7	PSS1B	Type 6	Hardwood Swamp - Logged	High	Moderate	8.19
I	PSS1C	Type 6	Alder Thicket	Moderate	Moderate	0.67
J	PEMC	Type 2	Fresh Wet Meadow	Moderate	Moderate	0.05
					Total	**13.38**
Center Loop						**Isolated Wetlands**
C4/C7	PEMH/ PSS1B	Type 4/ Type 6	Deep Marsh/Hardwood Swamp Logged	High	Moderate	**51.26**

[1] Complete MnRAM 3.1 Functions and Values Assessment data can be found in Appendix F3.

The Rail Alternative 1 corridor would require crossing about 6 linear feet of streams and bodies of water. See Table 4.7-30. The tributary to Colby Lake that flows through Wetland C is crossed twice by the center loop.

Table 4.7-30. Water Crossings for Rail Alternative 1 (East Range Site)

Water Crossing Location	MNDNR PWI	Length of Crossing (linear feet)
Tributary to Colby Lake (North Crossing)	Yes	3
Tributary to Colby Lake (South Crossing)	Yes	3
	Total	**6**

Railroad Alternative 2 (Figure 4.7-2) would extend from existing CN track southwest of the East Range Site, unload coal at the Mesaba Generating Station, and exit the site to join existing CN track east of the site. This alternative would not include a rail loop. Construction of Rail Alternative 2 would require filling 18.34 acres of wetland as indicated in Figure 4.7-2.

Railroad Alternative 2 would cross two streams as listed in Table 4.7-31 encompassing about 6 linear feet of crossings.

Table 4.7-31. Water Crossings for Rail Alternative 2 (East Range Site)

Water Crossing Location	MNDNR PWI	Length of Crossing (linear feet)
Tributary to Colby Lake	Yes	3
Wyman Creek	Yes	3
	Total	**6**

Access Road Alignments (East Range Site)

The plan for the East Range Access Road in the Draft EIS consisted of a looped roadway with two access points onto CR 666. Construction of the north segment of the roadway would require filling of 1.93 acres of wetland. Because of concerns raised by the USACE and other agencies regarding the need to avoid and minimize impacts to wetland habitats, the northern segment of the

looped Access Road was eliminated. Excelsior's revised Access Road for the East Range Site would connect the plant footprint with CR 666 directly to the east of the East Range Site as described in Section 2.3.2.2. The revised Access Road would minimize wetland impacts by crossing at the most narrow location and by accessing CR 666 at a point where adjacent wetland habitat is minimal. Table 4.7-32 identifies wetland impacts from the revised Access Road alignment.

Table 4.7-32. Wetland Fill for Revised Access Road (East Range Site)

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Permanent Impact Area
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality	
C6	PFO1B	Type 7	Hardwood Swamp	High	Moderate	0.39
D	PSS1B	Type 6	Alder Thicket	High	Moderate	0.05
					Total	**0.44**

[1] Complete MnRAM 3.1 Functions and Values Assessment data can be found in Appendix F3.

4.7.4.2 Impacts of Operation

The impacts to wetlands at the East Range Site would be the same as those presented as common operational impacts in Section 4.7.2.2.

4.7.5 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 equivalent to a "No Build" Alternative. Under the No Action Alternative, there would be no changes to water resources in the project area and the wetlands would continue to function in their current form.

4.7.6 Summary of Impacts

Table 4.7-33 (new in the Final EIS) summarizes both temporary and permanent wetland impacts for the Mesaba Generating Station Footprint and Buffer Land, HVTL and pipeline corridors, rail and access road alignments at the West Range Site. The table compares the impacts of these features based on the preferred sites and alignments in the Draft EIS with the preferred sites and alignments in the Final EIS for the West Range Site. The avoidance and minimization efforts described in Appendix F2 eliminated the potential for indirect wetland impacts, reduced the temporary and permanent type-conversion impacts, and reduced the wetlands to be filled by nearly 20 acres.

Table 4.7-33. Summary Comparison of Wetland Impacts (acres), West Range Site and Corridors

Project Component[1]	Permanent Impacts						Temporary Impacts		
	Indirect	Type Conversion			Fill	Total Direct (Fill + Type Conversion)	Emer-gent	Shrub -scrub	Total
		Shrub Scrub to Emergent	Forested to Emergent	Total					
Plant Footprint	—	—	—	—	—	—	—	—	—
Draft EIS	7.3	—	—	—	34.58	34.58	—	—	—
Final EIS	—	—	—	—	31.36	31.36	—	—	—
Rail Line	—	—	—	—	—	—	—	—	—
Draft EIS	58.3	—	—	—	17.93	17.93	—	—	—
Final EIS	—	—	—	—	5.73	5.73	—	—	—
Access Road	—	—	—	—	—	—	—	—	—
Draft EIS	—	—	1.07	1.07	5.67	6.74	—	—	—
Final EIS	—	—	—	—	0.19	0.19	0.08	0.13	0.21
HVTLs	—	—	36.16	36.16	0.01	36.17	—	2.33	2.33
Natural Gas	—	4.50	11.88	16.38	—	16.38	3.90	0.84	4.74
Process Water	—	1.35	3.12	4.47	—	4.47	1.26	1.33	2.59
Blowdown	—	—	—	—	—	—	—	—	—
Draft EIS	—	2.95	0.09	3.04	—	3.04	—	1.57	1.57
Final EIS	—	—	—	—	—	—	—	—	—
Water/Sewer	—	—	—	—	—	—	—	—	—
TOTAL									
Draft EIS	**65.6**	**8.80**	**52.32**	**61.12**	**58.19**	**119.31**	**5.16**	**6.07**	**11.23**
Final EIS	**0.0**	**5.85**	**51.16**	**57.01**	**37.29**	**94.30**	**5.24**	**4.63**	**9.87**

[1] Same configuration in Draft EIS and Final EIS unless listed separately.

Table 4.7-34 (new in the Final EIS) summarizes both temporary and permanent wetland impacts for the Mesaba Generating Station Footprint and Buffer Land, HVTL and pipeline corridors, rail and access road alignments at the East Range Site. The table compares the impacts of these features based on the preferred alternative sites and alignments in the Draft EIS with the preferred alternative sites and alignments in the Final EIS for the East Range Site. The avoidance and minimization process described in Appendix F2 slightly reduced the temporary type-conversion impacts and the wetlands to be filled. The reductions achieved at the East Range were less than those at the West Range because the mining and wetlands constraints dramatically reduced the design options.

Table 4.7-34. Summary Comparison of Wetland Impacts (acres), East Range Site and Corridors

Project Component[1]	Permanent Impacts						Temporary Impacts		
	Indirect	Type Conversion			Fill	Total Direct (Fill + Type Conversion)	Emer-gent	Shrub -scrub	Total
		Shrub Scrub to Emergent	Forested to Emergent	Total					
Plant Footprint	—	—	—	—	17.15	17.15	—	—	—
Rail Line	51.26	—	—	—	13.38	13.38	—	—	—
Road Access	—	—	—	—	—	—	—	—	—
Draft EIS	—	—	1.81	1.81	3.23	5.04	—	0.49	0.49
Final EIS	—	—	—	—	0.44	0.44	—	—	—
HVTL	—	19.21	40.41	59.62	0.09	59.71	—	0.20	0.20
Natural Gas	—	—	0.47	0.47	—	0.47	23.99	0.33	24.32
Process Water	—	0.26	1.07	1.33	—	1.33	0.79	0.19	0.98
Water/ Sewer	—	—	—	—	—	0.0	—	—	0.0
TOTAL									
Draft EIS	**51.26**	**19.47**	**43.76**	**63.23**	**33.85**	**97.08**	**24.78**	**1.21**	**25.99**
Final EIS	**51.26**	**19.47**	**41.95**	**61.42**	**31.06**	**92.48**	**24.78**	**1.01**	**25.50**

[1] Same configuration in Draft EIS and Final EIS unless listed separately.

4.7.7 Wetland Permitting and Mitigation Issues

4.7.7.1 Regulatory and Policy Considerations

Under Minnesota law and through a memorandum of understanding between the Minnesota Board of Water and Soil Resources and the USACE – St. Paul District, wetland impacts are generally evaluated based on acreage impacted and wetland function. For isolated versus non-isolated wetlands, the **state's WCA** makes no distinction in how these two types of wetlands are regulated. Therefore, isolated and non-isolated wetlands would be mitigated at the same thresholds.

Special or protected wetlands as discussed above are not known to occur within the West Range Site or the East Range Site IGCC Station Footprint and Buffer Land or utility and transportation corridors. However, areas of tamarack and spruce bogs are located within the facility site and the utility and transportation corridors (Excelsior, 2006b). USACE regulatory staff evaluates wetland loss by function, and therefore give much attention to wetland impacts by type. Wetland mitigation ratios often vary by wetland type affected, particularly for losses of forested wetland that require decades to establish. A more detailed analysis of wetland loss by function and actual mitigation ratios would be determined later in the permitting processes**, as discussed further in Appendix F2**.

The Proposed Action would be designed to minimize impacts to wetlands wherever feasible, including the placement of the facility footprint at the West Range Site or the East Range Site and routing infrastructure to avoid wetland areas. Placement of the HVTL towers would be selected to minimize placement within wetlands. Pipelines would be buried and would be directionally drilled under wetlands, whenever feasible, to avoid impacts (Excelsior, 2006b).

Many potential wetland impacts would be temporary (impacted during construction only) and these areas would be restored as quickly as possible following construction activities. USACE may require mitigation for temporary impacts.

Mitigation of wetland impacts would **follow** the **"watershed approach" that may include on-site compensatory mitigation, off-site compensatory mitigation (including mitigation banks), or a combination** of **on-site and off-site** replacement (see Appendix F2 for additional discussion). Wetland mitigation would follow **the** USACE **St. Paul District Compensatory Mitigation Policy for Minnesota**

and Replacement Plan requirements set forth in the WCA. No specific plans for wetland mitigation have been proposed by the project proponent at this point in time. Detailed mitigation plans would be created during the wetland permitting process following site selection under the guidance of respective regulatory entities. The application would be submitted with the Combined Wetland Permit Application and would include any design details on wetland replacement sites, wetland banks, and/or sources of wetland credit for the project. Mitigation requirements would be determined during the wetland-permitting phase of the project (Excelsior, 2006b).

In accordance with USACE wetland mitigation policy **and WCA wetland replacement standards**, wetland replacement options would be explored in the following sequence**, following the watershed approach**:

- Step 1: Project-specific wetland replacement options (on-site **and in-kind**) would be investigated first. If no project-specific wetland replacement opportunities exist or additional mitigation credit is required, Step 2 would be followed.
- Step 2: Potential wetland replacement opportunities within the watershed where the project is located would be investigated. If no opportunities are available or additional wetland mitigation credit is required, Step 3 would be followed.
- Step 3: Potential wetland replacement opportunities **would be identified within regions of the state where 80 percent or more of the pre-settlement wetlands exist. If no wetland replacement opportunities exist or additional mitigation credit is required, Step 4 would be followed**.
- **Step 4: Potential wetland replacement opportunities statewide would be identified.**

When replacement is by wetland banking, special rules apply with regard to location of replacement within the bank service area or adjacent bank service area.

The Basic Wetland Replacement Ratios under the USACE Mitigation Policy for Minnesota and WCA Rules are 1.5:1 for the greater than 80 percent area of Minnesota. The replacement ratio would never be greater than 1.5:1, but could be modified at most by 0.5:1 through implementation of at least two of the following three criteria: 1) in-advance, 2) in-place, or 3) in-kind. If only one measure were to be implemented the replacement ratio would be 1.25:1.

Under current WCA Exempt Rules, two forms of wetland replacement credit **may be used** in Minnesota: New Wetland Credit and Public Value Credit. New Wetland Credit can be used for any portion of wetland replacement. Public Value Credit means wetland replacement credit that can only be used for the portion of wetland replacement required above a 1:1 ratio. The USACE also recognizes these wetland credit types for Minnesota projects through a Memorandum of Understanding with the **Minnesota Board of Water and Soil Resources, but may accept Public Value Credit in the form of upland buffer at a lesser replacement ratio value**. Wetland replacement would likely include a combination of both New Wetland Credit and Public Value Credit to meet all replacement requirements of WCA and the USACE. As described above, it is anticipated that the **base ratio for replacement for both the** USACE **and WCA** would require wetland replacement at a ratio of 1.5:1 (Excelsior, 2006b).

Establishing **wetland credit** for mitigation is determined based on the type of wetland replacement used to mitigate impacts. Wetland replacement is generally in the form of restoration or creation. Restoration involves the functional improvement of a previously drained or impacted wetland. In comparison, wetland creation involves modification of a non-wetland area to establish newly formed wetlands. Wetland restoration is preferred and encouraged **over wetland creation** in **both** the WCA rules and USACE guidance and policies. Generally, 1 acre of **wetland credit** is valued equally to every 1 acre of impacted wetland, and **upland buffer** is valued at **0.25-**0.5 acre for every 1 acre of impacted wetland**, depending on the buffer's quality, quantity, and relative value to the surrounding wetland**. For these reasons, the value of **replacement credits, whether in the form of newly created or restored**

wetland, adjacent upland buffer, or utilization of New Wetland Credit and/or Public Value Credit from an approved wetland bank would need to be negotiated between the USACE**, Minnesota Board of Water and Soil Resources, and local government unit (LGU) administering the WCA** to determine what is appropriate for mitigation on the selected site and its utility and transportation corridors (Excelsior, 2006b).

No wetland replacement site-specific design details have been **finalized to date. However, potential wetland replacement projects have been identified and are under evaluation. The expectation is that final selection of such projects will be confirmed in Excelsior's applications for permits to be issued individually by the USACE and the LGU administering WCA. Initiation of replacement projects is expected to begin sometime after the Minnesota Public Utilities Commission issues Site and Route Permits for the Project. Proposed wetland replacement projects** would be designed to replace the wetland types, functions, and values to the greatest extent feasible. If additional wetland replacement credit is needed off site, the above-described regulatory-based processes and requirements would be followed (Excelsior, 2006b).

4.7.7.2 Contacts with Agencies

The project proponent has initiated consultation with USACE with respect to the consideration of wetlands in the screening of alternative sites for the Mesaba Energy Project, including the submission of **pre-application materials required to address USACE's questions, comments, and concerns arising as part of their participation as a Cooperating Agency in preparation of this EIS (e.g.,** Appendix F1) **under the State's Power Plant Siting Act process. Formal** agency consultation associated **with submission of a** Combined Wetland Permit Application and Replacement Plan **would begin after the USACE confirms that the Project represents the least environmentally damaging practicable alternative. This determination is expected to be made based on information to be presented in the Final EIS. A** Combined Wetland Permit Application and Replacement Plan would be prepared and submitted to the following agencies:

- USACE – Section 404 Clean Water Act wetland dredge-and-fill activities permit.
- MPCA – Section 401 Clean Water Act water quality certification.
- MNDNR – Public Waters work permit **(Division of Waters)**.
- Itasca County Soil and Water Conservation District –WCA approval (West Range Site and Associated Corridors).
- St. Louis County, Minnesota – WCA approval (East Range Site and associated corridors not within the city limits of Hoyt Lakes, Minnesota).
- City of Hoyt Lakes, Minnesota – WCA approval (Associated corridors for East Range Site within the city limits of Hoyt Lakes, Minnesota) (Excelsior, 2006b).

Designation of the LGU administering the WCA would be determined once the Minnesota Public Utilities Commission issues Site and Route Permits for the Project.

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4.8 BIOLOGICAL RESOURCES

4.8.1 Approach to Impacts Analysis

The following sections describe the approach that was employed to analyze the potential for impacts to biological resources resulting from the construction and operation of the Mesaba Energy Project.

4.8.1.1 Region of Influence

The region of influence for biological resources includes the alternative sites (West and East Range Sites) for the footprint of the Mesaba Generating Station and buffer land surrounding the plant. The region of influence also includes associated corridors and ROWs of the roads, rail lines, HVTLs, natural gas pipelines, process water lines, and cooling tower blowdown lines that would be necessary supporting structures for Mesaba Energy Project operations.

4.8.1.2 Method of Analysis

The evaluation of potential impacts on biological resources considered whether the Proposed Action or an alternative would cause, either directly or indirectly, the loss, displacement, isolation or alteration (irreparable or irreversible) of:

- Vegetation and/or wildlife;
- Aquatic communities;
- Aquatic and/or terrestrial habitat; or,
- Federally or state-listed protected species and habitat.

In response to Draft EIS comments by USACE and other agencies, the Final EIS was revised to address impacts to wildlife habitat based on the MNDNR ECS. Section 3.8 (Table 3.8-1) lists and describes the ECS categories included in the regions of influence for the West Range and East Range Sites and corridors along with the Species in Greatest Conservation Need (SGCN), as defined by the MNDNR, that typically utilize those habitat types.

4.8.2 Common Impacts of the Proposed Action

This section describes impacts to biological resources that would be common to the implementation of the Proposed Action at either site, based on the descriptions of biological resources provided in Section 3.8. Section 4.8.3 describes site-specific impacts. Impacts to wildlife and Federally listed, protected species resulting from the implementation of the Proposed Action would be considered common to both potential sites and their associated transportation and utility corridors. Therefore, impacts to wildlife and Federally protected species (not including State of Minnesota-listed, protected wildlife) are included in this section and are not addressed for site- and corridor-specific impacts (Section 4.8.3).

No MNDNR WMAs, SNAs, designated Game Lakes, or Designated Trout Streams are within or immediately adjacent to the West or East Range Sites.

4.8.2.1 Impacts of Construction

Flora

At either the West Range Site or the East Range Site, construction of the Mesaba Generating Station would cause loss of vegetation **for the power plant footprint and associated structures**. **Surrounding wooded vegetation would be preserved to the extent practicable to serve as buffer areas reducing visual and noise impacts of the power plant facilities.** Section 3.8.1 describes vegetation types that may be affected by construction at the West Range and East Range Sites and corridors.

Construction of the HVTLs and pipelines would result in permanent loss of forest resources and a temporary loss of grasslands. Forest areas within the disturbed utility ROWs would be converted to grasslands and any areas of existing grassland disturbed during construction would be restored and stabilized with native grasses. These grassy areas would experience periodic maintenance to control the growth of woody vegetation to ensure access and maintain the integrity of the utilities; therefore, the conversion of forest into grasslands would be permanent. Placement of underground pipelines would temporarily affect vegetation; however, these areas would be restored after construction.

Construction of railways and access roads at either the West Range Site or East Range Site would also result in the permanent loss of vegetation in areas falling within the footprint of the roads and rails. Forest areas would be converted into grasslands alongside the slopes and shoulders of these corridors.

Invasive species are species that have been introduced or moved by human activities to a location where they do not naturally occur and are termed "exotic," "non-native," "alien," and "nonindigenous." Oftentimes, these species become dominant in disturbed areas and outcompete native species, lower biological diversity, and alter ecosystem function. Earth disturbance associated with the removal of woody and herbaceous vegetation provides an opportunity for non-native or invasive plants to colonize disturbed areas. Invasive or non-native plants alter plant diversity and affect ecosystem function by displacing native flora. Native floral communities generally provide food, cover, or shelter for a wide variety of wildlife at different times of year. In contrast, non-native or invasive plant species typically alter wildlife habitat structure, forming monotypic vegetation communities by out-competing native plant species for resources such as water and light. Some invasive species also secrete toxic chemicals into the soil (allelopathy), which can prevent native plants from re-colonizing disturbed areas. The result could be creation of a structurally impaired, low quality habitat that benefits one or two faunal species instead of a highly diverse plant community benefiting a greater diversity of wildlife.

The potential for invasive species, primarily invasive plant species, would increase within the project area through construction and clearing activities. Natural areas around the power plant site as well as along utility corridors would be susceptible to invasive species introduction. Both the presence of vehicles and human traffic, which can inadvertently carry invasive plant seeds from other locations, would increase. Construction equipment could inadvertently carry invasive plant seeds into the area, and continued maintenance (i.e., vegetation clearing) along the utility ROWs would potentially allow for the spread and dominance of these species. Impacts to the overall ecosystems would be reduced, as these species would be located within lower quality habitat areas that would experience periodic human disturbance. Invasive species control measures, such as spraying and manual removal, could be implemented in areas dominated by invasive species to minimize impacts and prevent spreading.

Though no invasive or non-native species were noted in disturbed areas at the sites, the likelihood exists for invasive plant species to colonize and express dominance in areas disturbed by construction and maintenance activities. BMPs to stabilize the areas of ground disturbance, which would be required for erosion and sedimentation control described in Sections 4.4 and 4.5, along with the planting of native vegetation, would help avoid the establishment and dominance of invasive plant species in disturbed areas resulting from the Proposed Action.

Locations where temporary impacts to vegetation would occur would be restored following construction activities. In wetlands, excavated soils would be stockpiled and segregated from upland soils; then replaced in the opposite order from which they were excavated. This would insure replacement of subsurface soils at the appropriate lower depths and replacement of surface organic soils at the top, which would be more effective for wetland vegetation restoration. In upland areas, soil amelioration would be performed to alleviate compaction, which could include scarification, harrowing, disking, or other measures. Where possible, upland topsoil would be stockpiled and replaced in disturbed uplands. In some instances, additional clean, certified weed-

free topsoil may be required. Revegetation of wetland and upland habitats would be accomplished through reseeding with native grasses and forbs appropriate to the region and would follow standard practices acceptable to the local, state, and Federal agencies that authorize work within wetland and upland habitats. Following reseeding, these areas would be covered with weed-free certified mulch and, in upland habitats, would be covered with erosion control blankets/fabrics per site conditions.

Fauna and Habitat

In general, construction and operation of the Mesaba Generating Station and supporting infrastructures (i.e., HVTLs, gas and water pipelines, and transportation corridors) at either potential site could cause animal mortality and disrupt wildlife (mammals, birds, reptiles, and amphibians) movement through the West Range or East Range Sites. Section 3.8.1 describes wildlife species that may be affected by construction at the West Range and East Range Sites and corridors. Direct impacts on terrestrial habitats would not differ greatly between the West Range and East Range Sites.

Impacts to wildlife from the construction of the Mesaba Energy Project at either of the potential sites would occur due to vegetative clearing and habitat conversion resulting in permanent loss of potential habitat for mammals, birds, amphibians, and reptiles that either inhabit one of the sites or use a site transiently for food and shelter. Habitat loss and habitat degradation are influencing factors that contribute to the decline of wildlife species (MNDNR, 2007). Consequently, wildlife using the natural resources within the region of influence for the Mesaba Generating Station may be adversely affected. **Individual animals would be forced either to find suitable available habitat from relatively large amounts of comparable habitat in the area or to perish. As birds are more mobile than terrestrial species, they would be better equipped for relocating.**

The construction of the Mesaba Generating Station would cause the elimination of a small fraction of the total habitat near either the West Range Site or the East Range Site. **Therefore, these losses would not be expected to cause population-level adverse effects.** The potential impacts on wildlife travel corridors have been evaluated in a cumulative impacts analysis in Section 5.2.6 that takes into consideration the effects of the Mesaba Energy Project in conjunction with other potential projects in the Iron Range area. **Based on the cumulative impacts analysis, the loss of total existing habitat in the West Range and East Range from the Mesaba Energy Project would be 0.2 percent and 0.5 percent, respectively, within the study areas for the analysis.**

Noise from construction may disturb animals or displace them to less favorable habitat; however, wildlife responses to noise may be species-specific, and could result in either avoidance or habituation. Avoidance could cause species to underuse high-quality habitat near disturbance areas, resulting in decreased fecundity and survival. Noise impacts due to construction would be temporary and localized in nature.

Certain species with limited range or mobility such as small rodents, reptiles, and amphibians would be more susceptible to construction impacts than mobile, larger-ranging wildlife. Mortality of these species would most likely occur during grading and clearing activities. Other species, including birds and mammals, would be more susceptible if impacts occurred during the nesting/rearing season when nests and nurseries of various species may be destroyed during clearing and grading activities. Coordination with the MNDNR would determine the best time period to conduct grading or clearing activities.

Clearing of forest areas related to the power plant and transmission corridors may benefit some wildlife species such as deer, which use the transition zones between differing vegetative cover types for foraging or migration corridors. However, wildlife habitat fragmentation and the creation of the edge effect would increase predatory and parasitic prospects for a variety of opportunistic wildlife species. For example, small mammals (i.e., raccoon [*Procyon lotor*]) would exploit the newly created environment to satisfy their dietary needs by preying on avifauna **and herpetofauna** nest eggs. Similarly, parasitic

avifauna, such as the cowbird (*Molothrus ater*) or swallows (*Tachycineta* spp.), can affect a brood of fledgling birds. Parasitic birds lay their eggs in the nests of other bird species and leave the chick-rearing responsibility to other parents. The parasitic chick out-competes the host chicks for food, and in some cases, the parasitic chick may eliminate its competition by pushing the host chick out of the nest.

Predation of ground-nesting birds would increase along the newly cleared utility corridors primarily due to the increased presence of edge species such as raccoons. However, the overall amount of forest edge created and the vast amount of interior forest habitat would not create a noticeable decline in these bird populations. Studies have shown that nesting success rates of ground-nesting birds increase within 328 feet of the forest edge. In addition, studies have shown that predation due to edge effect is lower in forested dominated landscapes compared to agricultural dominated landscapes, as factors such as brood parasitism by brown-headed cowbirds is lessened (Manolis et al., 2002).

More generally, habitat fragmentation may inhibit gene flow between groups of individuals within a population due to geographic isolation. Although road and utility corridors do not necessarily create impassable barriers to wildlife movement, from a behavioral perspective, some species may not cross a location because the area was disturbed, habitat was altered, etc. This can ultimately result in a diminishing of genetic diversity and amplification of inbreeding within populations that become geographically isolated, which may result in the accumulation of deleterious genetic traits that can reduce individuals' ability to survive and reproduce. In addition, habitat fragmentation reduces the overall size of accessible habitat to a population, which may result in the area no longer being viable to support that population at its existing size (e.g., food resources could become too limited). In some instances, fragmented habitats may not be able to support any individuals of a particular species at all, considering some species require certain amounts of contiguous habitat to perform necessary survival functions (e.g., foraging and breeding) (EPA, 1994b).

Seeding the transmission or utility corridors with an appropriate seed mixture could benefit an assortment of wildlife species that thrive within a forest edge. Additionally, the grassy areas created by the transmission corridors would provide nesting habitat for a variety of grassland dependant avifauna.

Wetland habitat conversions on the respective site and corridors would occur as described in Section 4.7. Forested wetland areas would be maintained as herbaceous or shrub dominated communities, which in turn would affect migratory birds as well as amphibians that utilize the area for reproduction.

Impacts to game species, such as moose, deer, and grouse would be expected to be similar between the two site alternatives. These species may encounter some mortality during site preparation activities; however, these species are highly mobile making them some of the least susceptible in terms of collisions with vehicles and equipment. The primary impact to game species would be in the form of lost habitat; however, as previously stated, these are highly mobile species that would be expected to move to habitats adjacent to locations that would be affected by the Proposed Action. Also, as previously stated, forest clearing for utility ROWs would create open areas that could be utilized by larger game species as movement corridors, which could be a benefit during foraging activities. Therefore, impacts to game species would be expected to be small considering that there is ample habitat for these species surrounding the potential site locations.

The MNDNR NHIS database shows no bald eagle nesting areas within the West Range Site or the East Range Site or within a 2-mile radius of each site's boundary. The MNDNR NHIS database does show five bald eagle nesting areas within a 1-mile radius of the various transportation and utility corridors associated with the East Range Site. Though the bald eagle has been delisted under the Federal Endangered Species Act, the eagles are still regulated by the USFWS and are still listed as species of special concern by the MNDNR. The USFWS and the MNDNR are cooperating to monitor and protect

this species in Minnesota. The USFWS bald eagle protection measures include buffer zones and construction/activity limitations within these zones that are applicable during the nesting season to protect the nest trees from destruction. In addition, bald eagle nests are dynamic and can change geographically through time, resulting in the continuous updating of nest location data by the USFWS and MNDNR. In a letter dated March 6, 2007 (Appendix E), the USFWS agreed to consult with DOE on the West Range Site and concurred with DOE's determination that the Proposed Action would not likely adversely affect the bald eagle. In addition to complying with the protection measures, ongoing coordination with these agencies would be performed to receive updated information on new bald eagle nesting locations prior to construction.

Aquatic Communities

The water crossings that would occur under the various alternative utility and rail alignments, as described in Section 4.7, can generally be broken down into two categories: small perennial streams and lakes. None of the water bodies proposed to be crossed is designated as a trout stream or would be considered a cold-water stream, although it is possible that trout are occasionally present in some of the area waterways not designated. Section 3.8.2 describes aquatic communities in the West Range and East Range.

The crossing of streams for construction of rail lines could directly affect fisheries and aquatic life. Fish mortality may occur by temporary alteration of fish passage, causing incidental mortality. Fisheries and aquatic life may also be affected through habitat fragmentation and conversion. Uncontrolled sedimentation could enter the streams causing increased turbidity and biochemical oxygen demand and armoring the substrate of the stream channels. Armoring of the stream channels could affect the benthic community and the aquatic fauna that are dependent on macroinvertebrates as a food source. The removal of the riparian vegetation could also result in a temporary loss of habitat and shading, thereby resulting in increased water temperatures.

Water crossing impacts would be temporary for utility installations. Directional drilling is the preferred means, because it would avoid or minimize impacts to aquatic resources, and it could be used for short crossings lacking bedrock. In the event that directional drilling is not feasible, an open cut trench would be used, which would result in temporary impacts to aquatic communities. Potential impacts from open cut trenching could include a temporary increase in sedimentation of the water column, a short-term increase in the biochemical oxygen demand, armoring of the stream substrate that would affect the macroinvertebrate community, and an increase in water temperatures due to the loss of shading provided by riparian vegetation. This means of construction could be timed to coincide with low water levels, and accomplished using cofferdams, bypass flumes, diversionary channels, or other short-term methods of allowing work to be done in a dry channel. These measures would allow minimally invasive construction to be used depending on the type of crossing needed. It is assumed that fish species would temporarily relocate in open-trenched areas during construction. State in-stream construction restrictions would help reduce impacts to these species.

Construction would comply with all applicable state regulations pertaining to construction in surface waters. Guidance published by the USFWS, USACE, FERC, and MNDNR would be consulted and evaluated once final alignments have been determined. The cross sections and contours of the waters would be restored to their original grade and vegetated after construction to ensure continued water flow, habitat re-establishment, and adequate faunal movement, as required by applicable regulations and standards. **Therefore, construction would cause some temporary impacts to fisheries and other aquatic biota primarily from disruptions in water levels and increased sedimentation; however, these impacts would be construction-related and would not be permanent.**

Protected Species

There are no Federally listed plant species identified by the USFWS within either of the sites or any of the proposed utility or transportation corridors. Therefore, no adverse effects would be expected for any Federally protected plant species due to the implementation of the Proposed Action at either of the alternative sites.

As discussed in Section 3.8.3.1, both the West and East Range Sites and their associated utility and transportation corridors have potential habitat for and are within the distributional range of the Canada lynx (*Lynx canadensis*) **and the gray wolf (*Canis lupus*) both Federally listed as threatened**.

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.

Since Canada lynx **and gray wolf are** highly mobile, the direct take (loss of a species, or significant habitat modification or degradation that results in the loss of a species by significantly impairing essential behavioral patterns) due to construction activities would not be likely if clearing and grading activities are restricted during breeding times. Harassment of this species would likely occur within the project area through permanent loss of habitat and temporary noise disruption from construction. The potential for impacts to occur to Canada lynx would be greater at the East Range Site as compared to the West Range Site because, based on the distribution of verified lynx records since 2000 (Sullins, 2007), the East Range Site is well within the range of the lynx while the West Range Site is located toward the southwest periphery of the lynx's range.

On August 15, 2008, DOE submitted a 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 Site were selected for the Proposed Action, DOE would reopen consultation under Section 7 of the Endangered Species Act and resubmit the BA for USFWS review and concurrence at the East Range Site.

There are no MNDNR NHIS rare, threatened, or endangered animal species known to exist at either the West Range or East Range Sites. Sections 4.8.3 and 4.8.4 discuss Minnesota protected plant species and potential habitats, which potentially occur at respective sites.

4.8.2.2 Impacts of Operation

The impacts of Mesaba Generating Station operations on biological resources would be comparable for either site. Therefore, the descriptions of impacts for the West Range and East Range below focus primarily on construction-related impacts to the sites and corridors.

Once operational, the Mesaba Generating Station at either alternative site would require maintenance of landscaping; however, no additional direct impacts to vegetation would be expected following construction. An indirect impact from both the introduction of access roads and railways and increased traffic would include the potential for increased stress to vegetation from particulate matter and dust**, which could injure leaves, stems, and roots and increase vulnerability to diseases or insects (Delphi, 2004)**. Salt or deicers used on roads may cause additional stress to vegetation during the winter season.

The siting of the Mesaba Generating Station would cause the elimination of a small fraction of the total habitat in the areas of the West Range Site or the East Range Site; though similar habitat types are common in the region **(see Section 5.2.6)**. Impacts to wildlife from the operation of the Mesaba Generating Station at either of the potential sites would occur due to the placement of security fences and other barriers that would particularly affect the movement of larger animals in wildlife travel corridors. The potential impacts on wildlife travel corridors were evaluated in a cumulative impacts analysis in Section 5.2.6 that takes into consideration the effects of the Mesaba Energy Project in conjunction with other potential projects in the Iron Range area. Road and rail traffic near either site would increase during operation of the Mesaba Generating Station as described in Section 4.15, which would potentially result in increased collisions involving wildlife. This effect would be of particular concern with respect to Federally listed species as described further below.

Bird and bat mortality from collisions with exhaust stacks, transmission lines, and towers would be expected to occur, though this would not likely have a significant impact on bird populations within or migrating through the area. Collisions would typically peak seasonally during the spring and fall migrations and during night time hours. See Appendix D5 for further information.

The operation of the proposed Mesaba Generating Station at either location would have minimal impact on aquatic species and their prey caused by the bioaccumulation of heavy metals. The concentration of mercury in air emissions would be lower than background concentrations and would not be expected to directly increase the potential for bioaccumulation of mercury in fish or other aquatic species present in receiving waters (see also Sections 4.3, Air Quality, and 4.17, Safety and Health). **In general, mercury exposure can cause negative impacts to terrestrial and avian wildlife species including adverse effects to neurological, endocrine, and reproductive processes. There are two major guilds of wildlife that have the potential to act as a baseline for bioaccumulation: fish and insects. Therefore, species that prey on fish or insects have the potential to be affected as well (Colman, 2007).**

With the proposed use of an enhanced ZLD system at either plant site, as well as the collection and reuse of stormwater runoff, the Mesaba Generating Station would not discharge any process effluents or cooling tower blowdown to surface water bodies. However, large quantity water withdrawals for plant process and cooling water requirements could alter lake or stream temperatures and reduce the quality and quantity of aquatic habitat. Refer to Section 4.5, Water Resources, for surface water withdrawal predictions. Consequently, withdrawals could affect the lake or stream's ability to support certain types of fish, potentially leading to a decline in biodiversity in source waters for the project. Significant water level reductions could interfere with lake trout natural reproduction in the CMP (for the West Range Site), as this species deposits eggs

in the fall on boulder or cobble habitats in depths usually less than 40 feet and incubation lasts 4 to 6 months after spawning (Snyder and Oswald, 2005). Potentially affected fisheries would be the CMP and Prairie River on the West Range and Colby Lake and White Water Reservoir on the East Range. Withdrawals from the Prairie River may not be necessary and would be less than the state limit of 25 percent of 7Q10 flows, which is set to protect the river from excessive withdrawals. For the CMP, water level fluctuations are the only potential impact on fisheries.

For the East Range, fluctuations in the mining pits could be extreme, but such pits are privately owned, inaccessible to the public except through illegal trespass, and are neither protected waters nor established fisheries. Water levels in Colby Lake and White Water Reservoir would be controlled by the MNDNR to protect Hoyt Lake's potable water supply and local landowners' property interests, respectively. As part of the water appropriation permit process, the project proponent would be required to provide further hydrologic modeling to ensure that the Mesaba Generating Station would not result in any significant adverse impacts to regional water resources at the East Range Site.

As described in Section 4.5, Water Resources, the intake structures for process water pumping stations at the various mine pits would be designed to prevent the entrainment of fish species, which would preclude the transfer of live fish between surface waters. This situation is of particular concern for the West Range Site, because the CMP has a non-native population of rainbow smelt (see Section 3.8.2) that the USFWS and MNDNR do not want introduced into other local surface waters. **Water intake flow velocities would be less than 0.5 feet per second, as required by applicable regulations to minimize the potential for the entrainment of aquatic species within the structures (Barr, 2008).**

The greater challenge to listed species, as stated by USFWS in its letter of March 6, 2007, is the vulnerability of the Canada lynx to vehicle collisions when crossing roads. Therefore, the realignment of CR 7 for the West Range Site, which is a separate but connected action under consideration by Itasca County, could potentially affect this species by creating a new road with a new alignment, widened ROW, and potentially increased vehicle speeds in habitat occupied by the lynx. **However, as stated in Section 2.3.1.2, Itasca County has deferred its proposed project to realign CR 7 due to changes in state funding priorities.** These potential impacts will be addressed in the biological opinion to be prepared by USFWS. Other potential impacts from project operations on the lynx would be comparable to the impacts on fauna as described above. Also, this species may be affected by permanent noise disruption from facility and rail operations.

4.8.3 Impacts on West Range Site and Corridors

The construction-related impacts of the Mesaba Generating Station on the West Range Site and corridors are described in this section. The impacts of operations on biological resources would be comparable for either site and have been described in Section 4.8.2.2 unless otherwise appropriate. **This section as published in the Draft EIS was revised to address impacts to wildlife habitat based on the ECS habitat types in response to comments and requests by USACE and MNDNR. Therefore, tables that were included in the Draft EIS listing affected acreages by respective land cover were eliminated and replaced with tables based on the ECS System categories.**

During construction for the Phase I power plant, the Phase II footprint would be prepared and used as a staging and laydown area for stockpiling of materials and storage of equipment as well as for a concrete batch plant. Therefore, much of the footprint would be cleared during Phase I construction with the exception of wetlands and sensitive areas that would be avoided. For Phase II construction, Excelsior would establish off-site construction staging and laydown areas on 85 acres of land selected from among four potential sites as described in Chapter 2 (see Sections 2.2.4.1 and 2.3.1.1). All of the sites are located on lands that have been disturbed or cleared during prior uses by mineral extraction companies, and all have access to local roadways. Excelsior would select appropriate sites for the necessary acreage prior to construction of Phase II taking into

consideration potential effects on biological resources. Following completion of Phase II construction, sites used for staging and laydown would be restored to pre-existing conditions.

4.8.3.1 West Range Site and Power Plant Footprint

See Figure 2.3-1 in Section 2.3.1, which shows the West Range Site and plant footprint.

Vegetation and Habitat

A description of vegetation types found at the West Range Site is included in Section 3.8.1.1. **Because of concerns raised by the USACE and other agencies, regarding the need to avoid and minimize impacts to wetland habitats the footprint for the proposed IGCC power plant was shifted to the northwest as described in Section 2.3.1. This move would result in deciduous** forest **incurring** the highest acreage of impact from the construction of the Mesaba Generating Station at the West Range Site.

The impacts of construction on vegetation at the West Range Site generally would be as described in Section 4.8.2.1. Though the construction of the Mesaba Generating Station at the West Range Site would require a relatively large amount of vegetation clearing, resulting in habitat loss and fragmentation, these resources are common in the region, and the construction of the Mesaba Generating Station at the West Range Site would degrade only a small fraction of the total amount of these plant communities in the area **(see Section 5.2.6)**. The potential introduction of non-native or invasive flora would be minimized as described for common impacts in Section 4.8.2.

Section 3.8.1.1 describes wildlife species likely to inhabit the West Range Site. Habitat loss and habitat degradation are influencing factors that contribute to the decline of wildlife species (MNDNR, 2007). Consequently, wildlife using the natural resources within the region of influence for the Mesaba Generating Station may be adversely affected. However, comparable habitat types are common in the region, and the placement of the Mesaba Generating Station would cause the elimination of a small fraction of the total habitat near the West Range Site. Refer also to the discussion of cumulative impacts on wildlife habitat in Section 5.2.6.

Table 4.8-1 (added for the Final EIS) provides a summary of impacts to vegetation and wildlife habitats by ECS category. Section 4.8.2.1 generally describes impacts to wildlife. Table 3.8-1 (Chapter 3) lists the SGCN species, as defined by the MNDNR, that typically utilize the habitat types identified in Table 4.8-1. The plant site would convert existing wildlife habitat into industrial land use. The main habitat type that would be affected is northern mesic hardwood forest, which would experience over 150 acres of direct habitat loss as well as fragmentation for construction of Phases I and II. The impacts that would result from the original plant footprint are shown for comparison. The shifted plant footprint would affect slightly more forest, but less wetland cover. The difference in total footprint cover is attributed to grading outside the limits of the IGCC Power plant facility and equipment.

Table 4.8-1. Vegetation and Habitat Impacts (acres), Mesaba IGCC Power Plant Footprint (West Range Site)

ECS Codes[1]	West Range Site (acres)	Shifted Plant Footprint[2] Impacts (acres)			Original Plant Footprint[2] Impacts (acres)		
		Phase I	Phase II	Total	Phase I	Phase II	Total
AFXXXX - Aspen Forest[1]	185.4	-0.5	-7.1	-7.6	-1.8	—	-1.8
MHn35 - Northern Mesic Hardwood Forest	682.4	-84.2	-66.6	-150.8	-83.1	-64.4	-147.5
MHn44 - Northern Wet-Mesic Boreal Hardwood-Conifer Forest	468.9	-12.3	—	-12.3	—	-18.4	-18.4
MRn83 - Northern Mixed Cattail Marsh	12.6	—	-0.5	-0.5	-0.2	—	-0.2
WFn55 - Northern Wet Ash Swamp	209.7	-6.1	-17.2	-23.3	-19.5	-2.1	-21.6
WMn82 - Northern Wet Meadow/Carr	79.2	-7.5	—	-7.6	-1.2	-11.6	-12.7
APn80 – Northern Spruce Bog	4.0	—	—	—	—	—	—
APn90 – Northern Open Bog	0.4	—	—	—	—	—	—
FPn73 – Northern Rich Alder Swamp	34.0	—	—	—	—	—	—
Fpn82 – Northern Rich Tamarack Swamp	0.2	—	—	—	—	—	—
LKi54 – Inland Lake Clay/Mud Shore	0.6	—	—	—	—	—	—
OW – Other Water Body	0.1	—	—	—	—	—	—
XDXXPF – Old Field[1]	31.2	—	—	—	—	—	—
Total	**1708.4**	**-110.6**	**-91.5**	**-202.1**	**-105.8**	**-96.5**	**-202.3**

[1] Codes were created for habitats not included in ECS classification system.
[2] Phase I and Phase II are reversed between Original and Shifted Plant Footprints.
Note: Negative values indicate a loss of habitat.

Aquatic Communities

No direct impacts to aquatic species would occur from construction of the Mesaba Generating Station at the West Range Site. Section 4.8.2.2 describes the impacts of plant operations on aquatic communities. Section 4.8.3.2 discusses potential impacts that may result from the construction and operation of supporting infrastructure (e.g., natural gas pipelines, process water pipelines).

Protected Species

As described in Section 4.8.2.1, potential adverse impacts on Canada lynx and gray wolf would not be expected (see BA in Appendix E).

As discussed in Section 3.8.3.2, no MNDNR NHIS threatened, endangered or other species of concern inhabit or occur within the West Range Site. There are eight plant species (17 occurrences) of state-listed rare or protected plant species identified by the MNDNR NHIS within the Nashwauk, Taconite, and Bovey areas near the site (see Section 3.8). One plant species, moonwort (*Botrychium* sp.), is listed as occurring within a 1-mile radius of the West Range Site boundary. This species is located off site southeast of the West Range Site.

Records for the state-listed endangered orchid species, *Platanthera flava* var. *herbiola* (tubercled-rein orchid), indicate that the orchid can colonize in disturbed mine spoil areas **(it is not fully understood how this species was recruited into these highly disturbed areas)**. Typical habitat for this species occurs in wet meadow habitats dominated by native graminoids and sedges, which are present within the West Range Site boundary. Due to the rarity of tubercled-rein orchid in the state, the probability is low for encountering this species in wet meadow habitat within the West Range Site; however, it is not without possibility.

Two plant species records from the NHIS database in areas other than disturbed mine refuse areas, include the leafless water milfoil (*Myriophyllum tenellu* – non-status) and Torrey's manna grass

(*Torreyochloa pallida* – special concern). The leafless water milfoil is associated with the littoral zones of surface waters. Dunning Lake, adjacent to the site, is likely the only area within the West Range Site boundary that may provide potential habitat for this species. However, Dunning Lake and its associated aquatic habitats would be avoided for construction of the West Range Site facility and associated utility and transportation corridors.

T. pallida occurs in shallow marsh habitats in mixed hardwood forests. This type of habitat is common throughout the West Range Site, although this species was not observed during the habitat field reconnaissance or the wetland surveys. Shallow marsh habitat that could contain this plant would be affected by construction at the West Range Site and associated transportation and utility corridors. During the field reconnaissance in June 2005, a plant species that closely resembled moonwort (*B. minganense)*, a state-listed species of special concern, was observed in the mixed-hardwood conifer forest. Only one individual was observed, and no voucher specimens were collected. This area of forest may require a more thorough review for potential occurrences of state-listed *Botrychium* spp., and to determine if these resources could be affected. If the West Range Site were selected, a survey for *T. pallida* and *B. minganense* may be requested by the MNDNR. State-listed species of special concern and non-status species and their habitats are not regulated under the Minnesota Endangered Species Statute (Minnesota Statutes § 84.0895). However, coordination with MNDNR would be completed to determine if any impacts would occur and to avoid or minimize the potential for impacts should these species occur at the West Range Site.

4.8.3.2 HVTL, Pipeline, and Transportation Corridors

See Section 2.3.1 for descriptions of alternative alignments and Figures 2.3-2, 2.3-3, and 2.3-4 showing corridor alignments for the West Range Site.

HVTL Alternatives (West Range Site)

Section 2.3.1.5 describes HVTL alternatives and Figure 2.3-3 (Chapter 2) shows the alignments. Table 4.8-2 (added for the Final EIS) summarizes the impacts from construction of the alignments on vegetation and habitat acreage by ECS category based on a 100-foot permanent ROW and an additional 50-foot temporary ROW. Each alternative is described individually and does not consider habitat that would be impacted by other HVTL alignment alternatives. The table also does not reflect impacts attributed to the Power Plant Footprint or shared alignments with Rail Lines, Access Roads, Process Water Pipelines, or Natural Gas Pipelines. The following subsections describe the impacts from construction of respective alignments.

Table 4.8-2. Vegetation and Habitat Impacts (acres), HVTLs (West Range Site)

ECS Codes[1]	Permanent ROW Area			Temporary ROW Impact[2]			Permanent ROW Change[3]		
	HVTL 1	HVTL 1A	PH 2 B	HVTL 1	HVTL 1A	PH 2 B	HVTL 1	HVTL 1A	PH 2 B
AFXXXX - Aspen Forest[1]	18.8	11.8	4.4	3.1	0.3	—	-18.8	-11.8	-4.4
APn80 - Northern Spruce Bog	0.4	2.8	0.4	—	1.2	—	-0.4	-2.8	-0.4
APn90 - Northern Open Bog	10.3	5.8	—	4.2	2.2	—	+4.2	+2.8	+6.1
FPn73 - Northern Rich Alder Swamp	7.7	9.4	17.2	1.8	2.8	—	-7.7	-9.4	-17.2
FPn82 - Northern Rich Tamarack Swamp (Western Basin)	3.8	—	5.7	1.9	—	—	-3.8	—	-5.7
LKi54 - Inland Lake Clay/Mud Shore	—	0.2	0.3	—	0.2	—	—	—	—
MHn35 - Northern Mesic Hardwood Forest	19.5	11.2	1.2	5.3	4.1	0.7	-19.5	-11.2	-1.2
MHn44 - Northern Wet-Mesic Boreal Hardwood-Conifer Forest	14.7	30.7	6.9	3.2	12.3	3.7	-14.7	-30.7	-6.9
MRn83 - Northern Mixed Cattail Marsh	2.0	2.0	27.8	—	—	—	—	—	—
MRn93 - Northern Bulrush-Spikerush Marsh	—	—	0.2	—	—	—	—	—	—
WFn55 - Northern Wet Ash Swamp	5.5	4.1	0.7	1.3	0.9	—	-5.5	-4.1	-0.7
WMn82 - Northern Wet Meadow/Carr	3.5	4.9	16.2	1.5	2.3	1.1	+13.3	+13.5	+17.9
XDXXOF - Old Field[1]	24.9	21.0	100.8	0.1	1.8	—	+53.0	+53.7	+12.5
XDXXXX - Disturbed Land[1]	0.6	2.9	3.2	0.1	1.0	—	—	—	—
Total	**111.9**	**106.8**	**184.9**	**22.4**	**29.1**	**5.4**	**—**	**—**	**—**

[1] Codes were created for habitats not included in ECS classification system.
[2] Temporary ROW acreages do not include the area within the permanent ROW. There would be no permanent impacts to the temporary ROW as these habitats will be allowed to regenerate following construction.
[3] Negative values indicate a loss of habitat and positive values indicate a gain of habitat.

HVTL Alternative 1

Vegetation and Habitat

The area of an existing HVTL ROW **(MP 45L)** that extends from the West Range Site boundary southward to US 169, is classified by the LandSat-Based Land Use-Land Cover (Raster) data as "other rural developments," which means the existing ROW has been identified as land use other than a terrestrial vegetative community. In this area, no additional land clearing (beyond what is already cleared for the existing ROW) would be expected for installation of HVTL Alternative 1. **The remainder of the alignment would consist of new ROW (see Section 2.3.1.5) to** be cleared of trees and shrubs. Deciduous and regeneration/young forest are the most common vegetation/habitats within the corridor proposed for HVTL Alternative 1. **Table 4.8-2 summarizes the impacts to vegetation and wildlife habitats by ECS category that would result from construction of the proposed HVTL Alternative 1 route. Installation of HVTL Alternative 1 would convert existing wooded vegetation to grassland habitat within the permanent 100-foot ROW. Habitat cleared during construction activities within the additional temporary ROW would be allowed to regenerate following construction and would eventually recover over several years of natural succession. The habitat cleared within the permanent ROW would be maintained as grassland in perpetuity by vegetation management activities to keep the HVTL ROW cleared of trees and woody vegetation. The losses and gains in**

acreage by habitat type are listed in Table 4.8-2 in the column for the permanent ROW change. The main habitat types that would be affected are northern mesic hardwood forest and regrowth aspen forest, which would experience about 20 acres each of direct habitat loss as well as fragmentation. Impacts to wildlife would be as described in Section 4.8.2.1.

Aquatic Communities

There would be multiple surface water crossings associated with HVTL Alternative 1 as described in Section 4.7; however, the HVTL corridor would be suspended over the waterways, and the alignments would be designed to preclude the placement of towers within surface waters. Therefore, no direct impacts to aquatic communities would be expected.

Protected Species

As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf would not be expected based on the results of the BA.

There are seven known occurrences of state-listed **plant** species within 1 mile of HVTL Alternative 1 (see Section 3.8). Records for the endangered tubercled-rein orchid indicate it occurs within 1 mile of HVTL Alternative 1 in mine spoil areas, but there are no mine spoil areas that are within the alignment for HVTL Alternative 1. Although there is wet meadow habitat within HVTL Alternative 1, the probability is low, but not impossible, for encountering this species in wet meadow habitat along HVTL Alternative 1.

The remaining records of state-listed species observed within 1 mile of HVTL Alternative 1 are listed as species of special concern or non-status species. These species were all recorded within mine spoil areas, which are not found within the proposed alignment for HVTL Alternative 1.

If the West Range Site were selected for permitting, prior to construction Excelsior would coordinate with MNDNR to determine if a plant survey would be warranted for the tubercled-rein orchid along HVTL Alternative 1, as well as to determine potential effects on the state-listed species or their habitats within or near HVTL Alternative 1.

HVTL Alternative 1A

Vegetation and Habitat

The segment of HVTL Alternative 1A **shared** in common with HVTL Alternative 1 from the West Range Site boundary south to US 169 **was described for Alternative 1**. **The remainder of the alignment would consist of new ROW (see Section 2.3.1.5) to** be cleared of trees and shrubs. Deciduous and regeneration/young forest are the most common vegetation within the corridor proposed for HVTL Alternative 1A. **Table 4.8-2 summarizes the impacts to wildlife habitats by ECS category that would result from construction of the proposed HVTL Alternative 1A route. The impacts on temporary and permanent ROWs would be as described for HVTL Alternative 1. The main habitat type that would be affected is northern wet mesic boreal hardwood conifer forest, which would experience about 31 acres of direct habitat loss as well as fragmentation. Impacts on wildlife would be as described in Section 4.8.2.1.**

Aquatic Communities

There would be multiple surface water crossings associated with HVTL Alternative 1A as described in Section 4.7; however, no direct impacts to aquatic communities would be expected **for the same reasons as described for Alternative 1**.

Protected Species

Because the alignment for HVTL Alternative 1A is within 1 mile of the alignment for HVTL Alternative 1, and contains comparable vegetation, the potential for encountering state-listed plant species would be as described for HVTL Alternative 1. The same coordination with MNDNR would

apply. As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf are not expected.

HVTL Phase II Plan B

Vegetation and Habitat

The existing ROWs **for MP HVTLs, including the 45L/28L and 62L/63L (see Section 2.3.1.5)** that extend eastward from the West Range Site and then southward toward US 169, have been cleared of tree and shrub vegetation for establishment and maintenance of the ROWs. Although the LandSat-Based Land Use-Land Cover (Raster) data classify the areas within the Phase II Plan B ROW as a mix of terrestrial and wetland habitats, and other developed uses, aerial photographs show that it is clear of trees and shrubs. No additional land clearing (beyond what is already cleared for the existing ROW) would be expected for the installation of HVTLs during Phase II Plan B.

Table 4.8-2 summarizes impacts to wildlife habitats by ECS categories calculated utilizing GIS mapping. The mapping did not take into account the current condition of the land and therefore shows impacts to vegetation and habitat that do not currently exist. Because the route would follow existing ROWs there would be no change in vegetation and no effect on wildlife.

Aquatic Communities

There would be multiple surface water crossings associated with HVTLs for Phase II Plan B as described in Section 4.7; however, no impacts to aquatic communities would be expected **for the same reasons as described for HVTL Alternative 1**. **Pickerel Creek, a** designated trout stream located 2,500 feet east of HVTL Phase II Plan B Alternative, would not be crossed by the HVTL; therefore, no impact would be expected on this stream.

Protected Species

There are 12 known occurrences of state-listed **plant** species within 1 mile of HVTLs proposed for Phase II Plan B, which are detailed in Section 3.8. The known record for the tubercled-rein orchid near HVTL Phase II Plan B is within a mine spoil area, but there are no mine spoil areas or wet meadow habitat within the alignment for HVTL Phase II.

There are two known occurrences of pale moonwort (*B. pallidum* – state listed as endangered) within 1 mile of HVTL Phase II. However, this species would not be affected by HVTL Phase II because the records are within mine spoil areas, which would not be crossed by the HVTL. The remaining records of state-listed species within 1 mile of HVTL Phase II are listed as species of special concern or non-status.

Coordination with MNDNR would be completed to determine if a plant survey would be warranted for the tubercled-rein orchid along HVTL Phase II. Coordination would also be held with the MNDNR to determine potential effects on the state-listed species or their habitats within or near HVTL Phase II, particularly for state-listed endangered tubercled-rein orchid and pale moonw**o**~~a~~rt.

As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf are not expected.

Natural Gas Pipeline Alternatives (West Range Site)

Section 2.3.1.4 describes Natural Gas Pipeline alternatives and Figure 2.3-4 (Chapter 2) shows the alignments. Table 4.8-3 (added for the Final EIS) summarizes the impacts from construction of the alignments on vegetation and habitat acreage by ECS category based on a 70-foot permanent ROW and an additional 30-foot temporary ROW during construction. Each line is described individually and does not consider habitat that would be impacted by other gas pipeline alignment alternatives. The table also does not reflect impacts attributed to the Power Plant Footprint or shared alignments with Rail Lines or Access Roads. The impacts from construction of respective alignments are described in the following subsections.

Table 4.8-3. Vegetation and Habitat Impacts (acres), Natural Gas Pipeline (West Range Site)

ECS Codes[1]	Permanent ROW Area			Temporary ROW Impact[2]			Permanent ROW Change[3]		
	Alt 1	Alt 2	Alt 3	Alt 1	Alt 2	Alt 3	Alt 1	Alt 2	Alt 3
AFXXXX - Aspen Forest[1]	10.4	9.8	12.8	1.7	1.4	5.5	-10.4	-9.8	-12.8
APn80 - Northern Spruce Bog	1.0	0.5	—	0.3	—	—	-1.0	-0.5	—
APn90 - Northern Open Bog	1.2	0.9	1.2	0.4	—	0.1	+1.0	+0.5	—
FPn73 - Northern Rich Alder Swamp	4.0	6.3	1.0	1.9	0.4	0.3	-4.0	-6.3	-1.0
MHn35 - Northern Mesic Hardwood Forest	38.6	13.2	1.4	14.3	3.5	0.5	-38.6	-13.2	-1.4
MHn44 - Northern Wet-Mesic Boreal Hardwood-Conifer Forest	12.5	4.5	14.2	3.6	0.1	6.2	-12.5	-4.5	-14.2
MRn83 - Northern Mixed Cattail Marsh	1.2	1.1	1.0	0.1	—	—	—	—	—
MRn93 - Northern Bulrush-Spikerush Marsh	—	0.2	2.9	—	—	0.9	—	—	—
WFn55 - Northern Wet Ash Swamp	9.0	1.4	0.3	3.2	—	0.1	-9.0	-1.4	-0.3
WMn82 - Northern Wet Meadow/Carr	3.9	2.7	5.1	0.9	0.4	1.6	+13.0	+7.7	+1.3
XDXXOF - Old Field[1]	19.9	35.7	31.1	5.1	0.3	2.5	+61.5	+27.5	+28.4
XDXXXX - Disturbed Land[1]	1.2	1.1	7.3	0.3	—	2.6	—	—	—
Total	**102.8**	**77.5**	**78.2**	**31.8**	**6.2**	**20.4**	—	—	—

[1] Codes were created for habitats not included in ECS classification system.
[2] Temporary ROW acreages do not include the area within the permanent ROW. There would be no permanent impacts to the temporary ROW as these habitats will be allowed to regenerate following construction.
[3] Negative values indicate a loss of habitat and positive values indicate a gain of habitat.

As explained in Section 2.3.1.4, construction of the Nashwauk Natural Gas Pipeline was approved by the Minnesota PUC after publication of the Mesaba Draft EIS. Excelsior has stated its intent to negotiate with the Nashwauk PUC for purchase of natural gas from the Nashwauk pipeline, which will be constructed along the same corridor as the alignment for Natural Gas Pipeline Alternative 1 proposed for the Mesaba Energy Project. In the event that Excelsior would reach favorable terms for the purchase of natural gas from Nashwauk PUC, the construction of a separate natural gas pipeline for the Mesaba Generating Station would not be necessary, and the impacts described for Alternative 1 would not be directly attributable to the Mesaba Energy Project.

Natural Gas Pipeline Alternative 1

Vegetation and Habitat

Table 4.8-3 provides a summary of impacts to vegetation and wildlife habitats by ECS category that would result from the construction of the Natural Gas Pipeline along the Alternative 1 route. Installation of the pipeline would convert existing vegetation to grassland habitat within a permanent 70-foot ROW. Habitat cleared during construction activities within the additional temporary ROW would eventually regenerate over several years of natural succession. The habitat cleared within the permanent ROW would be maintained as grassland in perpetuity by ROW vegetation management activities to keep the HVTL ROW cleared of trees and woody vegetation. The losses and gains in acreage by ECS category are listed in the table column for the permanent ROW change. The main habitat type that would be affected is northern mesic hardwood forest, which would experience almost 39 acres of direct habitat loss as well as fragmentation. Impacts on wildlife would be as described in Section 4.8.2.1.

Aquatic Communities

Section 4.7 describes surface water crossings associated with Natural Gas Pipeline Alternative 1. Wherever practicable, the gas pipeline would be directionally drilled beneath surface waters to a distance of about 100 feet beyond the aquatic community, which would minimize the potential for impacts on aquatic resources.

Protected Species

There are nine known occurrences of state-listed **plant** species within 1 mile of Natural Gas Pipeline Alternative 1 (see Section 3.8). One species, is a state-listed endangered species, the others are listed as species of special concern or non-status. Records for the endangered tubercled-rein orchid, indicate it has colonized in disturbed mine spoil areas near Natural Gas Pipeline Alternative 1, but there are no mine spoil areas within the alignment. Due to the rarity of *P. flava* var. *herbiola* in the state, the probability is low, but not impossible, for encountering this species in wet meadow habitat within the alignment.

If the West Range Site were selected for permitting, before construction Excelsior would coordinate with MNDNR to determine if a plant survey would be warranted for the tubercled-rein orchid along Natural Gas Pipeline Alternative 1, as well as to determine potential effects on state-listed species or their habitats within or near the alignment.

As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf are not expected.

Natural Gas Pipeline Alternative 2

Vegetation and Habitat

Deciduous, mixed wood and regeneration/young forests would be the most common **vegetation** cleared for the **Natural Gas Pipeline along the Alternative 2** alignment. **Existing** grassland habitats would be used for access and staging of construction equipment as the pipeline is installed.

Table 4.8-3 summarizes impacts to vegetation and wildlife habitats by ECS category for construction of Natural Gas Pipeline along the Alternative 2 alignment. The impacts on temporary and permanent ROWs would be as described for the Alternative 1 route. The main habitat type affected is northern mesic hardwood forest, which would experience about 13 acres of direct habitat loss as well as fragmentation. Impacts on wildlife would be as described in Section 4.8.2.1.

Aquatic Communities

Section 4.7 describes surface water crossings associated with Natural Gas Pipeline Alternative 2. Construction methods to reduce impacts would be the same as described for Alternative 1.

Protected Species

There are three known occurrences of one state-listed **plant** species within 1 mile of Natural Gas Pipeline Alternative 2, which are detailed in Section 3.8. These three records are for the endangered tubercled-rein orchid. However, the known records for this species near Natural Gas Pipeline Alternative 2 are within mine spoil areas, and there are no mine spoil areas within the alignment.

Because of the rarity of *P. flava* var. *herbiola* in the state, the probability is low, but not impossible, for encountering this species in wet meadow habitat within Natural Gas Pipeline Alternative 2**. If the West Range Site were selected for permitting, prior to construction Excelsior would coordinate with MNDNR** to determine potential effects on the state-listed species or their habitats.

Based on the results of the BA, adverse impacts on Canada lynx and gray wolf are not expected.

Natural Gas Pipeline Alternative 3

Vegetation and Habitat

Deciduous forest is the most common vegetation that would be cleared for the Natural Gas Pipeline Alternative 3 alignment. Existing grassland habitats would be used for access and staging of construction equipment as the pipeline is installed.

Table 4.8-3 summarizes impacts to vegetation and wildlife habitats by ECS category that would result from construction of the proposed Natural Gas Pipeline along the Alternative 3 route. The impacts on temporary and permanent ROWs would be as described for the Alternative 1 route. The main habitat type that would be affected is northern wet mesic boreal hardwood conifer forest, which would experience about 14 acres of direct habitat loss as well as fragmentation. Impacts on wildlife would be as described in Section 4.8.2.1.

Aquatic Communities

Section 4.7 describes surface water crossings associated with Natural Gas Pipeline Alternative 3. Construction methods to reduce impacts would be the same as described for Alternative 1.

Protected Species

There are no known occurrences of state-listed protected or otherwise rare species within 1 mile of Natural Gas Pipeline Alternative 3. **Adverse impacts on Canada lynx and gray wolf are not expected based on the results of the BA.**

Process Water Supply Pipelines (West Range Site)

Process Water Supply Pipeline Segments 1, 2, and 3 described in this subsection would all be included in the process water supply plan for the West Range Site (see Section 4.5) and would all be constructed during Phase I of the Mesaba Energy Project. Section 2.3.1.3 discusses the alignments, as shown in Figure 2.3-3 (Chapter 2). Table 4.8-4 (added for the Final EIS) summarizes the impacts from construction of the pipelines on acreage by ECS category. Collectively, the pipeline segments would convert about 42 acres of wooded vegetation types to grassland types in the permanent ROWs. The table also does not reflect impacts attributed to Power Plant Footprint or shared alignments with Rail Lines or Access Roads.

Segment 1 (Lind Pit to Canisteo Pit)

Vegetation and Habitat

Table 4.8-4 provides a summary of impacts to vegetation and wildlife habitats by ECS category that would result from construction of the proposed Process Water Supply Pipeline Segment 1. Installation of the pipeline would convert existing vegetation to grassland habitat within a permanent 100-foot ROW. Habitat cleared during construction activities within an additional 50-foot temporary ROW would eventually regenerate over several years of natural succession. Maintenance of the permanent ROW would be as described for natural gas pipelines. The losses and gains in acreage by habitat type are listed in the table column for the permanent ROW change. The main habitat type that would be affected is aspen forest, which would experience about 6 acres of direct habitat loss as well as fragmentation. Aspen forests within the West Range Site are characterized as early successive, emerging after logging activities. Impacts on wildlife would be as described in Section 4.8.2.1.

Table 4.8-4. Vegetation and Habitat Impacts (acres), Process Water Supply Pipelines (West Range Site)

ECS Codes[1]	Permanent ROW Area				Temporary ROW Impact[2]				Permanent ROW Change[3]			
	Segment 1	Segment 2	Segment 3	Total	Segment 1	Segment 2	Segment 3	Total	Segment 1	Segment 2	Segment 3	Total
AFXXXX - Aspen Forest[1]	6.3	1.5	—	7.8	4.3	1.1	—	5.4	-6.3	-1.5	—	-7.8
APn90 - Northern Open Bog	—	—	0.4	0.4	—	—	0.1	0.1	—	—	—	—
FPn73 - Northern Rich Alder Swamp	—	0.1	1.4	1.5	—	0.1	1.2	1.3	—	-0.1	-1.4	-1.5
FPn82 - Northern Rich Tamarack Swamp (Western Basin)	—	—	—	—	—	—	0.1	0.1	—	—	+4.1	+4.1
APn81 - Northern Poor Conifer Swamp	—	0.8	1.0	1.8	—	0.3	0.1	0.4	—	-0.8	-1.0	-1.8
LKi54 - Inland Lake Clay/Mud Shore	—	—	0.1	0.1	—	0.1	0.2	0.3	—	—	—	—
MHn35 - Northern Mesic Hardwood Forest	—	5.8	17.2	23	—	3.4	9.9	13.3	—	-5.8	-17.2	-23.0
MHn44 - Northern Wet-Mesic Boreal Hardwood-Conifer Forest	—	1.6	9.9	11.5	—	1.2	5.7	6.9	—	-1.6	-9.9	-11.5
MRn83 - Northern Mixed Cattail Marsh	—	—	0.2	0.2	—	—	0.4	0.4	—	—	—	—
WMn82 - Northern Wet Meadow/Carr	—	—	—	—	—	—	—	—	—	+0.8	—	+0.8
MRn93 - Northern Bulrush-Spikerush Marsh	—	—	0.4	0.4	—	—	0.2	0.2	—	—	—	—
OW- Other Water Body	0.7	—	0.4	1.1	0.6	—	0.4	1.0	—	—	—	—
WFn55 - Northern Wet Ash Swamp	—	—	1.7	1.7	—	—	0.9	0.9	—	—	-1.7	-1.7
XDXXOF - Old Field[1]	8.8	4.5	3.4	16.7	7.5	0.9	1.0	9.4	+6.3	+8.9	+27.1	+42.3
XDXXXX - Disturbed Land[1]	10.9	0.2	11.4	22.5	1.0	1.3	4.0	6.3	—	—	—	—
Total	**26.6**	**14.3**	**47.6**	**88.7**	**13.4**	**8.3**	**24.1**	**46.0**	—	—	—	—

[1] Codes were created for habitats not included in ECS classification system.
[2] Temporary ROW acreages do not include the area within the permanent ROW. There would be no permanent impacts to the temporary ROW as these habitats will be allowed to regenerate following construction.
[3] Negative values indicate a loss of habitat and positive values indicate a gain of habitat.

Aquatic Communities

There are no surface water crossings that would be associated with Process Water Supply Pipeline Segment 1; therefore, no impacts to aquatic communities would be expected during construction.

Protected Species

There are four known occurrences of one state-listed **plant** species within 1 mile of Process Water Supply Pipeline Segment 1 (Lind Pit to Canisteo Pit), which are detailed in Section 3.8. These four records are for the state-listed *Botrychium* spp., which were documented through a field survey completed by Critical Connections Ecological Services, Inc. in 2005 (CCESR, 2005). It is assumed these records have been reported to the MNDNR and are now part of the NHIS database.

All four *Botrychium* spp. were recorded to occur in mine spoil areas, although it is not fully understood how these species were recruited into these highly disturbed areas. One species, *B. pallidum* (pale moonwort), is state-listed endangered. The remaining *Botrychium* spp. are listed as species of special concern or non-status species. All four species may be within the temporary or permanent ROWs for Process Water Supply Pipeline Segment 1 and could be directly affected due to construction activities.

Although impacts to species of special concern or non-status species and their habitats are not regulated by state law, the Proposed Action does not preclude the need for coordination or consultation with the MNDNR to determine significance of potential impacts. For these reasons, **Excelsior would coordinate** with MNDNR to determine the potential effects on these species or their habitats within or near Process Water Supply Pipeline Segment 1, particularly for state-listed endangered *B. pallidum*.

As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf are not expected.

Segment 2 (Canisteo Pit to West Range Site)

Vegetation and Habitat

The alignment for the Process Water Supply Pipeline Segment 2 (see Section 2.3.1.3) was relocated after publication of the Draft EIS to follow the alignment of Access Road 3 to the plant footprint. Table 4.8-4 summarizes the impacts on the permanent ROW for the Segment 2 realignment. The shifted alignment would affect slightly more aspen forest, but less northern wet-mesic boreal hardwood-conifer forest as compared to the original alignment. The impacts on temporary and permanent ROWs would be as described for Segment 1. Impacts on wildlife would be as described in Section 4.8.2.1.

Aquatic Communities

There are no surface water crossings that would be associated with Process Water Supply Pipeline Segment 2; **therefore,** no impacts to aquatic communities would be expected during construction.

Because the water level in the Canisteo Pit would be maintained in accordance with the water resources management plan for the Mesaba Generating Station at the West Range Site, and the process water intake structure would be designed to prevent entrainment of aquatic life as described in Section 4.5, impacts on lake trout would be minor. The design of the intake structure would preclude the transfer of live rainbow smelt to other surface waters during plant operation.

Protected Species

There are no known occurrences of state-listed protected or otherwise rare **plant** species within 1 mile of Process Water Supply Pipeline Segment 2 (Canisteo Pit to West Range Site). **As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf are not expected.**

Segment 3 (Gross-Marble Pit to Canisteo Pit)

Vegetation and Habitat

Table 4.8-4 summarizes the impacts on vegetation and wildlife habitats by ECS category that would result from Process Water Supply Pipeline Segment 3. The impacts on temporary and permanent ROWs would be as described for segment 1. The main habitat type that would be affected is northern mesic hardwood forest, which would experience about 17 acres of direct habitat loss as well as fragmentation. Impacts on wildlife would be as described in Section 4.8.2.1.

Aquatic Communities

There are no surface water crossings that would be associated with Process Water Supply Pipeline Segment 3; therefore, no impacts to aquatic communities would be expected during construction.

Protected Species

There is one known occurrence of a state-listed species within 1 mile of Process Water Supply Pipeline Segment 3 (Gross-Marble Pit to Canisteo Pit), which is detailed in Section 3.8. This record is for the state-listed threatened *B. rugulosum* (St. Lawrence grapefern), which was observed within a mine tailings basin among aspen trees. Although this record is not within the proposed alignment for Process Water Supply Pipeline Segment 3, there are mine spoil areas within the proposed alignment that may contain undocumented occurrences of this species. Consequently, coordination with MNDNR would determine whether a plant survey would be warranted. **As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf are not expected.**

Cooling Tower Blowdown Outfalls (West Range Site)

[Text in the Draft EIS describing impacts from construction of Cooling Tower Blowdown Outfalls was eliminated at this point based on Excelsior's decision to use an enhanced ZLD system at the West Range Site as discussed in Section 2.3.1.3.]

Potable Water and Sewer Pipelines (West Range Site)

Vegetation and Habitat

The alignment for the Potable Water and Sewer Pipelines was relocated after publication of the Draft EIS to follow the alignment of Access Road 3 to the plant footprint (see discussion in Section 2.3.1.3). Table 4.8-5 (added for the Final EIS) provides a summary of impacts to vegetation and wildlife habitats by ECS category that would result from construction of these pipelines. The shifted alignment would parallel the new access road to CR 7 and then continue south along CR 7 as originally proposed.

Installation of the pipeline would convert existing vegetation to grassland habitat within a permanent 40-foot ROW. An additional 60-foot temporary ROW would be cleared during construction but would eventually regenerate over several years of natural succession. Maintenance of the permanent ROW would be as described for Natural Gas Pipeline Alternative 1. Table 4.8-5 compares the impacts that would result from the revised alignment with those of the original alignment. The losses and gains in acreage by habitat type are listed in the table column for permanent ROW change. The impacts on wooded habitats would be slightly less for the revised alignment than the original alignment. The table does not reflect impacts attributed to the Power Plant Footprint or shared alignments with Rail Lines, Access Roads, or the Process Water Supply Pipelines. Impacts on wildlife would be as described in Section 4.8.2.1.

Table 4.8-5. Vegetation and Habitat Impacts (acres), Potable Water and Sewer Pipelines (West Range Site)

ECS Codes[1]	Permanent ROW Area		Temporary ROW Impact[2]		Permanent ROW Change[3]	
	Revised Alignment	Original Alignment	Revised Alignment	Original Alignment	Revised Alignment	Original Alignment
AFXXXX - Aspen Forest[1]	—	—	—	—	—	—
FPn73 - Northern Rich Alder Swamp	—	—	—	—	—	—
FPn82 – Northern Rich Tamarack Swamp (Western Basin)	—	—	—	1.5	—	—
APn81 - Northern Poor Conifer Swamp	0.6	—	—	—	-0.6	—
MHn35 - Northern Mesic Hardwood Forest	—	0.9	1.8	2.8	—	-0.9
MHn44 - Northern Wet-Mesic Boreal Hardwood-Conifer Forest	0.4	1.8	1.4	3.5	-0.4	-1.8
WMn82 – Northern Wet Meadow/Carr	—	1.0	—	—	+0.6	—
XDXXOF - Old Field[1]	—	—	0.8	0.3	+0.4	+2.7
XDXXXX - Disturbed Land[1]	2.3	2.3	1.9	1.7	—	—
Total	**3.3**	**6.1**	**5.9**	**9.9**	—	—

[1] Codes were created for habitats not included in ECS classification system.
[2] Temporary ROW acreages do not include the area within the permanent ROW. There would be no permanent impacts to the temporary ROW as these habitats will be allowed to regenerate following construction.
[3] Negative values indicate a loss of habitat and positive values indicate a gain of habitat.

Aquatic Communities

There are no surface water crossings that would be associated with the Potable Water and Sewer Pipelines.

Protected Species

As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf would not be expected. There are no known occurrences of state-listed protected or otherwise rare species within 1 mile of the Potable Water and Sewer Pipelines.

Rail Line Alternatives (West Range Site)

Section 2.3.1.2 describes the Rail Line Alternative alignments, as shown in Figure 2.3-2 (Chapter 2). Based on comments and recommendations from USACE and other agencies after publication of the Draft EIS, DOE conferred with Excelsior to identify additional alignments that would minimize and avoid impacts on wetlands (see also Section 4.7 and Appendix F2). This effort resulted in a new alignment preferred by Excelsior, Alternative 3B, which is compared to Excelsior's original preferred Alternative 1A in this Final EIS. Table 4.8-6 (added for the Final EIS) summarizes the impacts from construction of the alignments on vegetation and habitat acreage by ECS category. The table does not reflect impacts already attributed to the Power Plant Footprint. The impacts of the alternative alignments are described in the following subsections.

Table 4.8-6. Vegetation and Habitat (acres), Rail Line (West Range Site)

ECS Codes[1]	Alternative 3B		Alternative 1A	
	Rail Line	Center Loop[2]	Rail Line	Center Loop[2]
AFXXXX - Aspen Forest[1]	3.5	23.1	0.7	—
FPn73 - Northern Rich Alder Swamp	2.0	0.2	1.7	—
MHn35 - Northern Mesic Hardwood Forest	29.4	145.1	31.1	29.8
MHn44 - Northern Wet-Mesic Boreal Hardwood-Conifer Forest	42.0	25.4	32.3	—
MRn83 - Northern Mixed Cattail Marsh	0.1	2.0	—	—
OW- Other Water Body	0.6	—	0.2	—
WFn55 - Northern Wet Ash Swamp	10.2	3.5	18.5	49.8
WMn82 - Northern Wet Meadow/Carr	2.1	0.6	3.2	—
XDXXOF - Old Field[1]	1.9	12.6	2.2	—
XDXXXX - Disturbed Land[1]	2.3	—	2.2	—
Total	**93.8**	**212.4**	**92.0**	**79.6**

[1] Codes were created for habitats not included in ECS classification system.
[2] Depending on final design specifications for the center loop, habitat may not be impacted and would continue to exist in current form.

Rail Line Alternative 1A and Center Loop

Vegetation and Habitat

Table 4.8-6 summarizes impacts to vegetation and wildlife habitats by ECS category that would result from Rail Line Alternative 1A. The main habitat types that would be affected are northern wet-mesic boreal hardwood-conifer forest and northern mesic hardwood forest, which would experience, respectively, about 32 acres and 31 acres of direct habitat loss as well as fragmentation through construction of the rail line. Wetland habitat conversions would also occur as described in Section 4.7; however, unlike utility corridors, these wetland areas would be lost through construction of the rail line as opposed to being converted into herbaceous-dominated communities. Wetland habitats within the center loop, principally northern wet ash swamp, would be avoided during construction to the extent practicable and may not be permanently altered depending on the final design specifications.

Impacts on wildlife would be as described in Section 4.8.2.1. Impacts resulting from habitat fragmentation during construction and mortality due to collisions with trains during operations would be principal concerns.

Aquatic Communities

There are no surface water crossings that would be associated with Rail Line Alternative 1A; therefore, no impacts to aquatic communities would be expected as a result of the construction or operation of this structure.

Protected Species

As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf would not be expected based on the results of the BA. During plant operation, the potential for collisions with trains would be the impact of most concern.

There are no known occurrences of state-listed protected or otherwise rare species within 1 mile of Rail Line Alternative 1A.

Rail Line Alternative 1B and Center Loop

[Text in the Draft EIS describing impacts from construction of Rail Line Alternative 1B was deleted at this point. Excelsior eliminated Rail Line Alternative 1B from further consideration

based on the evaluation in the Draft EIS and subsequent consideration of Rail Line Alternative 3B as discussed in Section 2.3.1.2.]

Rail Line Alternative 3B and Center Loop

Vegetation and Habitat

As a result of concerns about potential wetland impacts raised by the USACE and other agencies following publication of the Draft EIS, Rail Line Alternative 3B was identified as Excelsior's new preferred alignment as described in Section 2.3.1.2. Alternative 3B would reduce impacts to wetlands, but would increase impacts to coniferous, deciduous, and mixed forest. Areas for the rail line are expected to be cleared and permanently altered for construction of the rail line. Wooded vegetation in the center loop would be avoided during construction to the extent practicable and may not be permanently altered depending on the final design specifications.

Table 4.8-6 summarizes impacts to vegetation and wildlife habitats by ECS category that would result from the proposed Rail Line Alternative 3B. The revised alignment would loop around the hill in the northeastern portion of the West Range Site and avoid encircling a substantial amount of wetland habitat as proposed under Alternative 1A. Alternative 3B would reduce impacts to northern wet ash swamp by about 8 acres for the rail alignment, and avoid about 46 acres of potential impacts to northern wet ash swamp encircled by the center loop of Alternative 1A. The main habitat type that would be affected is northern wet-mesic boreal hardwood-conifer forest, which would experience about 42 acres of direct habitat loss as well as fragmentation through construction of the rail line. The rail loop for Alternative 3B would encircle an upland area dominated by northern mesic hardwood forest.

Impacts on wildlife would be as described in Section 4.8.2.1. Impacts resulting from habitat fragmentation during construction and mortality due to collisions with trains during operations would be principal concerns.

Aquatic Communities

There are no surface water crossings that would be associated with Rail Line Alternative 3B.

Protected Species

As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf are not expected based on the results of the BA. During plant operation, the potential for collisions with trains would be the impact of most concern.

There are no known occurrences of state-listed protected or otherwise rare species within 1 mile of Rail Line Alternative 3B.

Access Road Alignments (West Range Site)

Potential Access Road alternatives are described in Section 2.3.1.2, and the alignments are shown in Figure 2.3-2 (Chapter 2).

Vegetation and Habitat

As discussed in Section 2.3.1.2, after publication of the Draft EIS, Itasca County deferred its proposed project to realign CR 7, which would have been the basis of Excelsior's proposed Access Road 1. Excelsior's proposed Access Road 2 would have connected Access Road 1 with the plant footprint and depended upon the realignment of CR 7 to be feasible. Also, as a result of concerns raised by the USACE and other agencies after the Draft EIS was published regarding the need to avoid and minimize impacts to wetland habitats, Excelsior identified a new preferred alignment, Access Road 3, which would connect the existing CR 7 with the plant footprint near the southwestern corner of the West Range Site boundary.

Table 4.8-7 (added for the Final EIS) provides a summary of impacts to vegetation and wildlife habitats by ECS category that would result from construction of Access Road 3. The table also summarizes impacts that would result from the Access Roads 1 and 2 alignments for comparison. The revised alignment would shorten the length of the road and would reduce impacts in the permanent ROW by a total of about 8 acres. Habitat cleared during construction activities within the temporary ROW would eventually recover over several years of natural succession. The habitat cleared within the permanent ROW would be converted to roadway and grassland in roadside ditches. The ditches would be kept cleared of trees and woody vegetation through maintenance. Process Water Supply Pipeline Segment 2 and the Potable Water and Sanitary Sewer Pipelines would occupy the permanent ROW adjacent to the new roadway. The main habitat types that would be affected include aspen forest and northern mesic hardwood forest, which would experience, respectively, about 7 acres and 5 acres of direct habitat loss as well as fragmentation. Aspen forests within the West Range Site are characterized as early successive, emerging after logging activities. Impacts on wildlife would be as described in Section 4.8.2.1.

Table 4.8-7. Vegetation and Habitat Impacts (acres), Access Roads (West Range Site)

ECS Codes[1]	Temporary ROW Impact[2]		Permanent ROW Change[3]	
	Access Road 3 Alignment	Access Roads 1 & 2 Alignment	Access Road 3 Alignment	Access Roads 1 & 2 Alignment
AFXXXX - Aspen Forest	4.3	0.6	-6.5	-0.7
FPn73 - Northern Rich Alder Swamp	0.1	—	-0.2	—
FPn82 - Northern Rich Tamarack Swamp (Western Basin)	—	—	—	—
MHn35 - Northern Mesic Hardwood Forest	3.3	5.2	-5.2	-7.8
MHn44 - Northern Wet-Mesic Boreal Hardwood-Conifer Forest	—	3.1	—	-4.3
MRn83 - Northern Mixed Cattail Marsh	0.1	0.1	—	—
WMn82 - Northern Wet Meadow/Carr	—	2.7	—	-4.2
XDXXOF - Old Field[1]	0.3	1.9	-0.2	-2.5
XDXXXX - Disturbed Land[1]	0.1	0.2	-0.1	-0.9
Total	**8.2**	**13.7**	**-12.3**	**-20.4**

[1] Codes were created for habitats not included in ECS classification system.
[2] Temporary ROW acreages do not include the area within the permanent ROW. There would be no permanent impacts to the temporary ROWs as these habitats will be restored following construction.
[3] Negative values indicate a loss of habitat.

Aquatic Communities

There are no surface water crossings that would be associated with the road alignments.

Protected Species

As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf are not expected based on the results of the BA. During plant operation, the potential for collisions with vehicles would be the impact of most concern.

There are no known occurrences of state-listed protected or otherwise rare species within 1 **mile of the road alignment.**

4.8.4 Impacts on East Range Site and Corridors

This section describes the construction-related impacts of the Mesaba Generating Station on the East Range Site and corridors. The impacts of operations on biological resources would be comparable for either site and are described in Section 4.8.2.2 unless otherwise appropriate. This

section as published in the Draft EIS was revised to address impacts to wildlife habitat based on the ECS habitat types in response to comments and requests by USACE and MNDNR. Therefore, tables that were included in the Draft EIS listing affected acreages by respective land cover have been eliminated and replaced with tables based on the ECS System categories.

During construction for the Phase I power plant, the Phase II footprint would be prepared and used as a staging and laydown area for stockpiling of materials and storage of equipment as well as for a concrete batch plant. Therefore, much of the footprint would be cleared during Phase I construction with the exception of wetlands and sensitive areas that would be avoided. For Phase II construction, Excelsior would establish off-site construction staging and laydown areas on 85 acres of land selected from two potential sites as described in Chapter 2 (see Sections 2.2.4.1 and 2.3.2.1). Both potential sites are located on lands that have been disturbed or cleared during prior uses by mineral extraction companies, and they have access to local roadways. Excelsior would select appropriate sites for the necessary acreage prior to construction of Phase II taking into consideration potential effects on biological resources. Following completion of Phase II construction, sites used for staging and laydown would be restored to pre-existing conditions.

4.8.4.1 East Range Site and Power Plant Footprint

See Figure 2.3-5 in Section 2.3.2, which shows the East Range Site and plant footprint.

Vegetation and Habitat

The impacts of construction on vegetation at the East Range Site generally would be as described in Section 4.8.2.1 Though the construction of the Mesaba Generating Station at the East Range Site would require a relatively large amount of vegetation clearing, resulting in habitat loss and fragmentation, these resources are common in the region, and the construction of the Mesaba Generating Station at the East Range Site would degrade a small fraction of the total amount of these plant communities in the area **(see Section 5.2.6)**. The potential introduction of non-native or invasive flora would be minimized as described for common impacts in Section 4.8.2.

Section 3.8.1.2 describes wildlife species likely to inhabit the East Range Site. Habitat loss and habitat degradation are influencing factors that contribute to the decline of wildlife species (MNDNR, 2007). Consequently, wildlife using the natural resources within the region of influence for the Mesaba Generating Station may be adversely affected. However, comparable habitat types are common in the region, and the placement of the Mesaba Generating Station would cause the elimination of a small fraction of the total habitat near the East Range Site. Refer also to the discussion of cumulative impacts on wildlife habitat in Section 5.2.6.

Table 4.8-8 (added for the Final EIS) provides a summary of impacts to vegetation and wildlife habitats by ECS category. Impacts on wildlife would be as described in Section 4.8.2.1. Table 3.8-1 (Chapter 3) lists the SGCN species, as defined by the MNDNR, that typically utilize the habitat types identified in Table 4.8-8. The plant site would convert existing wildlife habitat into industrial land use. The main habitat type that would be affected is northern wet-mesic boreal hardwood-conifer forest, which would experience over 133 acres of direct habitat loss as well as fragmentation for construction of Phases I and II.

Table 4.8-8. Vegetation and Habitat Impacts (acres), Mesaba IGCC Power Plant Footprint (East Range Site)

ECS Codes	Total Area within East Range Site (acres)	Phase I Impacts (acres)	Phase II Impacts (acres)	Total Impacts (acres)
APn80 - Northern Spruce Bog	12.9	-4.8	—	-4.8
APn81 - Northern Poor Conifer Swamp	37.1	-0.7	-1.4	-2.1
FPn73 - Northern Rich Alder Swamp	181.2	-0.2	-0.9	-1.1
MHn35 - Northern Mesic Hardwood Forest	304.3	-2.8	-11.1	-13.9
MHn44 - Northern Wet-Mesic Boreal Hardwood-Conifer Forest	416.4	-63.7	-69.4	-133.2
MRn83 - Northern Mixed Cattail Marsh	62.7	-1.9	-1.4	-3.3
WFn55 - Northern Wet Ash Swamp	249.4	-21.8	-0.3	-22.1
WMn82 - Northern Wet Meadow/Carr	12.1	-1.8	—	-1.8
XDXXOF - Old Field[1]	23.2	-0.3	-0.7	-1.0
AFXXXX - Aspen Forest1[1]	21.4	—	—	—
XDXXXX – Disturbed Land1[1]	0.9	—	—	—
Total	**1321.7**	**-97.9**	**-85.2**	**-183.1**

[1] Codes were created for habitats not included in ECS classification system.
Note: Negative values indicate a loss of habitat.

Aquatic Communities

No direct impacts to aquatic species would occur from construction of the Mesaba Generating Station at the East Range Site. Section 4.8.2.2 describes the impacts of plant operations on aquatic communities. Section 4.8.4.2 discusses potential impacts that may result from the construction and operation of supporting infrastructure (e.g., natural gas pipelines, process water pipelines).

Protected Species

As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf would not be expected (see BA in Appendix E).

No MNDNR NHIS threatened, endangered, or otherwise rare species inhabit or occur within the East Range Site. According to the MNDNR NHIS database, the closest occurrence is the wood turtle (*Clemmys insculpta*), which exists on the Partridge River, more than 2 miles from the East Range Site boundary **and would not be affected by the project**.

4.8.4.2 HVTL, Pipeline, and Transportation Corridors

See Section 2.3.2 for descriptions of alternative alignments and Figures 2.3-6, 2.3-7, and 2.3-8 showing corridor alignments for the East Range Site.

HVTL Alternatives (East Range Site)

Section 2.3.2.5 describes HVTL alternatives and Figure 2.3-8 (Chapter 2) shows the alignments. Table 4.8-9 (added for the Final EIS) summarizes the impacts from construction of the alignments on vegetation and habitat acreage by ECS category based on the clearing of additional permanent ROW in existing corridors and an additional 100-foot permanent ROW for corridors bridging between existing ROWs. Each alternative is described individually and does not consider habitat that would be impacted by other HVTL alignment alternatives. The table also does not reflect impacts attributed to the Power Plant Footprint or shared alignments with Rail Lines, Access Roads, Process Water Pipelines, or Natural Gas Pipelines. The impacts from construction of respective alignments are described in the following subsections.

Table 4.8-9. Vegetation and Habitat Impacts (acres), HVTLs (East Range Site)

ECS Codes[1]	Permanent ROW Area		Permanent ROW Change[2]	
	Alternative 1	Alternative 2	Alternative 1	Alternative 2
AFXXXX - Aspen Forest[1]	2.9	9.0	-2.9	-9.0
APn80 - Northern Spruce Bog	44.4	46.4	-44.4	-46.4
APn81 - Northern Poor Conifer Swamp	8.8	7.3	-8.8	-7.3
APn90 - Northern Open Bog	11.3	15.7	+53.2	+53.7
FPn73 - Northern Rich Alder Swamp	60.8	69.3	-60.8	-69.3
FPn81 - Northern Rich Tamarack Swamp (Water Track)	0.7	0.7	-0.7	-0.7
LKi54 - Inland Lake Clay/Mud Shore	3.7	3.3	—	—
MHn35 - Northern Mesic Hardwood Forest	31.4	38.3	-31.4	-38.3
MHn44 - Northern Wet-Mesic Boreal Hardwood-Conifer Forest	49.7	25.8	-49.7	-25.8
MRn83 - Northern Mixed Cattail Marsh	0.3	—	—	—
MRn93 - Northern Bulrush-Spikerush Marsh	0.7	0.8	—	—
OW- Other Water Body	1.1	1.0	—	—
WFn55 - Northern Wet Ash Swamp	20.2	19.2	-20.2	-19.2
WFn64 - Northern Very Wet Ash Swamp	0.2	2.8	-0.2	-2.8
WMn82 - Northern Wet Meadow/Carr	6.1	6.3	+81.8	+92.1
XDXXOF - Old Field[1]	475.8	478.4	+84.0	+73.1
XDXXXX - Disturbed Land[1]	35.0	39.2	—	—
Total	**752.8**	**763.5**	—	—

[1] Codes were created for habitats not included in ECS classification system.
[2] Negative values indicate a loss of habitat and positive values indicate a gain of habitat.

HVTL Alternative 1

Vegetation and Habitat

As described in Section 2.3.2.5, HVTL Alternative 1 would require the clearing of an additional 30-foot wide ROW alongside the existing ROW of the MP 38L that has been cleared of tree and shrub vegetation for maintenance. In addition, the HVTLs in the existing cleared ROWs for the MP 39L and MP 37L corridors would be upgraded with new poles and additional power lines, but no widening of the ROWs. Furthermore, two new ROW segments, each about 2 miles in length, would be required. One would extend alongside the existing MP 43L HVTL corridor to connect the Mesaba Generating Station with the initiation point of the 39L and 38L corridors. The second new ROW segment would be required to link the 39L and 37L corridors near the City of Eveleth. Table 4.8-9 summarizes the impacts to vegetation and wildlife habitats by ECS category that would result from construction for the proposed HVTL Alternative 1 routes. The main habitat types that would be affected are northern rich alder swamp and northern wet-mesic boreal hardwood-conifer forest, which would respectively experience about 61 acres and 50 acres of direct habitat loss as well as fragmentation. However, except in the new ROW segments, these losses would generally occur within a 30-foot corridor adjacent to an existing cleared ROW for the MP 38L. Impacts on wildlife would be as described in Section 4.8.2.1.

Aquatic Communities

There would be multiple surface water crossings associated with HVTL Alternative 1 as described in Section 4.7; however, the HVTLs would be suspended and the alignments would be designed to avoid the placement of towers within surface waters. Therefore, no impacts to aquatic resources would be expected..

Protected Species

As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf would not be expected. The HVTLs for Alternative 1 would be constructed in parallel to existing HVTLs in the same cleared ROWs, one alignment of which would be widened by an additional 30 feet.

There are 16 known occurrences of state-listed species within 1 mile of HVTL Alternative 1, which are detailed in Section 3.8. Of greatest potential concern are records for the state-listed endangered floating marsh-marigold (*Caltha natans*) that inhabits a pond outlet and state-listed threatened wood turtle, which exists in habitats near the St. Louis and Partridge Rivers. Wood turtles prefer wetland habitats and water bodies. The HVTL would be suspended and poles could be placed up to 1,000 feet apart, which would allow the project to avoid particularly sensitive habitats that may contain state-listed species. If this alternative is chosen as the preferred alternative, a survey for these species may be requested by the MNDNR. Coordination with the MNDNR would be completed to determine significance of effect on these species.

The remaining records of state-listed species within 1 mile of HVTL Alternative 1 are listed as species of special concern or non-status species. Coordination with MNDNR would be completed to determine the potential effects on these species or their habitats within or near HVTL Alternative 1.

HVTL Alternative 2

Vegetation and Habitat

As described in Section 2.3.2.5, HVTL Alternative2 (preferred by Excelsior) would require construction of an additional 30-foot wide ROW alongside the existing ROWs of the MP 39L and MP 37L that have been cleared of tree and shrub vegetation for maintenance. In addition, the HVTL in the existing cleared ROW for the MP 38L corridor would be upgraded with new poles and additional power lines, but no widening of the ROW. Furthermore, the same two new ROW segments, each about 2 miles in length, would be required as described for HVTL Alternative 1. Table 4.8-9 summarizes the impacts to vegetation and wildlife habitats by ECS category that would result from construction for the proposed HVTL Alternative 2 routes. The main habitat types that would be affected are northern rich alder swamp and northern spruce bog, which would respectively experience about 69 acres and 46 acres of direct habitat loss as well as fragmentation. However, except in the new ROW segments, these losses would generally occur within a 30-foot corridor adjacent to an existing cleared ROWs for the MP 39L and MP 37L. Impacts on wildlife would be as described in Section 4.8.2.1.

Aquatic Communities

There would be several surface water crossings associated with HVTL Alternative 2**,** as described in Section 4.7; however, the HVTLs would be suspended and the alignments would be designed to avoid the placement of towers within surface waters. Therefore, no impacts to aquatic resources would be expected.

Protected Species

As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf would not be expected. The HVTLs for Alternative 2 would be constructed in parallel to existing HVTLs in the same cleared ROWs, one alignment of which would be widened by an additional 30 feet.

There are 18 known occurrences of state-listed species within 1 mile of HVTL Alternative 2, which are detailed in Section 3.8. Of greatest potential concern are records for the state-listed threatened wood turtle, found in habitats near the St. Louis and Partridge Rivers. Wood turtles prefer wetland habitats and water bodies. The HVTL would be suspended and poles could be placed up to 1,000 feet apart, which would allow the project to avoid particularly sensitive habitats that may contain state-listed species. If this alternative is selected, a survey for this species may be requested by the MNDNR. Coordination with the MNDNR would be completed to determine significance of effect on this species.

The remaining records of state-listed species within 1 mile of HVTL Alternative 2 are listed as species of special concern or non-status species. Coordination with MNDNR would be completed to determine the potential effects on these species or their habitats within or near HVTL Alternative 2.

Natural Gas Pipeline (East Range Site)

Vegetation and Habitat

Section 2.3.2.4 describes the proposed alignment for the East Range Natural Gas Pipeline, as shown in Figure 2.3-8 (Chapter 2). Construction of the natural gas pipeline would take place entirely within the ROW of the existing NNG pipeline except for the segment of the pipeline extending from the existing ROW to the plant footprint. The land cover within the existing gas pipeline ROW has been cleared and contains no forested cover. Table 4.8-10 (added for the Final EIS) provides a summary of impacts to wildlife habitats by ECS category that would result from construction of the proposed natural gas pipeline. The table does not reflect impacts attributed to the Power Plant Footprint or shared alignments with other project elements. The impacts on the 30-foot temporary and 70-foot permanent ROWs would be as described for the West Range Natural Gas Pipeline Alternative 1 route. The main habitat types that would be affected are northern rich alder swamp and northern spruce bog, which would respectively experience about 9 acres and 8 acres of direct habitat loss as well as fragmentation. Impacts on wildlife would be as described in Section 4.8.2.1.

Table 4.8-10. Vegetation and Habitat Impacts (acres), Natural Gas Pipeline (East Range Site)

ECS Codes[1]	Permanent ROW Area	Temporary ROW Impacts[2]	Permanent ROW Change[3]
APn80 - Northern Spruce Bog	7.9	—	-7.9
APn90 - Northern Open Bog	1.0	—	+8.1
FPn73 - Northern Rich Alder Swamp	9.0	—	-9.0
FPn81 - Northern Rich Tamarack Swamp (Water Track)	0.2	—	-0.2
LKi54 - Inland Lake Clay/Mud Shore	0.4	—	—
MHn35 - Northern Mesic Hardwood Forest	0.8	0.3	-0.8
MHn44 - Northern Wet-Mesic Boreal Hardwood-Conifer Forest	1.4	0.6	-1.4
MRn83 - Northern Mixed Cattail Marsh	0.6	0.2	—
MRn93 - Northern Bulrush-Spikerush Marsh	0.1	—	—
OW- Other Water Body	0.1	—	—
WFn55 - Northern Wet Ash Swamp	4.4	0.2	-4.4
WMn82 - Northern Wet Meadow/Carr	1.8	—	+13.4
XDXXOF - Old Field[1]	95.6	0.1	+2.2
XDXXXX - Disturbed Land[1]	4.3	—	—
Total	**127.6**	**1.3**	—

[1] Codes were created for habitats not included in ECS classification system.
[2] Temporary ROW acreages do not include the area within the permanent ROW. There would be no permanent impacts to the temporary ROW as these habitats will be allowed to regenerate following construction.
[3] Negative values indicate a loss of habitat and positive values indicate a gain of habitat.

Aquatic Communities

Section 4.7 describes surface water crossings associated with **the proposed** Natural Gas Pipeline. Wherever practicable, the gas pipeline would be directionally drilled beneath surface waters to a distance of about 100 feet beyond the aquatic community, which would minimize the potential for impacts on aquatic resources.

Protected Species

As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf would not be expected.

There are 12 known occurrences of state-listed species within 1 mile of the proposed Natural Gas Pipeline, detailed in Section 3.8. Of greatest potential concern are those records for the state-listed threatened wood turtle, which exists in habitats near the St. Louis and Partridge Rivers. The preferred means of construction for the natural gas pipeline would be to directionally drill beneath rivers, streams, and other bodies of water, which could have temporary impacts on the wood turtle and its habitat in areas of disturbance. Impacted habitat would be restored to preconstruction conditions. If the East Range Site **were selected for permitting**, **prior to construction** a survey for wood turtles within this corridor may be requested by the MNDNR. Coordination with the MNDNR should be completed to determine potential impacts to this species.

The remaining records of state-listed species within 1 mile of the proposed Natural Gas Pipeline are listed as species of special concern or non-status species. Coordination with MNDNR would be completed to determine the potential effects on these species or their habitats within or near the Natural Gas Pipeline.

Process Water Supply Pipelines (East Range Site)

Vegetation and Habitat

All Process Water Supply Pipeline segments would be included in the process water supply plan for the East Range Site (see Section 4.5.4.1 for a discussion of uncertainties associated with process water sources relating to other projects proposed in the vicinity), and all would be constructed during Phase I of the Mesaba Energy Project. Section 2.3.2.3 discusses the alignments, as shown in Figure 2.3-7 (Chapter 2). Table 4.8-11 (added for the Final EIS) summarizes the impacts from construction of the pipelines on acreage by ECS category. Installation of the pipeline would require the clearing of a permanent 100-foot ROW. Habitat cleared during construction activities within an additional 50-foot temporary ROW would eventually regenerate over several years of natural succession. Most of the pipeline segments traverse lands between mine pits that have been disturbed during prior mineral extraction activities and contain negligible to minimal vegetation. Only two segments, Area 2WX to the Plant Footprint and Area 6 and Stephens Mine to Area 2WX, contain more than a few acres of wooded vegetation. Collectively, the pipeline segments would convert about 20 acres of wooded vegetation types to grassland types in the permanent ROWs. Impacts on wildlife would be as generally described in Section 4.8.2.1. The impacts from Process Water Supply Pipeline segments do not include acreages already included in the Power Plant Footprint.

Table 4.8-11. Vegetation and Habitat Impacts (acres), Process Water Supply Pipelines (East Range Site)

ECS Code[1]	Permanent ROW Area									Total Temporary Row Impact[2]	Total Permanent ROW Change[3]
	Area 2WX to Footprint	Area 2WX to 2W	Area 2W to 2E	Area 3 to 2E	Area Knox Mine to 2WX	Area 6 and Stephens Mine to 2WX	Area 9 south to Area 6	Area 9 North to Area 6	Total		
AFXXXX - Aspen Forest[1]	—	—	—	—	—	0.6	—	—	**0.6**	**0.8**	**-0.6**
APn80 - Northern Spruce Bog	0.2	—	—	—	—	—	—	—	**0.2**	**0.2**	**-0.2**
FPn63 - Northern Cedar Swamp	0.5	—	—	—	—	0.3	—	—	**0.8**	**0.5**	**-0.8**
FPn73 - Northern Rich Alder Swamp	—	—	—	—	—	0.7	—	—	**0.7**	**0.5**	**-0.7**
LKi54 - Inland Lake Clay/Mud Shore	—	—	—	—	—	—	—	—	**—**	—	**—**
MHn35 - Northern Mesic Hardwood Forest	3.3	—	—	1.0	—	2.9	—	0.5	**7.7**	**4.3**	**-7.7**
MHn44 - Northern Wet-Mesic Boreal Hardwood-Conifer Forest	1.4	0.3	—	—	0.6	8.5	—	—	**10.8**	**6.6**	**-10.8**
MRn93 - Northern Bulrush-Spikerush Marsh	—	—	—	0.2	—	—	0.3	—	**0.5**	**0.4**	**—**
OW- Other Water Body	—	0.1	0.7	—	0.1	0.3	0.5	0.2	**1.8**	**1.5**	**—**
WFn55 - Northern Wet Ash Swamp	0.1	—	—	—	—	—	—	—	**0.1**	**0.1**	**-0.1**
WMn82 - Northern Wet Meadow/Carr	0.2	—	—	—	—	—	—	—	**0.2**	**0.2**	**+1.8**
XDXXOF - Old Field[1]	1.5	0.4	0.3	—	—	2.9	1.0	—	**6.1**	**4.0**	**+19.1**
XDXXXX - Disturbed Land[1]	3.1	5.5	0.9	5.7	1.5	10.1	4.5	10.9	**42.2**	**18.9**	**—**
Total	**10.3**	**6.3**	**1.8**	**6.9**	**2.2**	**26.2**	**6.3**	**11.7**	**71.7**	**38.0**	**—**

[1] Codes were created for habitat not included in ECS classification system.
[2] Temporary ROW acreages do not include the area within the permanent ROW. There would be no permanent impacts to the temporary ROW as these habitats will be allowed to regenerate following construction.
[3] Negative values indicate a loss of habitat and positive values indicate a gain of habitat.

Aquatic Communities

The pipeline from Area 6 and Stephens Mine to Area 2WX would cross two streams; the pipeline from Area 9 South to Area 6 would cross one stream; and the pipeline from Area 9 North (Donora Mine) to Area 6 would cross one stream. Section 4.7 describes these stream crossings. In each case, construction of the pipeline is proposed to be conducted using open cut trenching. Construction methods and potential impacts would be as described in Section 4.8.2.1.

Protected Species

There are no known occurrences of state-listed protected or otherwise rare species within 1 mile of **any of the Process Water Supply Pipeline segments**. **As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf are not expected. Having been disturbed extensively during mining activities, the area is devoid of habitat for these species.**

Potable Water and Sewer Pipelines (East Range Site)

Vegetation and Habitat

Table 4.8-12 (added for the Final EIS) provides a summary of impacts to wildlife habitats by ECS habitat type that would result from the proposed Potable Water and Sanitary Sewer Pipelines. The temporary and permanent ROWs would be as described for the West Range Potable Water and Sewer Pipelines. The main habitat type that would be affected is northern wet mesic boreal hardwood conifer forest, which would experience about 1 acre of direct habitat loss as well as fragmentation. Impacts on wildlife would be as generally described in Section 4.8.2.1.

Table 4.8-12. Vegetation and Habitat Impacts (acres), Potable Water and Sewer Pipelines (East Range Site)

ECS Codes[1]	Permanent ROW Area	Temporary ROW Impact[2]	Permanent ROW Change[3]
LKi54 - Inland Lake Clay/Mud Shore	0.5	0.7	—
MHn35 - Northern Mesic Hardwood Forest	0.4	1.2	-0.4
MHn44 - Northern Wet-Mesic Boreal Hardwood-Conifer Forest	1.3	2.8	-1.3
WFn55 - Northern Wet Ash Swamp	0.1	0.2	-0.1
WMn82 - Northern Wet Meadow/Carr	—	—	+0.1
XDXXOF - Old Field[1]	5.3	6.6	+1.7
XDXXXX - Disturbed Land[1]	0.7	0.7	—
Total	**8.1**	**12.2**	—

[1] Codes were created for habitats not included in ECS classification system.
[2] Temporary ROW acreages do not include the area within the permanent ROW. There would be no permanent impacts to the temporary ROW as these habitats will be allowed to regenerate following construction.
[3] Negative values indicate a loss of habitat and positive values indicate a gain of habitat.

Aquatic Communities

The Potable Water and Sewer Pipelines are proposed to cross a relatively narrow portion of Colby Lake. The pipelines would be directionally drilled beneath the lake unless bedrock is encountered, which would require the pipelines to be installed by microtunneling. The pipelines would emerge about 100 feet beyond the edges of both sides of the lake. Since the pipelines would be drilled beneath Colby Lake no impacts to aquatic communities would be expected. **Construction methods and potential impacts would be as described in Section 4.8.2.1.**

Protected Species

There are no known occurrences of state-listed protected or otherwise rare species within 1 mile of the Potable Water and Sewer Pipelines; therefore, impacts to these resources or their habitats are not

expected for this alternative**. As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf are not expected.**

Rail Line Alternatives (East Range Site)

Section 2.3.2.2 describes the Rail Line Alternative alignments, as shown in Figure 2.3-6 (Chapter 2). Table 4.8-13 (added for the Final EIS) summarizes the impacts from construction of the alignments on vegetation and habitat acreage by ECS category. The table does not reflect impacts already attributed to the Power Plant Footprint. The impacts of the alternative alignments are described in the following subsections.

Table 4.8-13. Vegetation and Habitat (acres), Rail Line (East Range Site)

ECS Codes[1]	Alternative 1		Alternative 2
	Rail Line	Center Loop[2]	Rail Line
APn80 - Northern Spruce Bog	0.9	0.1	0.4
APn81 - Northern Poor Conifer Swamp	0.5	—	0.3
FPn63 - Northern Cedar Swamp	—	—	11.7
FPn73 - Northern Rich Alder Swamp	0.7	—	0.7
MHn35 - Northern Mesic Hardwood Forest	24.2	35.2	23.8
MHn44 - Northern Wet-Mesic Boreal Hardwood-Conifer Forest	13.6	20.0	10.9
MRn83 - Northern Mixed Cattail Marsh	2.7	22.9	5.3
WFn55 - Northern Wet Ash Swamp	8.6	25.3	1.1
WMn82 - Northern Wet Meadow/Carr	0.1	1.3	0.1
XDXXOF - Old Field[1]	0.8	—	1.8
XDXXXX - Disturbed Land[1]	1.2	—	2.0
Total	**53.2**	**104.8**	**58.0**

[1] Codes were created for habitats not included in ECS classification system.
[2] Depending on final design specifications for the center loop, habitat may not be impacted and would continue to exist in current form.

Rail Line Alternative 1 and Center Loop

Vegetation and Habitat

Table 4.8-13 summarizes impacts to vegetation and wildlife habitats by ECS category that would result from the proposed Rail Line Alternative 1. The main habitat types that would be affected are northern mesic hardwood forest and northern wet-mesic boreal hardwood-conifer forest, which would respectively experience about 24 acres and 14 acres of direct habitat loss, as well as fragmentation through construction of the rail line. Wetland habitat conversions would also occur as described in Section 4.7; however, unlike utility corridors, these wetlands areas will be lost through construction of the rail line as opposed to being converted into herbaceous dominated communities. Vegetation and habitat, including wetlands, which exist within the center loop would be avoided during construction to the extent practicable and may not be permanently altered depending on the final design specifications.

Impacts on wildlife would be as described in Section 4.8.2.1. Impacts resulting from habitat fragmentation during construction and mortality due to collisions with trains during operations would be principal concerns.

Aquatic Communities

The construction of Rail Line Alternative 1 would require crossing two streams, which could directly affect fisheries and aquatic life. **The potential impacts on aquatic life would be as described in Section 4.8.2.1**.

Upon the completion of construction, continued fish passage would be assured through the installation of culverts and the bridging of watercourses. The restoration of fish passage would adhere to the grades, habitat restoration, and other specifications established by the FERC, Mn/DOT, and the FHWA regulations.

Protected Species

As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf are not expected based on the results of the BA. During plant operation, the potential for collisions with trains would be the impact of most concern.

There are no known occurrences of state-listed protected or otherwise rare species within 1 mile of Rail Line Alternative 1.

Rail Line Alternative 2

Vegetation and Habitat

Table 4.8-13 summarizes impacts to wildlife habitats by ECS category that would result from the proposed Rail Line Alternative 2. This alternative does not have a center loop as it would cross the site rather than looping within it. The main habitat type that would be affected is northern mesic hardwood forest, which would experience about 24 acres of direct habitat loss as well as fragmentation through construction of the rail line. Wetland habitat conversions would also occur as described in Section 4.7; however, unlike utility corridors, these wetlands areas will be lost through construction of the rail line as opposed to being converted into herbaceous dominated communities.

Impacts on wildlife would be as described in Section 4.8.2.1. Impacts resulting from habitat fragmentation during construction and mortality due to collisions with trains during operations would be principal concerns.

Aquatic Communities

The construction of Rail Line Alternative 2 would require one stream crossing and would directly affect fisheries and aquatic life**. The potential impacts on aquatic life would be as described in Section 4.8.2.1.**

Upon the completion of construction, continued fish passage would be assured through the installation of culverts and the bridging of watercourses. The restoration of fish passage would adhere to the grades, habitat restoration, and other specifications established by the FERC, Mn/DOT, and FHWA regulations.

Protected Species

As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf would not be expected. During plant operation, the potential for collisions with trains would be the impact of most concern.

There are no known occurrences of state-listed protected or otherwise rare species within 1 mile of Rail Line Alternative 2.

Access Road Alignments (East Range Site)

Vegetation and Habitat

As a result of concerns raised by the USACE and other agencies regarding the need to avoid and minimize impacts to wetland habitats, the looped Access Road described in the Draft EIS was revised. Excelsior's current preferred Access Road for the East Range Site would connect the plant footprint with CR 666 directly to the east of the East Range Site as described in Section 2.3.2.2. The

single Access Road would affect 10 acres less vegetation than the original looped Access Road. This change would result in mixed wood forests incurring the highest acreage of impact. Table 4.8-14 provides a summary of impacts to vegetation and wildlife habitats by ECS category that would result from the revised Access Road alignment in comparison to the original alignment. The revised alignment would cross the wetlands at the most narrow point to reduce impacts. The main habitat type that would be affected is northern wet-mesic boreal hardwood-conifer forest, which would experience about 8 acres of direct habitat loss as well as fragmentation. Impacts on Temporary and Permanent ROWs would be as described for West Range Access Road alignments. Impacts on wildlife would be as generally described in Section 4.8.2.1.

Table 4.8-14. Vegetation and Habitat Impacts (acres), Access Road (East Range Site)

ECS Codes[1]	Temporary ROW Impact[2]		Permanent ROW Change[3]	
	Revised Alignment	Original Alignment	Revised Alignment	Original Alignment
FPn73 - Northern Rich Alder Swamp	0.1	1.4	-0.1	-1.6
MHn35 - Northern Mesic Hardwood Forest	2.7	3.2	-4.8	-4.8
MHn44 - Northern Wet-Mesic Boreal Hardwood-Conifer Forest	4.6	12.0	-8.2	-17.9
MRn83 - Northern Mixed Cattail Marsh	—	0.2	—	-0.1
WFn55 - Northern Wet Ash Swamp	1.7	1.4	-2.7	-2.1
WMn82 - Northern Wet Meadow/Carr	—	—	—	—
XDXXOF - Old Field[1]	0.2	0.4	-0.3	-0.8
XDXXXX - Disturbed Land[1]	0.2	0.3	-0.1	-0.4
Total	**9.5**	**18.7**	**-16.1**	**-27.7**

[1] Codes were created for habitats not included in ECS classification system.
[2] Temporary ROW acreages do not include the area within the permanent ROW. There would be no permanent impacts to the temporary ROWs as these habitats will be restored following construction.
[3] Negative values indicate a loss of habitat.

Aquatic Communities

There are no surface water crossings that would be associated with the Access Road.

Protected Species

As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf are not expected based on the results of the BA. During plant operation, the potential for collisions with vehicles would be the impact of most concern.

There are no known occurrences of state-listed protected or otherwise rare species within 1 mile of the Road Alignments.

4.8.5 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. Under the No Action Alternative, no project-related development would occur and there would be no impact or change in baseline conditions relating to biological resources.

4.8.6 Summary of Impacts

Tables 4.8-15 and 4.8-16 (added for the Final EIS), respectively, compare the acreages of permanent vegetation and habitat change by ECS category for Mesaba Generating Station Phases I and II at the West Range and East Range Sites based on Excelsior’s preferred configurations for

Table 4.8-15. Permanent Vegetation and Habitat Impacts (acres), West Range Site and Corridors

ECS Category	Power Plant Footprint	HVTL	Natural Gas Pipeline	Process Water Pipelines	Potable Water and Sewer	Rail Line	Access Road	Total
Preferred Alignment:	Both Phases (Shifted)	HVTL Alt 1	Alternative 1	All Segments	All ROW	Alternative 3B	Access Road 3	
AFXXXX - Aspen Forest	-7.6	-18.8	-10.4	-7.8	—	-3.5	-6.5	**-54.6**
APn80 - Northern Spruce Bog	—	-0.4	-1.0	—	—	—	—	**-1.4**
APn81 - Northern Poor Conifer Swamp		—		-1.8	-0.6	—	—	**-2.4**
APn90 - Northern Open Bog	—	+4.2	+1.0	—	—	—	—	**+5.2**
FPn63 - Northern Cedar Swamp		—		—	—	—	—	—
FPn73 - Northern Rich Alder Swamp	—	-7.7	-4.0	-1.5		-2.0	-0.2	**-15.4**
FPn81 - Northern Rich Tamarack Swamp (Water Track)	—	—	—	—	—	—	—	—
FPn82 - Northern Rich Tamarack Swamp (Western Basin)	—	-3.8	—	+4.1	—	—	—	**+0.3**
LKi54 - Inland Lake Clay/Mud Shore	—	—	—	—	—	—	—	—
MHn35 - Northern Mesic Hardwood Forest	-150.8	-19.5	-38.6	-23.0	—	-29.4	-5.2	**-266.5**
MHn44 - Northern Wet-Mesic Boreal Hardwood-Conifer Forest	-12.3	-14.7	-12.5	-11.5	-0.4	-42.0	—	**-93.4**
MRn83 - Northern Mixed Cattail Marsh	-0.5	—	—	—	—	-0.1	—	**-0.6**
MRn93 - Northern Bulrush-Spikerush Marsh	—	—	—	—	—	—	—	—
OW- Other Water Body	—	—	—	—	—	-0.6	—	**-0.6**
WFn55 - Northern Wet Ash Swamp	-23.3	-5.5	-9.0	-1.7	—	-10.2	—	**-49.7**
WFn64 - Northern Very Wet Ash Swamp	—	—	—	—	—	—	—	—
WMn82 - Northern Wet Meadow/Carr	-7.6	+13.3	+13.0	+0.8	+0.6	-2.1		**+18.0**
XDXXOF - Old Field	—	+53.0	+61.5	+42.3	+0.4	-1.9	-0.2	**+155.1**
XDXXXX - Disturbed Land		—	—	—		-2.3	-0.1	**-2.4**
Total	**-202.1**	—	**—**	**—**	**—**	**-93.8**	**-12.3**	**-308.4**

Table 4.8-16. Permanent Vegetation and Habitat Impacts (acres), East Range Site and Corridors

ECS Category	Power Plant Footprint	HVTL	Natural Gas Pipeline	Process Water Pipelines	Potable Water and Sewer	Rail Line	Access Road	Total
Preferred Alignment:	Both Phases	HVTL Alt 2	ROW	All Segments	All	Alternative 1	Revised Alignment	
AFXXXX - Aspen Forest		-9.0	—	-0.6	—	—	—	**-9.6**
APn80 - Northern Spruce Bog	-4.8	-46.4	-7.9	-0.2	—	-0.9	—	**-60.2**
APn81 - Northern Poor Conifer Swamp	-2.1	-7.3	—	—	—	-0.5	—	**-9.9**
APn90 - Northern Open Bog	—	+53.7	+8.1	—	—	—	—	**+61.8**
FPn63 - Northern Cedar Swamp	—	—	—	-0.8	—	—	—	**-0.8**
FPn73 - Northern Rich Alder Swamp	-1.1	-69.3	-9.0	-0.7	—	-0.7	-0.1	**-80.9**
FPn81 - Northern Rich Tamarack Swamp (Water Track)	—	-0.7	-0.2	—	—	—	—	**-0.9**
FPn82 - Northern Rich Tamarack Swamp (Western Basin)	—	—	—	—	—	—	—	—
LKi54 - Inland Lake Clay/Mud Shore	—	—	—	—	—	—	—	—
MHn35 - Northern Mesic Hardwood Forest	-13.9	-38.3	-0.8	-7.7	-0.4	-24.2	-4.8	**-90.1**
MHn44 - Northern Wet-Mesic Boreal Hardwood-Conifer Forest	-133.2	-25.8	-1.4	-10.8	-1.3	-13.6	-8.2	**-194.3**
MRn83 - Northern Mixed Cattail Marsh	-3.3	—	—	—	—	-2.7	—	**-6.0**
MRn93 - Northern Bulrush-Spikerush Marsh	—	—	—	—	—	—	—	—
OW- Other Water Body	—	—	—	—	—	—	—	—
WFn55 - Northern Wet Ash Swamp	-22.1	-19.2	-4.4	-0.1	-0.1	-8.6	-2.7	**-57.2**
WFn64 - Northern Very Wet Ash Swamp	—	-2.8	—	—	—	—	—	**-2.8**
WMn82 - Northern Wet Meadow/Carr	-1.8	+92.1	+13.4	+1.8	+0.1	-0.1	—	**+105.5**
XDXXOF - Old Field	-1.0	+73.1	+2.2	+19.1	+1.7	-0.8	-0.3	**+94.0**
XDXXXX - Disturbed Land		—	—	—	—	-1.2	-0.1	**-1.3**
Total	**-183.3**	—	—	—	—	**-53.2**	**-16.1**	**-252.7**

the Power Plant Footprint, HVTLs, utility pipelines, Rail Lines, and Access Roads at the respective sites.

4.8.7 Biological Resources Regulatory Implications and Mitigation

The following sections describe the Federal and state regulatory issues that would be associated with the Proposed Action as well as mitigation measures that could be employed to minimize potential adverse impacts of the Proposed Action.

4.8.7.1 Vegetation and Habitat

No designated Federal Wildlife Refuges, Waterfowl Production Areas, or National Preserves are within or immediately adjacent to the West or East Range Sites or their associated utility or transportation corridors. No MNDNR WMAs, SNAs, designated Game Lakes, or Designated Trout Streams are within or immediately adjacent to the West or East Range Sites. There is a Designated Trout Stream located 2,500 feet east of the West Range HVTL Phase 2 alignment (east of Pengilly) that drains into Swan Lake. This Designated Trout Stream is not directly connected to any wetland or water bodies within the West Range Site or its associated utility or transportation corridors. Because of these findings, no violations under the Fish and Wildlife Coordination Act would be expected as a result of the project for the West or East Range Sites.

Proposed mitigation to comply with the provisions of the Federal Migratory Bird Treaty Act (MBTA) includes limiting timber and land clearing activities, in particular within woodland and forest habitats, to periods outside of the songbird-nesting season (approximately April 15 through August 15). This minimizes the potential for incidental taking of the thousands of potential songbird nests, which would be violating the provisions of the MBTA. Limiting land clearing and/or timber removal to the winter months is the most effective means to comply with this provision. Bird diverters could be used as a BMP along HTVL corridors, where necessary to reduce/avoid impacts to migratory birds.

Given that the West and East Range Sites and their associated utility and transportation corridors are located within timber production areas in the state, subject to frequent clear cutting, comprised entirely of secondary growth, and within the forest setting of northern Minnesota, trees are not rare and no significant impacts to trees are expected. No tree mitigation would occur nor would any mitigation for impacts to terrestrial vegetation, because these are abundant throughout the region **(see Section 5.2.6)**.

For the various utility, pipeline, rail, and road alignments described for the West and East Range Sites, mitigation measures include compliance with the above-mentioned measures of the Federal MBTA to minimize impacts to nesting songbirds. Other mitigation for impacts to fauna would occur through the impact minimization and replacement standards set forth in the various Federal, state, and local permits that would be required when relevant requirements on fauna apply.

Impacts to fauna at the rivers, stream, and water body crossings would be mitigated through the requirements for the NPDES permit, wetland permits, and other environmental permits/approvals required for the respective utility corridors. Mitigation includes the compensatory replacement of wetlands through mitigation when permanent dredge and fill impacts are involved; implementation of erosion, sedimentation, and turbidity control standards specified in the NPDES permit and related erosion control plans; and restoration of grades and bottom contour topographies of water bodies that would be defined through the various permits required for the project. Section 4.7 describes in detail the compensatory mitigation that is expected for impacts to wetland communities based on the requirements set forth in state and Federal law.

4.8.7.2 Protected Species

The USFWS is the only agency that can make the final determination for significance of effects on the Federal resources it protects and determine the required avoidance, minimization, or mitigation

measures needed. The USFWS may consider public and other agency comments when making its determination of the significance of effects.

DOE initiated formal consultation with USFWS for the Proposed Action as described in Section 4.8.2.1. USFWS concurred with DOE's determination that the Proposed Action would not likely adversely affect the bald eagle**. On August 15, 2008, DOE submitted a 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.**

The MNDNR is the only agency that can make the final determination of significance of effects on the state resources it protects and determine the required avoidance, minimization, or mitigation measures needed. The MNDNR may consider public and other agency comments when making its determination of significance of effects. Species protected by the Minnesota Endangered Species Statute and species or sensitive habitats listed in the MNDNR NHIS database that may be affected would require coordination with the MNDNR Division of Ecological Services. Mitigation for any NHIS-listed elements, if necessary, would be addressed through this process. Minnesota Statutes provide legal protection for species listed as either "threatened" or "endangered" under the Minnesota Endangered Species Statute (Minnesota Statutes § 84.0895). "Species of special concern" and "non-status" (tracked) species are not legally protected under Minnesota Statutes § 84.0895; therefore, no avoidance, protection, or mitigation measures for taking of species so designated by the MNDNR is required.

Mitigation of impacts to state-listed species can incorporate a wide variety of options ranging from passive measures such as construction timing outside of critical breeding periods, permanent protection of known habitats elsewhere that contain the resource to be affected, or more aggressive measures including complete avoidance of impact. It should be noted that these are not the only mitigation measures that could be undertaken for a project. Each project that affects or potentially affects state-listed protected species is evaluated individually by the MNDNR to determine the appropriate mitigation measures that would be required, which are largely based on the significance of the impact.

The MNDNR NHIS would be reviewed again within a year prior to the start of construction to determine if any new NHIS occurrences have been recorded since the last review for this project was completed in 2005. This is especially important given the West and East Range Sites' proximity to mine pits or other habitats related to bald eagle breeding areas. Such a review accounts for species that are highly motile and/or have good dispersal ability.

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4.9 CULTURAL RESOURCES

4.9.1 Approach to Impacts Analysis

4.9.1.1 Region of Influence

The region of influence for **impacts to** cultural resources **and historic properties** consists of the APE used in cultural resource assessments. The cultural resources APE encompasses two types of cultural resources**:** archaeological and **architectural**. The archaeological APE is defined as all areas of potential effects from aspects of direct, physical impacts through the construction of the Proposed Action and its associated corridors and includes the total disturbance area within the site property and along the length of transportation, pipeline, and HVTL ROWs. The historical visual APE includes a radius of 1 mile surrounding the Mesaba Generating Station and 0.25 mile from the center line of the HVTL and transportation corridors. Although there are no Native American tribal lands within the cultural resources APE, in consideration of Native American concerns, the region of influence is extended to include tribal lands in Itasca and St. Louis Counties.

4.9.1.2 Method of Analysis

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

- **Adversely affect (based on 36 CFR 800.5) any characteristics that qualify a historic property for inclusion in the National Register. Examples of adverse effects include: physical destruction, alteration, removal from its historic location, change in character, diminished integrity, deterioration through neglect;**
- Potential loss, isolation, or substantial alteration of a Native American cultural resource; or
- Introduction of visual, audible, or atmospheric elements that would adversely affect a Native American cultural resource.

Cultural resource assessments performed on the West Range and East Range Sites and their proposed transportation, HVTL, and pipeline corridors **did not address Native American traditional cultural properties**. **Once the project site and utility corridor routes are designated by the PUC (and in case of the utility corridors, once access to conduct surveys is secured), additional surveys would be conducted for traditional cultural properties under the terms of a Programmatic Agreement (PA) being developed among DOE, SHPO, the Advisory Council on Historic Preservation (ACHP), Excelsior, and Native American Tribes (see discussion of PA below).** As part of the cultural resources assessment, an archaeological sensitivity model was developed using information from previous archaeological testing and fieldwork (106 Group, 2005). This model was then used to determine areas of high archaeological sensitivity within the West Range and East Range Site project areas. Since there are neither recorded archaeological sites nor historic buildings located within the West Range or East Range power plant footprints, the model was generated based on records of documented archaeological sites and NRHP-eligible historic sites within in a 10-mile area around the power plant buffer area and along the associated corridors. Areas within the APE were then categorized in terms of high, moderate, and low potential for the location of archaeological sites. Additional information on the archaeological finds used in the study is discussed in Section 3.9.

The majority of the archaeological sites located in northern Minnesota are found near water bodies (e.g., lakes, rivers, streams, wetlands). Previous research (Anfinson, 1988) indicates that, throughout Minnesota history, rivers and lakes have been the primary location for base and seasonal camps. Criteria used for establishing archaeological sensitivity include topographically prominent areas, evidence for

portage routes, and the presence of historic sites or structures. Generally, a higher level of archaeological sensitivity was given to areas located around lakes and rivers than to isolated wetlands.

Field surveys of the areas with high and medium archaeological potential would be performed before construction begins. Areas with low potential for archaeological and areas in which Holocene (i.e., less than 10,000 years old) deposits have been significantly disturbed in the project area and would be excluded from field surveys. The number of sites with high archaeological potential compared to the total disturbed area would determine the degree of the potential archaeological impacts at the Mesaba Generating Station and associated corridors.

4.9.2 Common Impacts of the Proposed Action

4.9.2.1 Impacts of Construction

Nearly all of the potential for impacts to the cultural resources would be during the construction phase of the Proposed Action. Any ground-disturbing construction activity would have the potential to alter or disturb a previously unknown archaeological resource. The previously identified or known archaeological resources within the APE of the selected site would be avoided or removed, pending consultation with the Minnesota SHPO**, the ACHP and Native American tribes**. A Phase I archaeology survey was conducted for area**s** with high archaeological potential on the East Range and West Range sites using the cultural assessment archaeological model. No archaeological resources were identified. **Additional surveys would be conducted for Native American Cultural Resources once the site and utility routes are selected by PUC. Treatment of unanticipated discoveries during construction would be consistent with provisions of a PA being developed among DOE, SHPO, ACHP, and Native American tribes (see discussion of PA below).**

For compliance with Section 106 of the National Historic Preservation Act, consultation was initiated with the Minnesota SHPO in August 2005. Correspondence letters between the SHPO and DOE are included in Appendix E. DOE supplied the SHPO with all of the cultural assessment reports. The SHPO reviewed the cultural assessment reports and in late December of 2006 forwarded to DOE a summary of the status and outstanding survey needs for the project from their perspective. The summaries of SHPO's recommendations are discussed further in the following West and East Range sections. Construction would not commence until all appropriate consultation, identification, and treatment of historic **properties** has occurred.

Depending on the location of historic properties in relation to the Mesaba Generating Station, views of the towers, plumes, and HVTL structures have the potential to affect scenic views of **such properties** in the region. To minimize the impact from adverse views, the power plant would be built in industrial-zoned locations and screened by forests. Sections 4.9.3 and 4.9.4 describe the site-specific historic resources, and Section 4.2 discusses the potential for impacts to the aesthetic resources surrounding the proposed Mesaba Generating Station locations and their corridors.

At either location, the footprints for both Phases I and II of the Mesaba Generating Station would be disturbed during construction for Phase I, because the Phase II footprint would be cleared and prepared as a staging and laydown area for construction of Phase I. Also, the rail and access road corridors, pipeline alignments, and new HVTL corridors would be disturbed for construction and operation of the Mesaba Phase I power plant. Therefore, impacts to cultural resources from a Phase I only outcome for the Mesaba Energy Project would be essentially indistinguishable from the impacts of constructing Phases I and II combined.

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 by mining companies or other entities that own them.

Following publication of the Draft EIS, DOE continued its outreach to Native American tribes and participated in conferences with tribal representatives as described in Section 1.8. Through meetings with Native American tribes, a private, voluntary Memorandum of Agreement among DOE, Excelsior, and Native American tribes is under consideration to address concerns of the tribes. That agreement would be separate from the PA being developed to address DOE's Section 106 responsibilities. The PA is under negotiation with the Minnesota SHPO, ACHP, Native American tribes and Excelsior Energy and is intended to ensure that: an appropriate APE is specified for any additional historic property surveys; traditional cultural resources are identified through a Phase I archaeological survey; architectural history resources within the APE are identified; eligibility of any potential historic properties for listing on the NRHP is determined; a determination of effects on such properties is made; a comprehensive Historic Property Treatment Plan is developed; and a plan for unanticipated discovery of potential historic properties during construction is implemented.

4.9.2.2 Impacts of Operation

Operation of the Mesaba Generating Station would not disturb the soils surrounding the facility, and therefore would not affect existing archaeological resources. Maintenance and repair of the corridors, especially the pipelines, may cause ground disturbance. However, the repairs would be limited to the areas previously disturbed during construction and with a low potential for archaeological artifacts. The facility personnel would be responsible for avoiding known cultural resources on the Mesaba Generating Station and corridors during operations and repairs. Facility operations would be conducted in compliance with applicable laws, regulations, policies, and procedures **governing historic properties (see Chapter 6, Regulatory and Permit Requirements)**.

4.9.3 Impacts on West Range Site and Corridors

4.9.3.1 Impacts of Construction

In June 2005, the archaeological model was used **in identifying potential historic properties** around the West Range Site and its associated corridors. Shovel testing was performed on potentially moderate- to high-risk areas in the IGCC buffer lands. No archaeological resources were identified in any of the survey trenches. In addition, no archaeological sites are known in the corridor APEs.

Table 4.9-1 provides the results of the 2005 archaeological assessment model at the West Range Site. Approximately 385 acres of the assessment study area were found to have high archaeological potential. The Mesaba Generating Station **footprint** and buffer land **consisted of** 55 acres **of land with high archaeological potential along** Dunning Lake. The rest of the high archaeological potential areas were located along the HVTL corridor, especially where the corridor crossed or passed by wetlands and lakes. Approximately 688 acres of the assessment study area were found to have moderate archaeological potential areas and were identified on drained, elevated areas near wetlands.

Table 4.9-1. Results of the 2005 Archaeological Assessment Model at the West Range Site

	Total Acreage	Total High Potential Areas (acres)	Percentage of Total Project Area	Total Moderate Potential Areas (acres)	Percentage of Total Surveyed Project Area
Total Surveyed Area	6332	385	6%	688	11%
IGCC Buffer Land	1344	55	1%	108	2%
Studied HVTL, Rail and Pipeline Corridors	4988	330	5%	580	12%

Source: 106 Group, 2005a

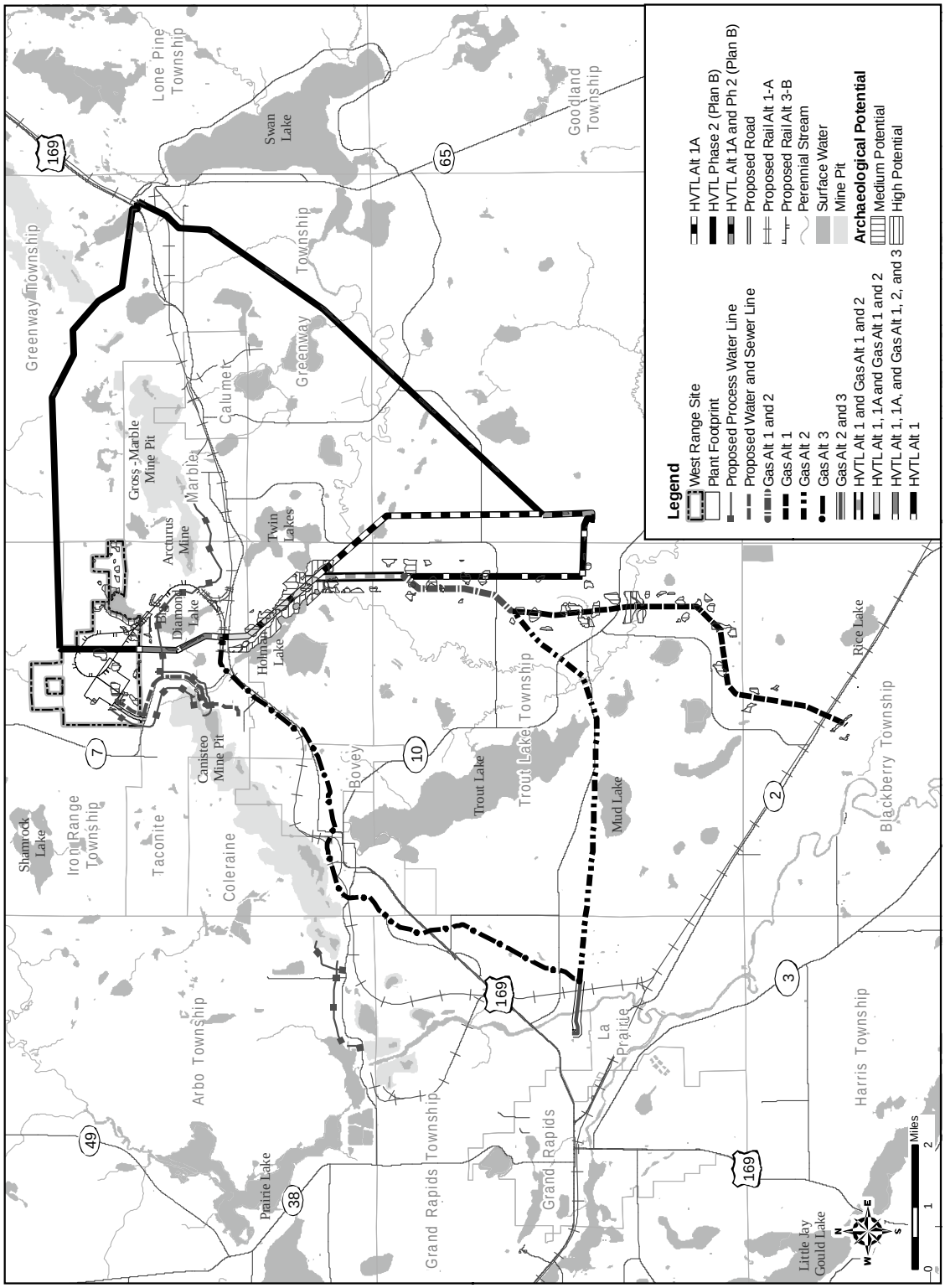

Figure 4.9-1. Archaeological Model for West Range

Figure 4.9-1 shows areas with high archaeological potential, which are located primarily around lakes and rivers. The assessment study area included the IGCC buffer lands, the WRA-1 and WRB-2A HVTL Alternatives, Process Water Segments 2 and 3, Rail Alignment Alternative 1A, and Access Roads 1 and 2. The Natural Gas Pipeline Alternatives 1, 2, and 3; the Process Water Segment 1; and Rail Alignment Alternative 3B were not studied as part of the assessment study area, however their archaeological potential is considered to be similar to the studied corridors. The Phase II HVTL, and Potable Water and Sewer pipelines were not surveyed. However, these corridors would be constructed on existing corridors and archaeological resources would likely not be present.

The cultural resources **report** also included an analysis of the local NRHP-listed or eligible properties to determine the potential for visual-related impacts from the Mesaba Generating Station and its transportation and utility. The West Range Site and associated corridors would be located in part of the Western Mesabi Iron Range Early Mining Landscape District, which includes portions of the mining landscape, the communities of Coleraine, Bovey, Taconite, and Holman, and specific railroad spurs.

Eleven architecturally historic properties recorded in SHPO records are found within the visual APE (Table 3.9-2). Two of them, the Great Northern Railway Nashwauk-Gunn Line and the Duluth, Missabe, and Northern Railway Alborn Branch, are eligible for listing on the NRHP. The rest of the properties are either not eligible, have not been evaluated, or are not extant. These rail lines are not located in the IGCC buffer lands. The construction or operation of the Mesaba Generating Station would not detract from the regional industrial character, which includes these rail lines. Potential views of the emission stacks and HVTL corridors would also be **partially** shielded by the surrounding forests. Additional consultation with the SHPO during construction would ensure that any changes to the historical character of the District would be considered and potential impacts avoided wherever possible.

In 2006, in accordance with Section 106 of the National Historic Preservation Act, DOE provided Minnesota SHPO with the results from the West Range cultural **resources report**. In response, the Minnesota SHPO provided DOE with a summary of outstanding survey needs from their perspective. In order to minimize the potential for uncovering previously unknown archaeological resources, SHPO recommended surveying the locations with a high and medium potential for archaeological sensitivity prior to construction. In addition, areas around NRHP-eligible properties (Table 3.9-2) would need to be surveyed if their terrain would be disturbed from construction activities.

A Phase I archaeological survey of locations with high and medium potential was conducted at the West Range site in 2007, consistent with the recommendations of the SHPO. The survey did not uncover any previously unknown resources within the site boundaries **and SHPO concurred with the findings of that survey in a December 2007 letter. An architectural survey was completed for the West Range plant site in January 2008, and identified the Holman-Cliffs Mine Landscape District as the only property in the area of potential effect that was potentially eligible for listing on the National Register of Historic Places. A subsequent report completed in June 2008 concluded that the property would not be adversely impacted by the Mesaba Energy Project (Summit Envirosolutions, 2008). If the West Range Site is specified in the PUC site permit, additional surveys for Native American Cultural Resources would be conducted. These surveys would use methodology agreed upon by DOE, Excelsior, and Native American Tribes who have signed the Programmatic Agreement once it is finalized.**

With regard to the roads, rail lines, HVTL and utility corridors related to the West Range site, archaeological surveys will only be conducted if the West Range site is selected as the site to be permitted by the PUC. And then, only those corridors that are permitted by the PUC will be surveyed. **As stated above,** DOE intends to enter into a **PA with the Minnesota** SHPO**, ACHP, Native American tribes, and Excelsior Energy** to ensure that**: an appropriate APE is specified for any additional historic property surveys; traditional** cultural resources are identified through a Phase I archaeological survey; architectural history resources within the APE are identified; eligibility of any resources for listing on the

NRHP is determined; a determination of effects on such resources is made; a comprehensive Historic Property Treatment Plan is developed; and a plan for unanticipated discovery of cultural resources during construction is implemented.

4.9.3.2 Impacts of Operation

There would be no impacts to archaeological resources due to project operation. All maintenance activities on the HVTL and pipeline corridors would occur either within land that was disturbed due to construction or within the construction study area.

4.9.4 Impacts on East Range Site and Corridors

4.9.4.1 Impacts of Construction

In September 2005, a cultural resources report for the East Range Site and HVTL corridors was completed. This study identified no known NRHP-eligible or known archaeological sites located within the Mesaba Generating Station APE (106 Group, 2005). Areas with high to moderate potential were delineated based on the sensitivity model described in Section 4.9.1.2. **As noted in section 4.9.1.2, traditional cultural property surveys would be conducted on the project site and utility corridors selected by the PUC, in accordance with an approved PA.**

The cultural resources assessment evaluated the archaeological potential for the East Range Plant Site and the corridors. As seen in Table 4.9-2, of the total 30,471 acres, 4,862 acres (16 percent) were delineated as high potential for archaeological artifacts. The areas with high archaeological potential were primarily identified around lakes, streams, and large wetland areas. The total moderate potential areas were calculated at 457 acres, or 1.5 percent of the total project area. Figure 4.9-2 shows the locations of the areas in the East Range Site with high archaeological potential. The Natural Gas Pipeline Route and HVTL corridors were not surveyed, however, the pipeline and HVTL would be **mostly** constructed within existing corridors with previous ground disturbance, and would not be expected to contain any archaeological artifacts. The process water supply pipelines are primarily located within areas that have been previously disturbed by mining activities, and would not be expected to contain archaeological artifacts.

Table 4.9-2. Results of the 2005 Archaeological Assessment Model at the East Range Site

	Total Project Acreage	Total High Potential Areas (acres)	Percentage of Total Project Area	Total Moderate Potential Areas (acres)	Percentage of Total Surveyed Project Area
Total Surveyed Area	30,471	**4,862**	16%	457	1.5%

Source: 106 Group, 2005b

Two confirmed archaeological sites are located within the APE of the **37L/39L** HVTL corridor, as shown on Figure 4.9-2. Sites 21SL0009 and 21SL0390 are located approximately 0.25 miles from the **37L/**39L HVTL **corridor**. These sites are located on the south side of Esquagama Lake approximately one half mile apart. The SHPO site survey forms characterize the sites as mounds, described from anecdotal evidence. These mounds are located at the very edge of the APE and outside the construction ROW.

One archaeological site (21SL0843) is located 0.5 miles west of the **38L** HVTL corridor. This site is outside the construction limits for the proposed HVTL and therefore would not be affected. A fourth archaeological site (21SL0836) (Figure 4.9-2) is outside of the region of influence.

During the cultural resources assessment for the East Range Site, four historic resources were identified within the East Range APE. The potentially eligible Eveleth City Hall and NRHP-listed

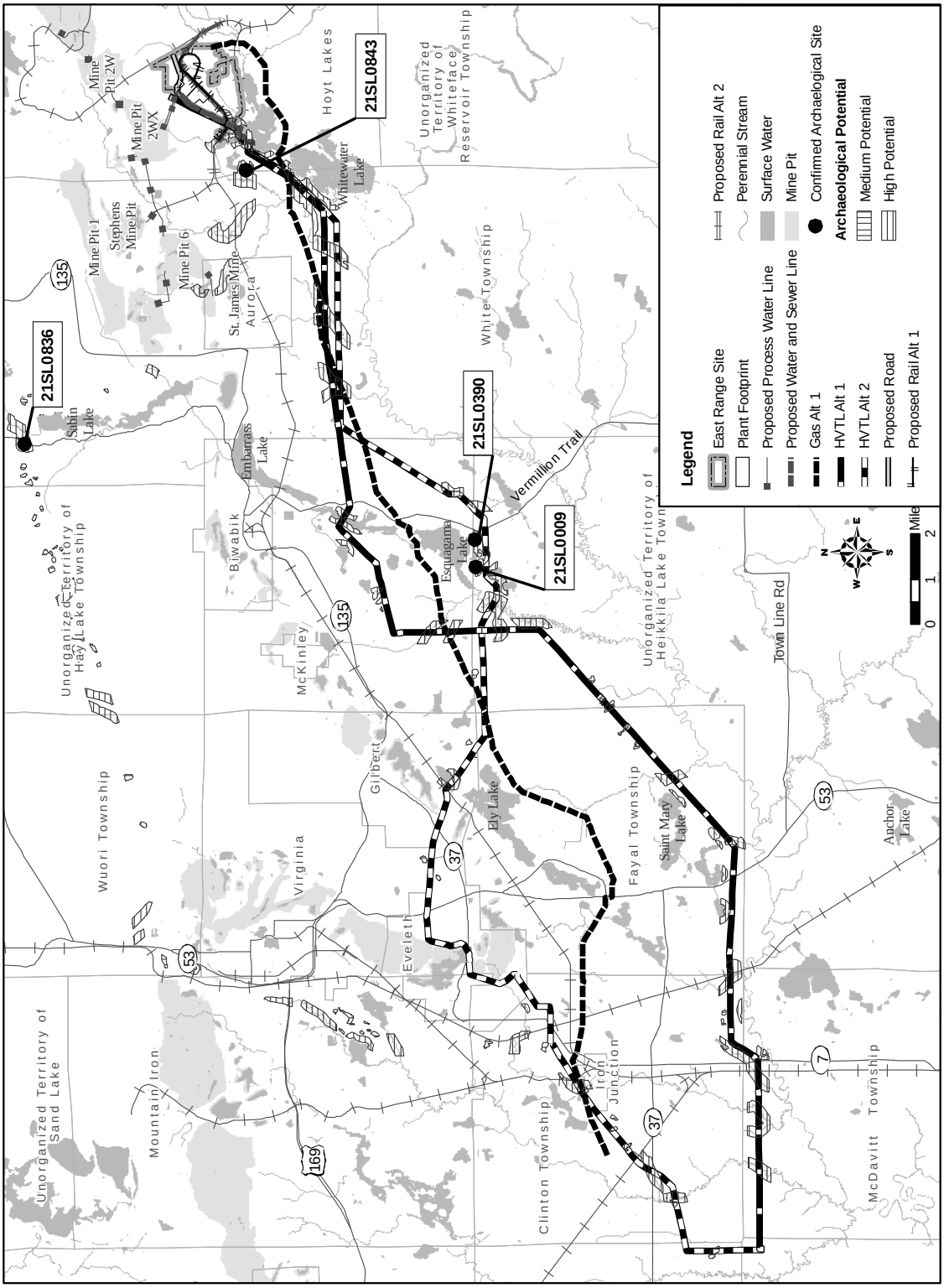

Figure 4.9-2. Archaelogical Model for East Range

Eveleth Recreation Building are located within the town of Eveleth, which is crossed by 39L of the **37L/39L** HVTL corridor. The eligible Duluth, Winnipeg, and Pacific Railway Company would also be crossed by HVTL lines south of the Mesaba Generating Station. The NRHP-listed E.J. Longyear First Diamond Drill Site is connected to County Road 666 by a series of nature trails. The primary site is shielded by trees, so would not have line of site views of the proposed power plant; and all construction and operation activities would be conducted to the west of the Longyear site. Communication between DOE and the SHPO indicates that there may be slight positive effects due to new awareness connected with increased traffic flow along County Road 666 (Pukanic, 2006).

In 2006, in accordance with Section 106 of the National Historic Preservation Act, DOE provided Minnesota SHPO with the results from the East Range cultural **resources report**. In response, the Minnesota SHPO provided DOE with a summary of outstanding survey needs from their perspective. For the East Range power plant site, the Phase I surveys are completed, and no further study is needed, provided there would be no terrain disturbance at the Longyear historic site. **In a December 2007 letter, SHPO concurred with DOE's determination of no adverse impact to the Longyear and the Two Harbors to Tower Junction segment of the DM&IR railroad sites.** Prior to construction, the East Range corridors would need additional surveying at the locations with a high and medium potential for archaeological sensitivity. Along the East Range corridors, areas around NRHP-eligible properties (Table 3.9-3) would need to be surveyed if their terrain would be disturbed from construction activities.

If the East Range Site is specified in the PUC site permit, additional surveys for Native American Cultural Resources would be conducted. These surveys would use methodology agreed upon by DOE, Excelsior, and Native American Tribes who have signed the Programmatic Agreement once it is finalized.

With regard to the roads, rail lines, HVTL and utility corridors related to the East Range site, archaeological surveys will only be conducted if the East Range site is selected as the site to be permitted by the PUC. And then, only those corridors that are permitted by the PUC will be surveyed. **As stated above,** DOE intends to enter into a **PA with the Minnesota** SHPO**, ACHP, Native American tribes, and Excelsior Energy** to ensure that: **an appropriate APE is specified for any additional cultural resource surveys;** cultural resources are identified through a Phase I archaeological survey; architectural history resources within the APE are identified; eligibility of any resources for listing on the NRHP is determined; a determination of effects on such resources is made; a comprehensive Historic Property Treatment Plan is developed; and a plan for unanticipated discovery of cultural resources during construction is implemented.

4.9.4.2 Impacts of Operation

All operational activities associated with the East Range Mesaba Generating Station would be restricted to the areas previously disturbed by construction, so no additional impacts are anticipated. Additional cooperation with the SHPO, and state and Federal regulations would minimize the potential for additional impacts.

4.9.5 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 equivalent to a "No Build" Alternative. The implementation of the No Action Alternative would not affect **potential historic properties**. The ground disturbance associated with construction would not occur, and in situ resources would remain in place. No structures would be built at the West Range Site or the East Range Site. Therefore, no NRHP or eligible properties would be impacted.

4.9.6 Summary of Impacts

Basis for Impact	No Action	West Range	East Range
Adversely affect any characteristics that qualify a historic property for inclusion in the National Register. (physical destruction, alteration, removal from its historic location, change in character, diminished integrity, deterioration through neglect).	No **potential historic properties** disturbed. **(No new structures built.)**	No documented archaeological sites within APE. **Two railroad spurs eligible for NRHP identified within visual APE, neither found on project property.**	Two archaeological sites identified within the APE of HVTL Alternative 2, but outside of the construction ROW. **One NRHP-listed building, one NRHP-listed historical site, one eligible building, and one eligible railroad spur located within HVTL visual APE.**
Cause loss, isolation or alteration of a Native American cultural resource.	No Native American cultural resources disturbed.	No known Native American cultural resources within APE. **If resources are discovered during subsequent surveys or construction, additional surveys and proper treatment of resources would be implemented in accordance with a Programmatic Agreement.**	No known Native American cultural resources within APE. **If resources are discovered during subsequent surveys or construction, additional surveys and proper treatment of resources would be implemented in accordance with a Programmatic Agreement.**
Cause the introduction of visual, audible or atmospheric elements near Native American **c**ultural resource.	No new structures would be built.	No known Native American cultural resources within 1 mile of power plant footprint. **If resources are discovered during subsequent surveys, construction or operation, additional surveys and treatment of resources would be implemented in accordance with a Programmatic Agreement.**	No known Native American cultural resources within 1 mile of power plant footprint. **If resources are discovered during subsequent surveys, construction or operation, additional surveys and treatment of resources would be implemented in accordance with a Programmatic Agreement.**

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4.10 LAND USE

4.10.1 Approach to Impacts Analysis

4.10.1.1 Region of Influence

The regions of influence for land use affected by the Mesaba Generating Station include the lands within the West Range Site and East Range Site boundaries and neighboring lands within 1 mile of the respective generating station footprints. The regions of influence for land use affected by utility and transportation corridors for the West Range and East Range locations include the alignments and neighboring lands within 0.5 mile of the centerline of each alignment.

4.10.1.2 Method of Analysis

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

- Conflict with existing land uses on surrounding properties in the regions of influence;
- Conflict with jurisdictional zoning ordinances applicable to project areas; or
- Conflict with local and regional land use plans applicable to project areas.

Relevant documents that were reviewed to determine potential adverse land use impacts include the following:

- City of Hoyt Lakes Zoning Ordinance;
- City of Taconite Zoning Ordinance;
- Itasca County Zoning Ordinance;
- Itasca County Comprehensive Land Use Plan;
- St. Louis County Zoning Ordinance No. 46 (St. Louis County, 2003);
- St. Louis County Proposed East Range Plan and Zoning; and
- St. Louis County Land Department Environmental Policy.

As an innovative energy project defined by Minnesota Statues § 216B.1694, the Mesaba Energy Project is exempt from the requirement for a Certificate of Need and would have the power of eminent domain limited to sites and alignments approved by the PUC.

4.10.2 Common Impacts of the Proposed Action

4.10.2.1 Impacts of Construction

Impacts on adjacent land uses during construction at sites, along existing roads used to transport equipment to the sites, and along corridors for HVTLs, natural gas pipelines, water and effluent pipelines would result from fugitive dust emissions, construction traffic, and noise. These temporary impacts would affect adjacent land uses during the periods of construction as described in Sections 4.3, 4.15, and 4.18, respectively.

During construction for Phase II, temporary offsite staging and laydown areas would be acquired and 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 owned by mining companies and all have been disturbed or cleared during prior use. Following construction, these areas would be restored to pre-existing conditions.

The proposed HVTL routes traverse remote areas with relatively few landowners as described in Section 3.10. Existing HVTL ROWs would be used to the extent practicable as described in Section 2.3.

Widening of the existing corridors as necessary may affect undisturbed lands adjacent to the existing ROWs. However, because the ROW is already cleared as a corridor for power transmission lines, it is not anticipated that additional widening of the corridor would affect adjacent land uses substantially. Easements across public and private lands would be required for new ROWs. New corridors would be cleared and replanted with grasses and low vegetation after construction. Landowners would have use of corridors subject to restrictions on permanent structures and the planting of trees and tall vegetation.

Minnesota Rules **7849.5930** specifically identifies prohibited HVTL routes. For example, no HVTL may be routed through state or national wilderness areas. HVTLs also may not be routed through state or national parks or state scientific and natural areas unless the HVTL would not materially damage or impair the purpose for which the area was designated, and no feasible and prudent alternative exists. Since none of the proposed HVTL routes pass through prohibited areas, there would be no land use impacts to these areas. Minnesota Rules **7849.5940**, Subpart 4 restricts the amount of prime farmland soils disturbed by electric power plants. Section 4.4 provides information on prime farmland on the West Range and East Range Sites.

The PUC has jurisdiction over natural gas pipelines within the state, which are subject to Minnesota Rules Chapter **7852**. Interstate natural gas pipelines are regulated by the Federal Energy Regulatory Commission under the Federal Natural Gas Act.

Excelsior or a pipeline owner would negotiate with landowners for easements to install gas pipelines on each tract that the route would cross. New pipeline corridors would be cleared for construction and would be replanted after installation of the pipeline. However, vegetation would be limited in height to permit access for pipeline maintenance. Also, the use of the corridors by landowners would be subject to certain restrictions whereby landowners would agree not to build any structures in the easement or remove any land cover from above the pipeline without the consent of the pipeline owner.

Construction of water and discharge pipelines would have impacts on land use comparable to those for natural gas pipelines. Construction of rail alignments and access roads would have similar impacts on adjacent land uses related to fugitive dust emissions, construction traffic, and noise as described in Sections 4.3, 4.15, and 4.18, respectively.

4.10.2.2 Impacts of Operation

The operation of the Mesaba Generating Station would have impacts on adjacent land uses mainly attributable to the impacts on environmental resource areas as described throughout this chapter. In particular, impacts on surrounding land uses would result from changes in viewsheds (Section 4.2), air emissions (Section 4.3), water use and effluent discharges (Section 4.5), socioeconomic conditions (Section 3.11), community services (Section 3.13), utility systems (Section 4.14), traffic and rail transport (Section 4.15), materials and wastes (Section 4.16), safety and health (Section 4.17), and noise (Section 4.18). Specific discussions of the land use compatibility of the Mesaba Generating Station and associated ROWs are provided separately for the West Range and East Range in the following sections.

4.10.3 Impacts on West Range Site and Corridors

Site features and corridor alignments for the Mesaba Generating Station on the West Range are described and illustrated in Section 2.3.1. **Because the entire West Range Site property, rail and access road corridors, pipeline alignments, and new HVTL corridors would be acquired for construction and operation of the Mesaba Phase I power plant, land-use impacts from a Phase I only outcome for the Mesaba Energy Project would be essentially indistinguishable from the Phase I and II impacts combined. The only exception would be the potential avoidance of the need to upgrade HVTLs in the event that MISO decisions require the implementation of Plan B, Phase II (see Section 2.3.1.5).**

4.10.3.1 Impacts of Construction

The proposed Mesaba Generating Station footprint on the West Range Site is located in the City of Taconite, within Iron Range Township, and entirely within an area zoned by Itasca County and the City of Taconite as an Industrial (I) District. There are no buildings on the site. The facility is compatible with an I District and would be approvable as a conditional use in the district. Therefore, construction of the proposed power station would not conflict with existing land use, zoning, or comprehensive plans affecting the West Range Site. Adjacent properties to the west of the site along CR 7 are zoned as Farm Residential and Rural Residential Districts. The residential properties on the north shore of Big Diamond Lake and southeast shore of Dunning Lake are zoned as Rural Residential Districts. As described in Section 3.10, approximately 50 residential properties would be located within one mile of the station footprint. Although buffered by 0.5 mile or more of densely wooded lands, these existing properties would experience the most adverse impacts during construction on the site. Impacts from construction activity would be as described in Section 4.10.2.1.

Both Excelsior's preferred Rail Alignment Alternative 3B and Rail Alignment **Alternative** 1A for the rail spur would pass between Big Diamond Lake and Dunning Lake on land zoned for industrial use by Itasca County and the City of Taconite. Rail Alignment Alternative 1B would pass to the east of both Big Diamond Lake and Dunning Lake also on land zoned for industrial use. Approximately 16 residences are located within 0.5 mile of the centerline of Alignment**s 3B and** 1A, while approximately eight residences are located within 0.5 mile of Alignment 1B. **Excelsior's preferred Access Road 3 alignment would pass within 1,250 feet of two residences located on CR 7 near the southwestern corner of the West Range Site property boundary. No other residences are located within 0.5 mile of the centerline of the proposed alignment of Access Road 3.** The proposed realignment of CR 7 **(recently deferred by Itasca County)** would pass between Big Diamond Lake and Dunning Lake and extend directly to the west, just north of Diamond Lake Road, which is an existing "heavy haul" road now used for access by local residents. Approximately 22 residences are located within 0.5 mile of the centerline of the proposed CR 7 realignment **(Access Road 1)** and the access road to the station footprint **(Access Road 2)**. Rail and road construction would have impacts as described in Section 4.10.2.1. Construction of these two transportation elements would likely take place over a two-year period, temporarily interrupting the residents' normal daily activities. Thereafter, increased levels of construction traffic would be ongoing over several years as construction of the Mesaba Generating Station proceeds.

The proposed alignments for process water supply pipelines would be located on lands zoned for industrial use but within 0.5 mile of 104 residences, most of which are in the vicinity of Marble. Only four residences would be located within 500 feet of the centerline. The proposed alignments for potable water, sanitary wastewater, and process water effluent pipelines would cross primarily industrial lands adjacent to existing transportation corridors. The process water effluent pipelines **(which would be eliminated by the use of an enhanced ZLD system)** would be located within 0.5 mile of 14 residences, two of which would be located within 500 feet. The potable water and sanitary pipelines would be located within 0.5 mile of 114 residences, primarily in the City of Taconite urban area, four of which only would be located within 500 feet. The construction of these pipelines would have impacts as described in Section 4.10.2.1.

Among the alternative alignments for the natural gas pipeline to serve the West Range Site, the Preferred Alignment 1 would be located in lands zoned for industrial and farm-residential uses and would pass within 0.5 mile of 153 residences. Only three residences would be located within 300 feet. Alternative Alignment 2 would pass within 0.5 mile of 339 residences in lands zoned for industrial and farm-residential uses, of which five residences would be located within 300 feet. The corridor for Alternative Alignment 3 would pass through populated areas in Bovey and Coleraine within 0.5 mile of 935 residences in industrial and farm-residential lands. Approximately 29 residences would be located within 300 feet. The construction of the pipeline would have impacts as described in Section 4.10.2.1.

Preferred HVTL route WRA-1 (WRB-1) and alternative route WRA-1A (WRB-1A) would traverse areas that have similar residential density profiles, and each would require the acquisition of approximately 6 miles of new ROW in lands zoned as I and Farm Residential Districts. Easements would be negotiated with several property owners, at which time the routing may be subject to minor changes. Route WRA-1 (WRB-1) would pass within 0.5 mile of 66 residences, four of which would be located within 500 feet of the centerline. Route WRA-1A (WRB-1A) would pass within 0.5 mile of 62 residences, seven of which would be located within 500 feet of the centerline. Alternative route WRB-2A would follow existing HVTL ROWs in I and Farm Residential Districts that pass within 0.5 mile of 214 residences, of which 29 are located within 500 feet of the existing centerline. The construction of the HVTLs would have impacts as described in Section 4.10.2.1.

4.10.3.2 Impacts of Operation

The operation of the Mesaba Generating Station at the West Range Site would be consistent with other activities on lands zoned for industrial use. The region of influence for land use would include the same properties as described for construction impacts in Section 4.10.3.1. Impacts on surrounding land uses during operations would be as described in Section 4.10.2.2.

Unit train operations on the rail spur and traffic on realigned CR 7 **(now deferred by Itasca County)** and the station access road at the West Range Site would have the most adverse effects on properties in the regions of influence for the respective alignments as described in Section 4.10.3.1. The impacts would be as described in Section 4.10.2.2.

Once constructed, the various pipelines for natural gas supply, process water supply, potable water supply, cooling tower blowdown discharge **(which would be eliminated by the use of an enhanced ZLD system)**, and sanitary wastewater would have limited impacts on adjacent land uses in the regions of influence for respective alignments. The principal impacts would result from the restrictions on land uses in the ROWs by property owners, the need to limit the height of vegetation in the ROWs, which would create linear clearings within wooded areas, and the need for utility vehicles to access the corridors periodically for inspection and maintenance. These impacts would be most adverse for properties affected by new ROWs as described in Section 4.10.3.1, because existing ROWs would experience little change in existing activities.

Once constructed, the HVTL facilities would have limited impacts on adjacent land uses in the regions of influence for respective alignments. The principal impacts would result from the changes in viewsheds caused by the HVTL towers and lines, restrictions on land uses in the ROWs by property owners, the need to limit the height of vegetation in the ROWs, which would create linear clearings within wooded areas, and the need for utility vehicles to access the corridors periodically for inspection and maintenance. These impacts would be most adverse for properties affected by new ROWs as described in Section 4.10.3.1.

There are no anticipated land use impacts to farmland on the West Range Site or associated corridors. Section 4.4 provides more discussion of prime farmland. The proposed operations would not affect land use on public lands adversely.

4.10.4 Impacts on East Range Site and Corridors

Site features and corridor alignments for the Mesaba Generating Station on the East Range are described and illustrated in Section 2.3.2. **Because the entire East Range Site property, rail and access road corridors, pipeline alignments, and HVTL corridor expansions would be acquired for construction and operation of the Mesaba Phase I power plant, the land-use impacts from a Phase I only outcome for the Mesaba Energy Project would be indistinguishable from the Phase I and II impacts combined.**

4.10.4.1 Impacts of Construction

The proposed Mesaba Generating Station footprint on the East Range Site is located on **former** CE property in the City of Hoyt Lakes, entirely within an area zoned as a MD. There are no buildings on the site. The facility is compatible with other uses in an MD zone and would be approvable as a conditional use in the district. Therefore, construction of the proposed power station would not conflict with existing land use, zoning, or comprehensive plans affecting the East Range Site. As described in Section 3.10, no residential properties are located within one mile of the proposed station footprint. The nearest residential land uses are located along the southeastern shore of Colby Lake more than one mile south of the station footprint and consist of areas zoned for single family residences (R-1) and two family residences and townhouses (R-5). These properties would be buffered from the station footprint by 0.5 mile or more of densely wooded lands, but they may experience adverse impacts during construction on the site as described in Section 4.10.2.1.

No residences are located within 0.5 mile of either alternative rail alignment or the access road for the generating station, which would be located on **former** CE property zoned MD. Therefore, the impacts from construction of these features on land use as described in Section 4.10.2.1 would be minimal.

The proposed alignments for process water supply pipelines would be located entirely on CE property on land zoned MD. No residences are located within 0.5 mile of any proposed process water supply pipeline segments, and there would be no process water effluent pipeline for the generating station at the East Range Site. No residences are located within 0.5 mile of the proposed potable water supply and sanitary wastewater pipeline alignments. Therefore, the impacts from construction of these features on land use would be minimal.

The proposed natural gas pipeline to serve the East Range Site would follow the existing ROW for NNG's smaller pipeline serving the **former** CE property, which crosses lands zoned for various uses. The alignment passes within 0.5 mile of 856 residences between Iron Junction and Hoyt Lakes, although only 46 residences are within 300 feet of the centerline. The construction of the pipeline would have impacts as described in Section 4.10.2.1.

Alternative HVTL routes for the East Range Site would follow existing HVTL ROWs that cross lands zoned for various uses between the **former** CE property and the Forbes substation. The 38L alignment passes within 0.5 mile of 271 residences, although only 22 are located within 500 feet of the centerline. The 39L and 37L alignments pass within 0.5 mile of 962 residences, although only 49 are located within 500 feet of the centerline. The construction for HVTLs would have impacts as described in Section 4.10.2.1.

4.10.4.2 Impacts of Operation

The operation of the Mesaba Generating Station at the East Range Site would be consistent with other activities on the **former** CE property that is zoned for mineral mining. There are no residential properties in the region of influence for land use. The impacts from operation of the generating station would be as described in Section 4.10.2.2.

Unit train operations on the rail spur and traffic on the station access road at the East Range Site would occur entirely within **former** CE property zoned MD. There are no residential properties in the region of influence. The impacts from rail and road operations would be as described in Section 4.10.2.2.

Once constructed, the various pipelines for natural gas supply, process water supply, potable water supply, and sanitary wastewater would have limited impacts on adjacent land uses in the regions of influence for respective alignments. The principal impacts would result from the restrictions on land uses in the ROWs by property owners, the need to limit the height of vegetation in the ROWs, which would create linear clearings within wooded areas, and the need for utility vehicles to access the corridors periodically for inspection and maintenance. Existing ROWs for natural gas pipelines would experience

little change. New ROWs for other pipelines would be situated on mineral mining district lands that have been disturbed extensively from prior activities.

Once constructed, the HVTL facilities would have limited impacts on adjacent land uses in the regions of influence for respective alignments. The principal impacts would result from the changes in viewsheds caused by the HVTL towers and lines, restrictions on land uses in the ROWs by property owners, the need to limit the height of vegetation in the ROWs, which would create linear clearings within wooded areas, and the need for utility vehicles to access the corridors periodically for inspection and maintenance. Since the proposed HVTL alignments would follow existing ROWs for HVTLs, changes would relate mainly to the heights of towers and the increase in power lines that would be visible from adjacent properties, which would not affect adjacent land uses substantially and adversely.

There are no anticipated land use impacts to farmland on the East Range Site or associated corridors. Section 4.4 provides more discussion of prime farmland. The proposed operations would not affect land use on public lands adversely.

4.10.5 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. Hence, this alternative would maintain the status quo with respect to existing land use in the West Range and East Range. No structures or corridors would be built at the West Range Site or the East Range Site, so no land clearing would be necessary and no residential properties would be affected.

4.10.6 Summary of Impacts

Basis for Impact	No Action	West Range	East Range
Conflict with existing land uses.	No change in land use.	Generating station on 1,**708**-acre site, currently undeveloped, ~50 residential properties within 1 mi of station (closest, 0.71 mi) buffered by ~0.5 mi of dense woodlands.	Generating station on **1,322**-acre site, currently undeveloped, no residential properties within 1 mi of station (closest, 1.28 mi) buffered by ~0.5 mi of dense woodlands.
		Rail Alignment Alternative**s 3B and** 1A within 0.5 mi of 16 residences (closest, **470** ft). Alternative 1B within 0.5 mi of 8 residences (closest, 2,000 ft).	No residences within 0.5 mi of either rail alignment alternative (closest, ~1 mi).
		CR 7 realignment **(Access Road 1)** and **A**ccess **R**oad **2** within 0.5 mi of 22 residences (closest within 300 ft). **Access Road 3 within 0.5 mi of 5 residences (2 within 1,000 ft).**	No residences within 0.5 mi of site access road (closest, >1 mi).
		Process water pipelines within 0.5 mi of 104 residences (4 within 500 ft). Process effluent pipelines **(eliminated by use of enhanced ZLD system)** within 0.5 mi of 14 residences (2 within 500 ft). Potable/sanitary pipelines within 0.5 mi of 114 residences (4 within 500 ft).	No residences within 0.5 mi of process water pipeline segments (closest, >0.75 mi). No process effluent pipeline. No residences within 0.5 mi of potable/sanitary pipelines (closest >0.75 mi).
		Natural Gas Pipeline Alternative 1 within 0.5 mi of 153 residences (3 within 300 ft). Alternative 2 within 0.5 mi of 339 residences (5 within 300 ft). Alternative 3 within 0.5 mi of 935 residences (5 within 300 ft).	Natural gas pipeline on existing ROW within 0.5 mi of 856 residences (46 within 300 ft).
		HVTL route WRA-1 within 0.5 mi of 66 residences (4 within 500 ft). Route WRA-1A within 0.5 mi of 62 residences (7 within 500 ft). Route WRB-2A within 0.5 mi of 214 residences (29 within 500 ft).	All HVTLs on existing ROWs. 38L corridor within 0.5 mi of 271 residences (22 within 500 ft). 39L/37L corridors within 0.5 mi of 962 residences (49 within 500 ft).
		No distinguishable differences in impacts for a Phase I only outcome.	**No distinguishable differences in impacts for a Phase I only outcome.**
Conflict with local and regional zoning ordinances.	No change.	No conflict with local and regional zoning ordinances. West Range Site zoned as Industrial District.	No conflict with local and regional zoning ordinances. East Range Site zoned as Mineral Mining District.
Conflict with local and regional land use plans.	No change.	No conflict with local and regional land use plans.	No conflict with local and regional land use plans.

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4.11 SOCIOECONOMICS

4.11.1 Approach to Impacts Analysis

4.11.1.1 Region of Influence

The proposed Mesaba Generating Station represents a large new investment in northeastern Minnesota. The wider region of influence for the socioeconomic analysis includes the seven counties in the Arrowhead Region: Aitkin, Carlton, Cook, Itasca, Koochiching, Lake, and St. Louis. The local regions of influence are defined as Census Tract 9810 in Itasca County for the West Range Site (including Iron Range Township and the City of Taconite) and Census Tract 140 (the City of Hoyt Lakes) in St. Louis County for the East Range Site.

4.11.1.2 Method of Analysis

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

- Require demolition of housing and cause displacement of people residing in the region of influence.
- Reduce the desirability of local housing and residential property values in the region of influence.
- Cause population and housing growth in the region of influence either by the direct construction of new housing with an influx of residents or by providing new public roads or infrastructure that would influence new housing construction and population growth not otherwise expected to occur.
- Reduce employment opportunities by displacing businesses in the region of influence or by otherwise eliminating existing jobs.
- Reduce the desirability of local businesses and commercial property values in region of influence.
- Induce population influx into the region of influence by providing new employment opportunities not otherwise anticipated, which may exert pressure on the housing market and public services.

Economic and employment projections by the Bureau of Business and Economics Research (BBER) in the University of Minnesota at Duluth using the IMPLAN software model provided the basis for the impacts analyses. BBER estimated the regional and state economic and employment impacts of the Mesaba Energy Project (Phase I) in 2005. The results of that study were updated in 2006, at which time BBER used the model to estimate the economic and employment impacts of Phase II for the proposed Mesaba Generating Station (BBER, 2006). The following definitions are necessary to interpret the IMPLAN model results:

- “Direct Effect” is defined as initial new spending in the study area resulting from a project and represents the direct expenditures for construction and/or operation of the Mesaba Generating Station.
- “Indirect Effect” is defined as the additional inter-industry spending caused by a project and represents spending generated and jobs created by local companies to provide goods and services to support the Mesaba Generating Station.
- “Induced Effect” is defined as the additional household expenditures resulting from the direct and indirect expenditures for a project and represents the additional consumer spending and jobs created by increased local and regional disposable income resulting from the Mesaba Generating Station.

- "Value Added" is a measure of a project's contribution to the local community as represented by the direct, indirect, and induced effects of wages, rents, interest, and profits for the Mesaba Generating Station.
- "Total Output" is defined as the value of local production required to sustain activities and represents the sum of the direct, indirect, and induced effects from total project expenditures for construction and/or operation of the Mesaba Generating Station.

Based on the construction and operating cost estimates, BBER used the IMPLAN model to predict the direct, indirect, and induced economic and job multiplier benefits of the Mesaba Generating Station, both for the Arrowhead Region and for the State of Minnesota. These predictions, along with information about project activities provided in Chapter 2, were also used to evaluate potential impacts on the local regions of influence for the West Range and East Range Sites.

Note that the years stated in this section for construction (2008 through 2013) are based on the years depicted in the 2006 BBER study, and they have not been revised to reflect project schedule changes. As stated in Chapter 2, Excelsior's schedule was revised to reflect current planned construction of Phase I from 2010 through 2014 and Phase II from 2012 through 2016. Likewise, the BBER study assumed that the demonstration of Phase I would commence in 2011, which is now expected to occur in 2014. Therefore, the years stated in this section should be viewed and adjusted accordingly.

In response to a specific request by USACE, DOE revised Section 4.11 of this Final EIS where appropriate to describe the impacts of a Mesaba Energy Project Phase I (only) outcome. Because the infrastructure requirements for both phases would be essentially the same for Phase I, the principal differences relating to socioeconomic impacts would be associated with the increase in power plant size and activity levels (e.g., rail and truck deliveries) resulting from the addition of Phase II. These differences are generally described for other resource subjects (Aesthetics, Air Quality, Transportation, Safety and Health, and Noise) as they affect the regional population.

4.11.2 Common Impacts of the Proposed Action

4.11.2.1 Impacts of Construction

Employment, Income, Business and Economy

Employment and income impacts would stem from the hiring of construction workers in the region of influence. For a major construction project such as the Mesaba Generating Station, labor would be drawn from throughout the Arrowhead Region and beyond. Based on data provided by Excelsior, BBER estimated that total direct construction jobs for the Mesaba Generating Station would reach a peak during Phase I in year 2009 **(second year of construction)** at 1,555 jobs and a peak during Phase II in year 2011 **(fourth year of construction)** at 1,483 jobs. If both phases would be constructed on schedule, the total direct construction jobs in the peak construction year (2011) for the Mesaba Generating Station would be 1,617. These employment estimates are summarized in Table 4.11-1. BBER estimated the number of construction jobs as full-time, part-time, and temporary jobs for all construction activities on site and off site, including the generating station and associated utility and transportation corridors. Therefore, the estimates in Table 4.11-1 differ somewhat from the estimated peak onsite construction personnel described in Section 2.2.4.4.

Table 4.11-1. Estimated Employment – Construction Jobs (Mesaba Generating Station)

Year	Phase I	Phase II
2008	736	
2009	1,555	
2010	862	629
2011	134	1,483
2012		900
2013		167

Source: BBER, 2006

As described in Section 3.11.3, unemployment has historically been one or two percentage points higher in most of the Arrowhead Region than in the State of Minnesota as a whole. Although regional unemployment rates have declined recently, the historically persistent higher unemployment rates suggest that the region will have a skilled labor force available unless international demand for taconite and other mining products continues to increase. At least some researchers believe that the unemployment rates in the Arrowhead Region will return to their historically higher levels before project construction is scheduled to begin, and the gap between the unemployment rates in the region and the rest of the state may grow even wider as employment in manufacturing and iron mining industries in the Northeast region again declines (BBER, 2006).

The Department of Employment and Economic Development workforce data (DEED, 2006a) for the Arrowhead Region indicates that in 2005, the regional labor force was 169,200 with 160,500 employed. Minnesota Department of Employment and Economic Development estimated that there is an ample supply of labor in the area in general, but the aging population threatens to create a labor shortage in some industries by 2015 (DEED, 2006b). The extent to which temporary and permanent jobs can be filled by local residents would be driven in part by the local labor market characteristics, the availability of unemployed or underemployed skilled construction workers, and prevailing wages. Given the labor market characteristics in northeastern Minnesota, and the size of the labor force in the Arrowhead Region relative to the number of construction jobs expected to be created, the effect on labor availability is not expected to be adverse.

BBER obtained construction cost estimates from Excelsior and generated model inputs for annual expenditures on capital costs, wages, rents, interest, and profits for the Mesaba Generating Station. Tables 4.11-2 and 4.11-3 summarize the projected economic impacts on the Arrowhead Region based on the construction cost estimates. Table 4.11-2 shows that construction of Phase I would provide value added benefits to the regional economy of $587 million, while construction of Phase II would provide value added benefits of $387 million, resulting in a total value added benefit to the regional economy of nearly $1 billion during the period 2008 through 2013 **(entire period of construction)**. These value added benefits include the direct, indirect, and induced effects of the wages, rents, interest, and profits associated with the project. Dividing the total value added impact for Phase I ($587 million) by direct expenditures ($369 million) results in a value added multiplier of 1.59. This means that for each dollar spent on wages, rents, interest, and profits for construction of Mesaba Phase I, the regional economy will spend another $0.59. Using the IMPLAN model, BBER also determined that the Mesaba project would have additional value added benefits throughout the State of Minnesota.

Table 4.11-2. Value Added Economic Impacts for the Arrowhead Region During Construction of Mesaba Phases I and II ($ millions)

Period	Direct	Indirect	Induced	Total
Phase I (2008 – 2011)	$369	$119	$99	$587
Phase II (2010 – 2013)	$178	$114	$95	$387
Total	$547	$233	$194	$974

Source: BBER, 2006

Table 4.11-3 shows the total output impact on the regional economy predicted by the model for construction of Phases I and II. The total output impact for the Mesaba Generating Station ($3 billion) represents the sum of direct, indirect, and induced effects from construction of the project between 2008 and 2013. The total output for Mesaba Phase I ($1.96 billion) divided by the total direct project costs ($1.56 billion) would result in a regional economic output multiplier of about 1.26. Using the IMPLAN model, BBER also determined that the Mesaba project would have additional total output benefits throughout the State of Minnesota.

Table 4.11-3. Total Output Economic Impacts for the Arrowhead Region During Construction of Mesaba Phases I and II ($ millions)

Period	Direct	Indirect	Induced	Total
Phase I (2008 – 2011)	$1,561	$237	$162	$1,960
Phase II (2010 – 2013)	$743	$225	$156	$1,124
Total	$2,304	$462	$318	$3,084

Source: BBER, 2006

The model results in Table 4.11-4 show jobs created in the region during construction of both phases of the Mesaba Generating Station. During the peak construction year 2011, an estimated 1,100 new indirect jobs, in addition to the 1,617 direct construction jobs, would be created in the region to provide goods and services for the project. Another 955 new jobs in numerous industries would be induced by the project through increased consumer spending. Overall, the model predicted that the project would result in an estimated 3,672 jobs in the region during the peak year of 2011 **(fourth year of construction)** when both phases of the generating station would be under construction. **For Phase I only, the combined estimate of jobs created in the region would peak at 3,521 in the second year of construction.**

Table 4.11-4. Estimated Jobs Created in the Arrowhead Region During Construction of Mesaba Phases I and II

Year	Direct	Indirect	Induced	Total
2008	736	559	451	1,746
2009	1,555	1,050	916	3,521
2010[1]	1,491	962	865	3,318
2011[2]	1,617	1,100	955	3,672
2012	900	573	520	1,993
2013	167	147	108	422

Source: BBER, 2006
[1] **Results distributed as approximately 58% for Phase I and 42% for Phase II based on Table 4.11-1**
[2] **Results distributed as approximately 8% for Phase I and 92% for Phase II based on Table 4.11-1**

If construction workers needed for the Mesaba Generating Station were to come from outside Minnesota, a portion of the socioeconomic benefits would accrue to states where these workers hold permanent residences. Though there is no data to determine the share of out-of-state workers that might be needed to meet the labor demands of the plant, there is anecdotal evidence that out-of-state labor may be prevalent in the construction industry particularly for power plant projects such as the Mesaba Generating Station (Excelsior, 2006b).

Nonetheless, the construction of the Mesaba Generating Station would have a net beneficial impact on the regional economy by stimulating more than $3 billion of economic activity during the six-year construction phase and creating between 400 and 3,600 annual jobs from 2008 through 2013 **(entire period of construction)**. **For Phase I only, the project would have a net beneficial impact on the regional economy by stimulating nearly $2 billion of economic activity during the four-year construction period and creating between 300 and 3,500 annual jobs from 2008 through 2011.** Based on the higher relative unemployment rates in the Arrowhead Region, a considerable number of the expected jobs would likely benefit regional workers.

Population and Housing

The need for construction workers would be limited in duration, and a potential influx of temporary residents is not expected to cause an unsustainable increase in permanent regional population. However, a potential influx of construction workers for the Mesaba Generating Station may have an adverse short-term impact on the regional housing market. As indicated in Section 3.11.2, the Arrowhead Region has about 35,300 vacant housing units of which approximately 7,700 are not vacant on a seasonal basis only. Itasca County accounts for approximately 1,000 of these vacant units, while St. Louis County accounts for approximately 4,300. Additionally, Itasca County and St. Louis County have approximately 3,000 and 21,000 renter-occupied houses, respectively. Therefore, depending upon the percentage of construction jobs that could be filled by existing residents, the influx of workers from outside the region could create a demand for rental housing and lodging that may exceed available capacity. It is likely that many temporary workers could be accommodated through the renting of rooms in private residences, which could provide additional economic stimulus to local communities in the region.

4.11.2.2 Impacts of Operation

Employment, Income, Business and Economy

Although the economic and employment benefits from construction of the Mesaba Generating Station would be considerable, they would only last six years **(four for Phase I alone)** and would provide the greatest effect during a three-year period. Economic and employment benefits during operations, on the other hand, would occur throughout the service life of the Mesaba Generating Station. Permanent labor would be drawn from throughout the Arrowhead Region and beyond. The permanent employment data that were used in the BBER study were provided by Excelsior as summarized in Table 4.11-5. **Note that as stated in Chapter 2, Excelsior's schedule has been revised to reflect initial start-up of Phase I in 2014 and of Phase II in 2016. Therefore, the years stated in this section should be viewed and adjusted accordingly.**

Table 4.11-5. Estimated Employment, Permanent Operating Jobs (Mesaba Generating Station)

Year	Phase I	Phase II	Total (Phase I and II)
2011	28		28
2012	79		79
2013	107	15	122
2014	107	63	170
Typical	107	78	185

Source: BBER, 2006

Tables 4.11-6 and 4.11-7 summarize the projected economic impacts on the Arrowhead Region from operation of the Mesaba Generating Station. Table 4.11-6 shows that a typical year of operation for Phase I would provide value added benefits to the regional economy of $370 million, while typical operation of Phase II would provide value added benefits of $392 million. The total value added benefit to the regional economy from both phases would be $762 million per year beginning in 2015 as planned. Dividing the total value added impact for Phase I ($370 million) by direct expenditures ($316 million) results in a value added multiplier of 1.17. BBER also determined that the Mesaba project would have additional value added benefits throughout the State of Minnesota.

Table 4.11-7 shows the total output impact from operation of the Mesaba Generating Station on the regional economy as predicted by the model. Assuming full operation of Phases I and II as planned, the Mesaba Generating Station would have a total output economic impact on the Arrowhead Region of $1.1 billion annually beginning in 2015. Dividing the total output for Mesaba Phase I ($535 billion) by the total direct project costs ($440 billion) results in a regional economic output multiplier of about 1.22. BBER also determined that the Mesaba Energy Project would have additional total output benefits throughout the State of Minnesota.

Table 4.11-6. Value Added Economic Impacts for the Arrowhead Region for a Typical Year of Operation, Mesaba Phases I and II ($ millions)

Period	Direct	Indirect	Induced	Total
Phase I	$316	$14	$40	$370
Phase II	$335	$15	$42	$392
Total	$651	$29	$82	$762

Source: BBER, 2006

Table 4.11-7. Total Output Economic Impacts for the Arrowhead Region for a Typical Year of Operation, Mesaba Phases I and II ($ millions)

Period	Direct	Indirect	Induced	Total
Phase I	$440	$30	$65	$535
Phase II	$466	$32	$69	$567
Total	$906	$62	$134	$1,102

Source: BBER, 2006

Table 4.11-8 summarizes the projected impact on job creation in the Arrowhead Region attributable to the operation of the Mesaba Generating Station. In addition to the 185 direct jobs that Excelsior expects the plant to require for operation of both phases, the model predicted that plant operation would indirectly create an additional 59 permanent jobs in industries such as commercial machinery repair and maintenance. Also, the model indicated that plant operation would induce the creation of an additional 189 permanent jobs attributable to increased consumer spending in food services and numerous other industries. Overall, the model predicted that the project would result in a regional increase of 432 full- and part-time jobs in a typical operating year. On a statewide basis, the model predicted an increase of 472 full- and part-time jobs in a typical operating year.

Table 4.11-8. Estimated Jobs Created in the Arrowhead Region During a Typical Year of Operation, Mesaba Phases I and II

Year	Direct	Indirect	Induced	Total
Phase I	107	34	109	250
Phase II	78	25	80	182
Total	185	59	189	432

Source: BBER, 2006

Based on the higher relative unemployment rates and labor market characteristics in the Arrowhead Region, the Mesaba Generating Station is not expected to compete with other local businesses to attract skilled labor for the permanent jobs and would be able to hire staff at prevailing wages. Therefore, the project is expected to have a net beneficial impact on employment in the region.

Population and Housing

On a regional basis, the relatively small number of permanent positions to be filled for the operation of the Mesaba Generating Station would not affect the rate of population growth. Even if all 185 positions were filled by newcomers to the Arrowhead Region, the increase would be small. The region is expected to increase in population by an average of 1,000 to 2,000 individuals annually through 2030 (MSDC, 2002). Similarly, a small influx of permanent workers would not impose an unsupportable demand on the regional housing supply.

4.11.3 Impacts on West Range Site and Corridors

4.11.3.1 Impacts of Construction

The construction of the Mesaba Generating Station (Phases I and II) and associated facilities (rail lines, access roads, water pipelines, effluent pipelines, gas pipelines, and HVTLs) at the West Range Site would not require the destruction of existing housing or commercial businesses and would not displace existing local population or eliminate jobs. Temporary traffic and noise impacts to property-owners along Diamond Lake Road would occur during the proposed relocation of CR 7 by Itasca County as discussed in Sections 4.15, Transportation and 4.18, Noise. Construction of rail lines, pipelines, and HVTLs would also cause temporary adverse impacts for adjacent property owners as described throughout this chapter.

The potential increase in demand for lodging by construction workers may have adverse impacts on the local market for rental housing in Taconite, Bovey, Marble and other local communities in Census Tract 9810 of Itasca County. This census tract has less than 3,000 housing units, of which 375 were renter-occupied and 138 were vacant (not seasonal) in the 2000 Census. In the event that a substantial percentage of construction workers are drawn from outside the region, adequate local housing may not be available in Census Tract 9810. Therefore, these workers would be required to seek and compete for temporary lodging or rental housing in the larger communities of Grand Rapids, approximately 12 miles to the west, and Hibbing, approximately 25 miles to the east, as well as other smaller communities in

between and farther away. Also, local homeowners with available rooms may take in lodgers to supplement their incomes.

The numbers of workers anticipated during the peak years of construction for Phases I and II would strain the local rental housing and temporary lodging markets, particularly in Taconite and adjacent communities along US 169. Therefore, local officials and business leaders would expect to coordinate with Excelsior and its contract management consultant to address the needs for temporary housing and lodging to accommodate the potential influx of construction workers.

The Final EIS for the Minnesota Steel Project in Nashwauk (MNDNR and USACE, 2007) addressed the impacts of constructing that project in combination with the Mesaba Energy Project and other projects in the Grand Rapids-Hibbing area. The Minnesota Steel Final EIS concluded that: "With a limited number of rental units and a very low vacancy rate, the rental housing market is initially expected to experience a lot of pressure, which may cause rent levels to escalate, causing affordability issues for certain households." (MNDNR and USACE, 2007) However, the document also pointed out that local governments and other groups have been working with Minnesota Steel in anticipation of the workforce needs. Therefore, the Minnesota Steel Final EIS did not anticipate significant socioeconomic impacts.

4.11.3.2 Impacts of Operation

The operation of the Mesaba Generating Station and associated facilities at the West Range Site would not require the destruction of existing housing or commercial businesses and would not displace existing population or eliminate jobs. The impacts of additional permanent workers drawn from outside the region on the demand for local housing in Census Tract 9810 may be considerable. However, the numbers of permanent workers **(107 for Phase I and 185 for both phases)** would be well below the numbers of construction workers, and they would likely find suitable housing within reasonable commuting distance of the site in the region between Grand Rapids and Hibbing along the US 169 corridor. **In comparison, the Minnesota Steel Final EIS estimated a permanent workforce of 700 for that project.**

The existence of the plant and rail facilities and the operation of these facilities, as well as the relocation of CR 7 by Itasca County along the alignment of Diamond Lake Road, would have the potential to adversely impact the desirability of nearby residential properties and cause reductions in home values for properties within visual and audible range of these facilities. Block 3083 of Block Group 3 in Census Tract 9810, in which the West Range Site is located, has approximately 33 housing units. However, none is within 3,500 feet of the power plant footprint, and all would be separated from the plant by a minimum 2,000-foot width of wooded buffer land. Three residences near Big Diamond Lake and Dunning Lake would be located within 1,000 feet of **either** the **prior Excelsior** preferred rail alignment (Alternative 1A) **or the new Excelsior preferred rail alignment (Alternative 3B)**; one of these residences would be located within 500 feet **of the common alignment of both rail alternatives**. These units would be most adversely affected by the Proposed Action. The alternative rail alignment (Alternative 1B) would be located 2,000 feet away from the closest residence. **The new Excelsior preferred road alignment (Access Road 3) would be located within 1,250 feet of two residences along CR 7 near the southwestern corner of the property.** At least five residences along Diamond Lake Road north of Big Diamond Lake would be adversely affected by the relocation of CR 7 **(although this action has been deferred by Itasca County since publication of the Mesaba Draft EIS)**. Perhaps a dozen or more of the other residential properties along CR 7 and Diamond Lake Road closest to the plant site or rail alignment may experience reductions in values or at least slower rates of growth in values.

The proposed new HVTL corridors for the preferred (WRA-1 or WRB-1) and alternative (WRA-1A or WRB-1A) routes would pass through sparsely populated areas between the retired Greenway Substation near US 169 and existing ROWs near the Blackberry Substation. The corridors would run

parallel to Twin Lakes Road, passing respectively to the west and east of the road by 0.5 miles. **[Sentence in Draft EIS at this point deleted in conjunction with the addition of the new paragraph below.]** One residence would be located within 300 feet of preferred alignment WRA-1 (or WRB-1) and three others would be located within 500 feet. Two residences would be located within 300 feet of Alternative Alignment WRA-1A (or WRB-1A) and five others would be located within 500 feet. The alternative corridor for Plan B (WRB-2A) would affect residences along existing ROWs for HVTLs. Eight residences are located within 300 feet of the existing ROWs and 21 others are located within 500 feet.

In a recent article, Pitts and Jackson (2007) found that prior studies reported an average discount of 1 percent to 10 percent in property values when negative impacts of HVTLs are evident. Although these impacts can extend to a quarter mile when views of lines and towers are completely unobstructed, the impacts were found to diminish with distance and disappeared at a distance of 200 feet if HVTL structures are at least partially screened by trees, landscaping, or topography. Therefore, a small number of the closest residences may experience adverse effects on property values depending upon the visibility of HVTL structures. Excelsior expects to compensate property owners for the granting of easements.

Once installed, gas pipelines would have minimal aboveground features that would affect adjacent property owners. Generally, pipeline ROWs would limit the height of vegetation planted and require accessibility for inspection and maintenance. Three residences would be located within 300 feet of Natural Gas Pipeline Alternative 1 (Excelsior's preferred alignment), five residences would be located within 300 feet of Natural Gas Pipeline Alternative 2; and 29 residences would be located within 300 feet of Natural Gas Pipeline Alternative 3. **As discussed in Section 2.3.1.4, Excelsior proposes to negotiate with Nashwauk PUC for the purchase of natural gas to supply the Mesaba Generating Station. Nashwauk PUC received a permit in April 2008 (after publication of the Mesaba Draft EIS) to construct its pipeline along essentially the same alignment as Excelsior's Alternative 1.** Other pipelines (water and effluent) generally would not be located near residential properties.

There are few commercial properties in the vicinity of the West Range Site, and it is unlikely that any would be impacted by the operations of the plant or rail line. However, the existence of the plant near Taconite and the US 169 corridor would likely stimulate the development of additional commercial businesses in the vicinity that would cater to the routine needs of plant workers.

The proposed realignment of CR 7 by Itasca County, as shown previously in Figure 2.3-2, could open adjacent properties to residential and commercial development due to improved access. Although the realignment is not a component of the proposed Mesaba project, it is considered a connected action for the purpose of this EIS. **However, as described in Section 2.3.1.2, Itasca County has deferred its plan to realign CR 7 due to changes in funding priorities.**

4.11.4 Impacts on East Range Site and Corridors

4.11.4.1 Impacts of Construction

The construction of the Mesaba Generating Station and associated facilities at the East Range Site would not require the destruction of existing housing or commercial businesses and would not displace existing local population or eliminate jobs. Construction of rail lines, access roads, and water pipelines would occur in unpopulated areas. Construction of gas pipelines and HVTLs would occur along existing ROWs for such facilities and would cause temporary adverse impacts for adjacent property owners as described throughout this chapter.

The potential increase in demand for lodging by construction workers may have adverse impacts on the local market for rental housing in Hoyt Lakes and other local communities in the vicinity because people not associated with construction of the plant would have to compete for housing. Hoyt Lakes (Census Tract 140 of St. Louis County) has less than 1,000 housing units, of which 76 were renter-

occupied and 67 were vacant (not seasonal) in the 2000 Census. In the event that a substantial percentage of construction workers are drawn from outside the region, adequate local housing would not be available in Hoyt Lakes. Therefore, these workers would be required to seek lodging in the larger community of Virginia, approximately 20 miles to the west, as well as other communities in between and farther away. Also, local homeowners with available rooms may take in lodgers to supplement their incomes.

The numbers of workers anticipated during the peak years of construction for Phases I and II would strain the local rental housing and temporary lodging markets, particularly in Hoyt Lakes and adjacent communities along CR 100 and CR 110. Therefore, local officials and business leaders would expect to coordinate with Excelsior and its contract management consultant to address the needs for temporary housing and lodging to accommodate the potential influx of construction workers.

4.11.4.2 Impacts of Operation

The operation of the Mesaba Generating Station and associated facilities at the East Range Site would not require the destruction of existing housing or commercial businesses and would not displace existing population or eliminate jobs. The impacts of additional permanent workers drawn from outside the region on the demand for local housing in Hoyt Lakes may be considerable. However, the numbers of permanent workers would be well below the numbers of construction workers, and they would likely find suitable housing in the region between Hoyt Lakes and Virginia along the CR 110, CR 100, SR 135, and US 53 corridors within a radius of 30 miles.

Because there is no population or housing in Block 1008 of Block Group 1 in Census Tract 140, in which the East Range Site is located, no residential properties would be directly impacted by the existence and operation of the plant and rail facilities. The closest populated census units to the plant site, Blocks 1023 and 1024 of Block Group 1, had approximately 46 and 7 housing units, respectively, at the 2000 Census. These residential properties are located near the southeast shore of Colby Lake more than 1 mile south of the proposed plant footprint and less than 1 mile east of the Syl Laskin Energy Center. Because the properties that would have the clearest lines of sight to the Mesaba Generating Station are lakefront and lake-view properties, some of which already have views of the Syl Laskin power plant (Figure 4.11-1), it is not known whether the values of these properties would be adversely affected by their proximity to the Mesaba plant. The properties also would be separated from the proposed Mesaba plant power block and rail line by a minimum 3,000-foot width of wooded buffer land. There are no residential properties located in the vicinity of potential new rail lines or access roads for the plant. The proposed gas pipeline would be constructed within an existing ROW for a natural gas pipeline that has 46 residences located within 300 feet.

Figure 4.11-1. View of Syl Laskin Plant from Residences on Colby Lake

The proposed widening of HVTL corridors along either the preferred or alternative routes from the Laskin Substation to the Forbes Substation would affect existing ROWs that already contain HVTLs. Approximately 16 residences are located within 300 feet of the ROWs for the preferred 39L/37L route and 33 others are located within 500 feet. Approximately 11 residences are located within 300 feet of the ROWs for the alternative 38L route and 11 others are located within 500 feet. Because these residences are already located near existing HVTL ROWs, it is unlikely that property values along these corridors would be affected by the additional HVTLs. Also, local property owners would be compensated for the granting of additional easements.

It is unlikely that any commercial properties in Hoyt Lakes would be impacted by the operations of the plant or rail line, because most establishments are located near CR 110, approximately 2 miles south of the East Range Site. However, the existence of the plant in Hoyt Lakes near the CR 110 corridor would likely stimulate the development of additional commercial businesses in the vicinity that would cater to the routine needs of plant workers.

4.11.5 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. Hence, this alternative would maintain the status quo with respect to demographic and socioeconomic conditions in the Arrowhead Region and local communities. Given the status of the local economy, employment, and income, the region would lose the potential for a stimulus to support economic stability.

4.11.6 Summary of Impacts

Basis for Impact	No Action	West Range	East Range
Demolish housing stock and displace population.	No houses demolished; no population displaced.	No houses demolished; no population displaced.	No houses demolished; no population displaced.
Reduce the desirability of local housing, thereby affecting residential property values.	No impact on property values.	**Residences closest to power plant, rail alignment and HVTL corridors may experience reductions in property values.** No residences within 3,000 feet of power plant footprint. Three residences within 1,000 feet of Rail Alignment Alternative**s** 1A **and 3B**. No residences within 1,000 feet of Rail Alignment Alternative 1B. **Between 4 and 29 residences within 500 feet of HVTLs depending upon route.**	**Residences closest to power plant, rail alignment and HVTL corridors may experience reductions in property values.** No residences within 3,000 feet of power plant footprint. No residences within 1,000 feet of rail alignment alternatives. **71 residences within 500 feet of existing HVTLs that may be expanded for the project.**
Directly construct new housing stock.	No direct construction of new housing stock.	No direct construction of new housing stock.	No direct construction of new housing stock.

Basis for Impact	No Action	West Range	East Range
Provide new public roads and infrastructure that may influence new housing and population growth.	No construction of new public roads or infrastructure.	Related realignment of CR 7 by Itasca County **(deferred since publication of the Draft EIS)** may influence local housing development in vicinity.	No construction of new public roads or infrastructure that would influence growth.
Displace businesses and/or eliminate jobs.	No displacement of businesses or elimination of jobs.	No displacement of businesses or elimination of jobs.	No displacement of businesses or elimination of jobs.
Reduce the desirability of local businesses, thereby affecting commercial property values.	No impact on commercial property values.	No commercial businesses within 3,000 feet of power plant footprint.	No commercial businesses within 3,000 feet of power plant footprint.
Create new employment not otherwise anticipated that would induce population influx and exert pressure on the housing market and public services	No new jobs created.	Peak construction-related employment would affect short-term demand for housing locally. Operation-related employment would not exceed estimates for regional population growth.	Peak construction-related employment would affect short-term demand for housing locally. Operation-related employment would not exceed estimates for regional population growth.

4.12 ENVIRONMENTAL JUSTICE

4.12.1 Approach to Impacts Analysis

4.12.1.1 Region of Influence

The regions of influence for environmental justice are determined for each resource area by 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. The municipalities nearest to the West and East Range Sites, respectively, are Taconite and Iron Range Township and Hoyt Lakes. The wider demographic areas for analysis and comparison include the larger census units in proximity to the respective sites, nearby communities, the counties of Itasca (West Range) and St. Louis (East Range), and American Indian tribal communities and reservations in the Arrowhead Region.

4.12.1.2 Method of Analysis

The evaluation of potential environmental justice impacts considered whether the Proposed Action or an alternative would cause any of the following conditions:

- Disproportionately high and adverse effects on minority populations in the region of influence.
- Disproportionately high and adverse effects on low-income populations in the region of influence.

The CEQ's December 1997 Environmental Justice Guidance (CEQ, 1997) provides guidelines regarding whether human health effects on minority populations are disproportionately high and adverse. Agencies were advised to consider the following three factors to the extent practicable:

1) Whether the health effects, which may be measured in risks and rates, are significant (as employed by NEPA), or above generally accepted norms. Adverse health effects may include bodily impairment, infirmity, illness, or death;

2) Whether the risk or rate of hazard exposure by a minority population, low-income population, or Indian tribe to an environmental hazard is significant (as employed by NEPA) and appreciably exceeds or is likely to appreciably exceed the risk or rate to the general population or other appropriate comparison group; and

3) Whether health effects occur in a minority population, low-income population, or Indian tribe affected by cumulative or multiple adverse exposures from environmental hazards.

Based on the definitions in Section 3.12 and criteria outlined above, the analysis for environmental justice in this EIS was performed in the following sequence:

First, determine the potential for an adverse impact from site-specific or corridor-specific project activities (construction or operation) to affect a minority population in the vicinity disproportionately based on the definitions outlined by CEQ and described in Section 3.12.1 and using data from the 2000 Census.

Second, determine the potential for an adverse impact from site-specific or corridor-specific project activities (construction or operation) to affect a low-income population in the vicinity disproportionately based on the definitions outlined by CEQ and described in Section 3.12.1 and using data from the 2000 Census.

Third, determine the potential for adverse health risks in a wider radius from respective project sites and corridors based on impacts analyzed in Section 4.17, Safety and Health, and then assess the potential that an adverse health risk would affect a minority population, low-income population, or American Indian tribe at a higher rate than the general population.

Fourth, determine whether health effects may occur in a minority population, low-income population, or American Indian tribe affected by cumulative or multiple adverse exposures from environmental hazards based on impacts analyzed in Section 4.17, Safety and Health.

4.12.2 Impacts on West Range Site and Corridors

4.12.2.1 Impacts on Minority Populations

As described in Section 3.12.2.2, the smallest census unit in which the West Range Site is located (Census Tract 9810, Block Group 3, Block 3083) had no minority population in the 2000 Census. Furthermore, the larger census units surrounding the site (Iron Range Township and Census Tract 9810) had lower distributions of minority populations than Itasca County, the Arrowhead Region, and the state.

The proposed new utility corridors for the Mesaba Energy Project at the West Range Site would pass through sparsely populated areas in Census Tract 9810 and other census units in Itasca County. As described in Section 3.12.2.2, this census tract and Itasca County as a whole had distributions of minority populations comparable to the Arrowhead Region and lower than the state.

Based on the demographic analysis, any potential adverse impacts from the Mesaba Energy Project at the West Range Site or along associated utility corridors would not have a disproportionate effect on minority populations; therefore, no potential environmental justice impacts are indicated relating to minority populations.

4.12.2.2 Impacts on Low-Income Populations

As described in Section 3.12.3.2, the smallest census unit in which the West Range Site is located and for which poverty statistics are published by the U.S. Census Bureau (Census Tract 9810, Block Group 3) had poverty rates lower than those in Taconite and comparable to the larger census unit of Iron Range Township in the 2000 Census. Although local poverty rates are higher than in Itasca County and the Arrowhead Region, 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, Itasca County, and the Arrowhead Region in general than to those in Taconite and Iron Range Township.

The proposed new utility corridors for the Mesaba Energy Project near the West Range Site would pass through sparsely populated areas in Census Tract 9810 and other census units in Itasca County. As described in Section 3.12.3.2, the census tract had poverty rates comparable to Itasca County and the Arrowhead Region as a whole.

Based on the demographic analysis, any potential adverse impacts from the Mesaba Energy Project at the West Range Site or along associated utility corridors would not have a disproportionate effect on low-income populations; therefore, no potential environmental justice impacts are indicated relating to low-income populations.

4.12.3 Impacts on East Range Site and Corridors

4.12.3.1 Impacts on Minority Populations

As described in Section 3.12.2.3, the closest populated census unit to the East Range Site (Census Tract 140, Block Group 1, Block 1023) had no minority population in the 2000 Census. Furthermore, the larger census units surrounding the site (Tract 140, Block Group 1 and Hoyt Lakes) had lower distributions of minority populations than St. Louis County, the Arrowhead Region, and the state.

Proposed new utility corridors for the Mesaba Energy Project at the East Range Site would be located along existing ROWs for HVTLs and pipelines that generally pass through sparsely populated areas in St. Louis County. As described in Section 3.12.2.3, St. Louis County had distributions of minority

populations comparable to the Arrowhead Region and lower than the state. Furthermore, the largest concentrations of minority populations in St. Louis County are found in the vicinity of Duluth and in Indian tribal reservations far removed from the proposed corridors.

Based on the demographic analysis, any potential adverse impacts from the Mesaba Energy Project at the East Range Site or along associated utility corridors would not have a disproportionate effect on minority populations; therefore, no potential environmental justice impacts are indicated relating to minority populations.

4.12.3.2 Impacts on Low-Income Populations

As described in Section 3.12.3.3, the smallest census unit in which the East Range Site is located and for which poverty statistics are published by the U.S. Census Bureau (Census Tract 140, Block Group 1) had lower poverty rates than the larger census units of Hoyt Lakes and St. Louis County as a whole in the 2000 Census. Furthermore, the poverty rates in St. Louis County were comparable to those in the larger Arrowhead Region.

Proposed new utility corridors for the Mesaba Energy Project at the East Range Site would be located along existing ROWs for HVTLs and pipelines that generally pass through sparsely populated areas in St. Louis County. As described in Section 3.12.3.3, St. Louis County had percentages of low-income populations comparable to the Arrowhead Region, and low-income populations are widely distributed throughout the county and region.

Based on the demographic analysis, any potential adverse impacts from the Mesaba Energy Project at the East Range Site or along associated utility corridors would not have a disproportionate effect on low-income populations; therefore, no potential environmental justice impacts are indicated relating to low-income populations.

4.12.4 Health Risk-related Environment Justice Impacts

American Indian tribes in northern Minnesota include populations of subsistence fishers who may consume higher amounts of fish than the general population. Mercury contamination of fish is a well-documented problem in the state, and the Minnesota Department of Health currently advises people to restrict their consumption of sport fish due to mercury levels in virtually every lake that has been tested (MPCA, 2005).

The largest proportion—perhaps 98 percent—of the mercury in Minnesota lakes and rivers comes from the atmosphere. About 30 percent of the mercury in the atmosphere is the result of the natural cycling of mercury. The other 70 percent of atmospheric mercury is the result of human activities that have released mercury from the geological materials in which it had been stored. These activities include the mining of ores containing mercury, the use of mercury in products and manufacturing, and the incidental release of trace concentrations of mercury naturally present in coal, crude oil, and metal ores, such as taconite. Mercury emissions in Minnesota declined significantly (about 68 percent) from 1990 to 2000, and there is evidence that concentrations of mercury in Minnesota's fish have declined by about 10 percent, which is considered an encouraging response (MPCA, 2005).

Excelsior conducted a human health risk assessment to estimate the risk for subsistence fishers as a result of mercury emissions from the proposed Mesaba Generating Station. The results of this study are described in Section 4.17. The study evaluated the worst-case mercury deposition and subsistence fishers receptor scenario, which would occur near the West Range Site at Big Diamond Lake, located less than 2 miles from the proposed plant stacks. The study found that the background mercury deposition to the lake would be **16.5** grams per year from all existing sources, while the highest deposition attributable to the Mesaba power plant would be approximately **0.08** grams per year. The incremental increase in health risk from ingestion of fish as posed by mercury from plant emissions would be within the MPCA

acceptable risk quotient. Therefore, although the Mesaba Generating Station would be an additional source of atmospheric mercury, it would not by itself cause unacceptable health risks.

The concentrations of American Indian populations closest to either the West Range Site or East Range Site are located approximately 20 miles away. Because of the distance of these populations, the prior existence of fish consumption advisories, and the relatively low mercury emissions expected from the Mesaba Generating Station compared to other power plant technologies, the incremental impacts to local American Indian populations from the project would be negligible. Therefore, no potential environmental justice impacts are indicated relating to disproportional health risks for American Indian tribes.

A Native American Tribal retirement complex may be constructed in the vicinity of the West Range Site. The complex is believed to be planned on property along the west shores of Twin Lakes, off Cherokee Road, south of US 169, about 3 miles southeast of the West Range IGCC Power Station footprint. Based on the exposure risks determined by the AERA analysis in Section 4.17.2.3, the retirement complex would be situated farther away from the Mesaba facility than the adult and child residents with highest risk of exposure to hazardous emissions, which are located 1.2 miles away. The AERA analysis determined that the highest risk exposure scenario for these adult and child residents would be below the risk thresholds established by MPCA and EPA for both cancer risk and non-cancer morbidity hazard. Therefore, it is concluded that the exposure risk to residents of the planned retirement complex would also be below the MPCA and EPA risk thresholds.

4.12.5 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. Although the No Action Alternative would not create the potential for direct environmental justice impacts, the area would lose the potential for the new jobs and economic stimulus described in Section 4.11, Socioeconomics that would help reduce the proportions of low-income populations in the region.

4.12.6 Summary of Impacts

Basis for Impact	No Action	West Range	East Range
Cause potential for disproportionately high and adverse effects on minority populations in the region of influence.	No Impact to minority populations.	No potential environmental justice impacts are indicated relating to minority populations.	No potential environmental justice impacts are indicated relating to minority populations.
Cause potential for disproportionately high and adverse effects on low-income populations in the region of influence.	No impact on low-income populations.	No potential environmental justice impacts are indicated relating to low-income populations.	No potential environmental justice impacts are indicated relating to low-income populations.

4.13 COMMUNITY SERVICES

4.13.1 Approach to Impacts Analysis

4.13.1.1 Region of Influence

The region of influence for impacts on community services is defined both regionally and locally. The larger region of influence is the Arrowhead Region of Minnesota, including Aitkin, Carlton, Cook, Itasca, Koochiching, Lake, and St. Louis counties. The local regions of influence are defined as the City of Taconite (West Range Site) in Itasca County and the City of Hoyt Lakes (East Range Site) in St. Louis County.

4.13.1.2 Method of Analysis

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

- Increase the demand on service capacities of local and regional law enforcement agencies (directly or indirectly).
- Impede effective access by law enforcement services in the region of influence.
- Displace law enforcement facilities or conflict with local and regional plans for law enforcement.
- Increase the demand on service capacities of local and regional emergency response agencies (directly or indirectly).
- Impede effective access by emergency services in the region of influence.
- Displace medical facilities or conflict with local and regional plans for emergency services.
- Increase the demand on local and regional recreational lands and facilities (directly or indirectly).
- Displace designated recreational uses or conflict with local and regional plans for recreation and open space.
- Increase enrollment in local school systems (directly or indirectly).
- Displace school facilities or conflict with local and regional plans for school system capacity and enrollment.

The analysis was based on information about project features and activities, as well as estimated employment during construction and operations, and other data as provided in Chapter 2. Background information about community services has been provided in Section 3.13.

4.13.2 Common Impacts of the Proposed Action

4.13.2.1 Impacts of Construction

As described in Section 4.11.2.1, although the BBER study listed the years of construction as 2008 through 2013, Excelsior's schedule has been revised to reflect current planned construction of Phase I from 2010 through 2014 and Phase II from 2012 through 2016. Therefore, the years stated throughout this section should be viewed and adjusted accordingly. The BBER study (Section 4.11.2.1) estimated that employment during the seven-year construction period for the Mesaba Generating Station (Phases I and II) would range between approximately 160 and 1,600 workers with highest annual employment (over 1,500 workers) in years 2009 through 2011. Due to the relatively high rates of unemployment in the Arrowhead Region (Section 3.11.3), it is expected that a considerable number of these positions would be filled from the regional and local labor pools. Additional construction workers would be drawn to the area to satisfy the demand and fill specialized needs. Though the influx is not expected to result in substantial increases in permanent residents due to the temporary duration of the construction phase, short-term impacts on community services can be expected.

As projected by the BBER study, the project would also stimulate the creation of approximately 2,000 additional jobs in the Arrowhead Region during each of the three years of peak construction. These jobs could be located anywhere in the seven-county region, which had a regional labor force of 169,200 in 2005 with 160,500 employed (Section 4.11.2.1).

In general, both Phases I and II would require twice as much time to construct compared to Phase I alone. Therefore, impacts on community services associated with the duration of large numbers of construction workers located in or commuting to the plant site and utility corridors would last twice as long.

Law Enforcement

Law enforcement agencies in the Arrowhead Region have a lengthy history of maintaining order in an area where mining, lumbering, and other trades comparable to heavy construction predominate. On a regional basis, the project is not expected to increase the demand on these services substantially beyond available capacities. Nor would construction activities impede effective law enforcement or conflict with regional plans.

Emergency Response

On a regional basis, the incidents and injuries during construction predicted in Section 4.17, Safety and Health are not expected to increase the demand on emergency services and medical facilities substantially beyond available capacities; nor would construction of the project conflict with regional plans. During construction of utilities and transportation features, temporary road closings could impede access by emergency vehicles. However, such closings would be coordinated with local and regional authorities to minimize impacts and ensure that alternative routes would be provided for emergency vehicles.

Parks and Recreation

The construction of the Mesaba Generating Station would not displace existing designated recreation areas or conflict with regional plans. Regional recreational opportunities are sufficient to meet the demands of additional workers drawn to the Arrowhead Region for project construction.

School Systems

Though some portion of the work force drawn to the region during construction may relocate with families, a large influx of school-aged children would not be anticipated. Furthermore, project construction would not displace existing school facilities or conflict with school system plans.

4.13.2.2 Impacts of Operation

As stated in Chapter 2, Excelsior's schedule has been revised to reflect initial start-up of Phase I in 2014 and of Phase II in 2016. Therefore, the years stated in this section should be viewed and adjusted accordingly. The completion of the Mesaba Generating Station would establish a large industrial facility in the Arrowhead Region that would require regular deliveries of coal via unit trains and generate additional traffic as described in Section 4.15. With the completion of **Phase I, the station would employ approximately 107 personnel, and after completion of** Phase II, the station would employ approximately 185 personnel. Due to the specialized requirements of some positions, a small influx of new workers may be anticipated. Impacts on community services would be related to the particular needs of the generating station and the increase in regional residents caused by the influx of operating personnel and their families. The BBER study (Section 4.11.2.2) also estimated that the operation of **Phase I would stimulate the creation of more than 140 additional jobs throughout the Arrowhead Region; the operation of** the **two-phase** generating station would stimulate the creation of nearly 250 additional jobs throughout the Arrowhead Region.

The Mesaba Generating Station Phases I and II would be nearly twice the size of Phase I alone and would require nearly twice the number of rail and truck deliveries on a weekly basis. Phase II would also increase the plant workforce by approximately 79 percent over Phase I. Therefore, impacts on community services associated with the size of the plant workforce and numbers of trains and trucks accessing the plant would be roughly proportional to these increases.

Law Enforcement

Though concerns have been raised about the vulnerability of nuclear power plants to terrorist attack (Behrens and Holt, 2005), the potential for such attacks on coal-based power plants has not been identified as a threat of comparable magnitude. IGCC power plants do not use or store nuclear materials that may be the targets of a terrorist raid, and the bombing of a coal-based plant by terrorists would not release radioactive substances. However, the sabotage of a large generating station, such as Mesaba, could disrupt power supply in a large region of the country comparable to the Great Northeast Power Blackout in August 2003, which resulted from an accident. Therefore, security for the Mesaba Generating Station would be among the priorities of regional law enforcement agencies.

The relatively small number of permanent jobs created by the Mesaba Generating Station, and stimulated elsewhere throughout the Arrowhead Region, would have the potential for a very small increase in regional population that would have a negligible impact on the regional demand on law enforcement agencies.

Emergency Response

The Mesaba Generating Station would be subject to an Emergency Response Program to be developed in compliance with OSHA Standard 1910.120, which would include an Emergency Response Plan (1910.120(q)). On a regional basis, the incidents and injuries during operation of the generating station as predicted in Section 4.17, Safety and Health are not expected to increase the demand on emergency services and medical facilities substantially beyond available capacities; nor would the operation of the station conflict with regional plans.

The 115- to 135-car unit trains required for coal delivery to the Mesaba Generating Station would range in length from 6,600 to 7,700 feet. Assuming a more conservative travel speed of 10 miles per hour, a unit train would take approximately eight to nine minutes to pass through each grade crossing. Hence, medical and fire emergency response vehicles would be delayed at grade crossings when trains are present. **Under Minnesota law, train crossing times are limited to a maximum of 10 minutes (Minnesota Statute 219.383, Subdivision 3).** The impacts on emergency response vehicles are described respectively for the West Range (Section 4.13.3.2) and East Range (Section 4.13.4.2) below.

Parks and Recreation

Tourism is a key sector of Minnesota's economy, and northern Minnesota is the second-most popular destination for travelers (after the Twin Cities). It is difficult to predict the economic impact of the Mesaba Energy Project on tourism revenues, because tourism in the region has coexisted historically with extensive ore mining, timber harvesting, and associated industrial activities. Surface water resources were lost or degraded by these activities in the past, while other valued surface water resources are the direct result of these past activities, as in the case of the flooded CMP, Hill Annex Mine Pit, and other flooded mine pits. And, it should be recognized that the CMP and other flooded pits could be lost to potential dewatering and mineral extraction in the future. The historic existence of mining operations and industrial facilities in the region has not affected tourism or recreational revenue substantially as reflected in the modest employment growth of 3 percent in this sector between 2002 and 2004 (DEED, 2006b).

The operation of the Mesaba Generating Station would not conflict with regional plans for recreation. Regional parks and recreational opportunities are sufficient to meet the demands of additional workers

drawn to the Arrowhead Region for station operation. Site-specific impacts on recreational uses are described separately for the West Range (Section 4.13.3.2) and East Range (Section 4.13.4.2) below.

School Systems

Regional school systems have sufficient capacities to meet the demands of workers with school-aged children drawn to the Arrowhead Region for station operation.

4.13.3 Impacts on West Range Site and Corridors

4.13.3.1 Impacts of Construction

Law Enforcement

As described in Section 4.13.2.1, the large numbers of construction jobs created by the Mesaba Energy Project, especially during the peak three-year period of 2009 through 2011, could create an influx of temporary residents to the communities between and beyond Grand Rapids and Hibbing. The increased temporary resident population may affect the capacities of the East End patrol district of the Itasca County Sheriff's Office as well as other law enforcement agencies in the vicinity, including the Grand Rapids Police Department, the St. Louis County Regional Sheriff's Office in Hibbing and the Hibbing Police Department. However, the locations where itinerant construction workers would reside during the period of construction would depend on the availability of local lodging, which would effectively disperse workers throughout local communities within an approximate 10- to 50-mile commuting distance of the site (as far away as the City of Virginia).

Emergency Response

Locally, the incidents and injuries during construction predicted in Section 4.17 are not expected to increase the demand on emergency services substantially beyond available capacities of facilities in Grand Rapids and Hibbing. Other impacts would be as described in Section 4.13.2.1.

Parks and Recreation

The construction of the Mesaba Generating Station would not displace designated recreation areas or conflict with local plans. Local recreational opportunities are sufficient to meet the demands of additional workers drawn to eastern Itasca County and western St. Louis County communities for project construction.

School Systems

Impacts would be as described in Section 4.13.2.1.

4.13.3.2 Impacts of Operation

Law Enforcement

Local impacts on law enforcement during the operation of the Mesaba Generating Station at the West Range Site generally would be as described in Section 4.13.2.2. The site is located within the East End patrol district of the Itasca County Sheriff's Office.

Emergency Response

The operation of the proposed generating station would increase demand for emergency response in the City of Taconite. The city's volunteer fire department may need to expand from the current staff of 14 to a staff of approximately 20, which is comparable to the number of fire and emergency personnel in the City of Cohasset. The Cohasset fire and emergency response staff of 21 has served Minnesota Power's Clay Boswell plant successfully for over 25 years with a response requirement of three or four visits a year (Excelsior, 2006b). **The City of Cohasset had a population of 2,481 in 2000 compared to a population of 2,087 for Bovey, Coleraine, and Taconite combined.** Also, to comply with OSHA

Standard 1910.120, the Mesaba Generating Station would be expected to provide and train its own first responders and first aid specialists to respond until local emergency personnel arrive. The Itasca County Director of Emergency Management (Itasca County Sheriff) would have principal responsibility for oversight of response to a major emergency involving the Mesaba Generating Station at the West Range Site. Locally, the incidents and injuries during operation of the generating station, as predicted in Section 4.17, are not expected to increase the demand on medical services substantially beyond available capacities of facilities in Grand Rapids and Hibbing.

As described in Section 4.13.2.2, medical and fire emergency response vehicles would be delayed by eight to nine minutes at a grade crossing when a unit train is passing (assuming train speed is 10 miles per hour). **Under Minnesota law, train crossing times are limited to a maximum of 10 minutes (Minnesota Statute 219.383, Subdivision 3).** Rail lines serving the West Range Site have grade crossings at 17 locations between Taconite and western Grand Rapids, including two crossings in Taconite, one in Coleraine, and eight in downtown Grand Rapids. The Grand Itasca Clinic and Hospital is located on the south side of the railroad tracks, which bisect Grand Rapids from east to west. The Mesaba Generating Station (Phases I and II) would require a maximum of two unit trains per day round trip, which would cause trains to pass through affected intersections four times per day. Hence, trains serving the generating station would create a total of 36 minutes of delay at grade crossings each day on average, which represents a 2.5 percent probability that an emergency vehicle would be delayed at a grade intersection on any given day. Currently, six trains per day on average pass through Grand Rapids in either direction (Excelsior, 2006c). Assuming that these six trains require 3.6 minutes each (assuming 25 miles per hour speed for existing trains, which is typically observed in this region) to pass through a grade crossing, the total effect in combination with the trains serving Mesaba would result in a 4 percent probability that an emergency vehicle could be delayed at a grade crossing in downtown Grand Rapids on any given day.

Parks and Recreation

Local recreational opportunities are sufficient to meet the demands of additional workers and families drawn to the Taconite area for station operation. Currently, the CMP is used for recreational boating and fishing by area residents and visitors as described in Section 3.13.3.1. Excelsior has requested that the pit be closed for recreational uses to meet the security requirements for process water intake facilities to serve the generating station. Therefore, the existing recreational use of the CMP could be displaced if the generating station were located at the West Range Site **and if MNDNR agreed to restrict access to the pit**. **However, Excelsior recognizes that demands for recreational access to the CMP would affect the MNDNR decision and expects further discussion with the agency on the issue. In general, Excelsior intends to 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). DOE and MDOC are confident that agreement on an appropriate solution can be reached between Excelsior and MNDNR that would maintain the security of the cooling water intake structure without adversely restricting access to the majority of the CMP for fishing, boating, and other recreational uses.**

As described in the update to Section 2.2.3.2, the use of enhanced ZLD at the West Range Site would eliminate all potential plant discharges to surface waters including Holman Lake, which has a swimming beach at Gibbs Park. This recreational use of Holman Lake would not be displaced by the operation of the generating station.

Water levels in the CMP would remain stabilized during withdrawals for Mesaba plant operations. As described in Section 3.5.1.1, water levels in the CMP have ranged between 1,290 and 1,309 feet msl in recent years but are increasing. As explained in Section 4.5.3.1, Excelsior expects to maintain water levels in the CMP during power station operations between 1,260 and 1,290 feet

msl in normal weather conditions, with a maximum range of 1,250 to 1,300 feet msl. However, in a typical year, Excelsior expects to maintain the water levels in the CMP at 1,290 ± 2 feet msl. Below a level of 1,260 feet msl, land bridges could be exposed in the CMP that could interfere with boating. Also, as described in Section 4.8.2.2, significant water level reductions could interfere with lake trout natural reproduction in the CMP, as this species deposits eggs in the fall on boulder or cobble habitats in depths usually less than 40 feet and incubation lasts 4 to 6 months after spawning.

School Systems

Impacts would be as described in Section 4.13.2.2.

4.13.4 Impacts on East Range Site and Corridors

4.13.4.1 Impacts of Construction

Law Enforcement

The increased temporary resident population described in Section 4.13.2.1 may affect the capacities of the Hoyt Lakes Police Department, as well as other law enforcement agencies in the vicinity, including St. Louis County Sheriff's Office detachments in Aurora and Virginia, and police departments in Gilbert and Eveleth. However, the locations where itinerant construction workers would reside during the period of construction would depend on the availability of local lodging, which would effectively disperse workers throughout local communities within an approximate 10- to 50-mile commuting distance of the site (as far away as the City of Hibbing).

Emergency Response

Locally, the incidents and injuries during construction predicted in Section 4.17 are not expected to increase the demand on emergency services substantially beyond available capacities of facilities in Aurora and Virginia. Other impacts would be as described in Section 4.13.2.1.

Parks and Recreation

The construction of the Mesaba Generating Station would not displace designated recreation areas or conflict with local plans. Local recreational opportunities are sufficient to meet the demands of additional workers drawn to St. Louis County communities for project construction.

School Systems

Impacts would be as described in Section 4.13.2.1.

4.13.4.2 Impacts of Operation

Law Enforcement

Local impacts on law enforcement during the operation of the Mesaba Generating Station at the East Range Site generally would be as described in Section 4.13.2.2. The site is located within the jurisdiction of the Hoyt Lakes Police Department which is supported by St. Louis County Sheriff's Office detachments in Aurora and Virginia.

Emergency Response

The operation of the proposed generating station would increase demand for emergency response in the City of Hoyt Lakes. Currently, the number of EMT and fire calls for the 25-person cooperative regional EMT and fire department is enough to support the cost of the service (i.e., about 400 runs per year). The Hoyt Lakes city manager estimates that the city can easily absorb up to five hundred new residents without needing a new dedicated Hoyt Lakes EMT or fire department or increasing the number of personnel in the existing cooperative agreement with neighboring communities (Excelsior, 2006b). To

comply with OSHA Standard 1910.120, the Mesaba Generating Station would be expected to provide and train its own first responders and first aid specialists to respond until local emergency personnel arrive. The St. Louis County Director of Emergency Management (St. Louis County Sheriff) would have principal responsibility for oversight of response to a major emergency involving the Mesaba Generating Station at the East Range Site. Locally, the incidents and injuries during operation of the generating station as predicted in Section 4.17 are not expected to increase the demand on medical services substantially beyond available capacities of facilities in Aurora and Virginia.

Rail lines serving the East Range Site have grade crossings at eight locations between Hoyt Lakes and Clinton Township south of Iron Junction, including one crossing in Aurora, one near McKinley, and three near Iron Junction. As described in Section 4.13.3.2, trains serving the generating station would cause a 2.5 percent probability that an emergency vehicle would be delayed at a grade intersection on any given day (assuming train speed is 10 miles per hour). Currently, 12 trains per day on average travel between Hoyt Lakes and Iron Junction in either direction (Excelsior, 2006c). Hence, the total effect in combination with the trains serving Mesaba would result in a 5.5 percent probability that an emergency vehicle could be delayed at a grade crossing on any given day (assuming 25 miles per hour speed for existing trains, which is typically observed in this region).

Parks and Recreation

Local recreational opportunities are sufficient to meet the demands of additional workers and families drawn to the Hoyt Lakes area for station operation. The generating station would not displace designated recreation areas in Hoyt Lakes or otherwise impede recreational uses in the vicinity or conflict with recreational plans.

School Systems

Impacts would be as described in Section 4.13.2.2. The loss of population by Hoyt Lakes following the LTV Industries shutdown in 2001 resulted in the closing of a local school.

4.13.5 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, demands on community services would remain unchanged.

4.13.6 Summary of Impacts

Basis for Impact	No Action	West Range	East Range
Increase the demand on service capacities of local and regional law enforcement agencies.	No change in demand.	Large number of construction workers (>1,500 during three years of peak construction) may affect capacities of local agencies. Security requirements for the generating station may affect local agencies.	Large number of construction workers (>1,500 during three years of peak construction) may affect capacities of local agencies. Security requirements for the generating station may affect local agencies.
Impede effective access by law enforcement services in the region of influence.	No change in existing conditions.	Refer to emergency response access below.	Refer to emergency response access below.
Displace law enforcement facilities or conflict with local and regional plans for law enforcement.	No change in existing conditions.	No displacement or conflict.	No displacement or conflict.
Increase the demand on service capacities of local and regional emergency response agencies.	No change in demand.	Emergency response demands for the generating station may affect local agencies.	Emergency response demands for the generating station may affect local agencies.
Impede effective access by emergency services in the region of influence.	No change in existing conditions.	Potential for delays at rail grade crossings; approximately 2.5% probability of delay at crossing caused by train serving Mesaba plant; 4% probability of delay from combined rail traffic.	Potential for delays at rail grade crossings; approximately 2.5% probability of delay at crossing caused by train serving Mesaba plant; 5.5% probability of delay from combined rail traffic.
Displace medical facilities or conflict with local and regional plans for emergency services.	No change in existing conditions.	No displacement or conflict.	No displacement or conflict.
Increase the demand on local and regional recreational lands and facilities.	No change in demand.	No substantial change in demand.	No substantial change in demand.
Displace designated recreational uses or conflict with local and regional plans for recreation and open space.	No change in existing conditions.	Security requirements for process water intake at Canisteo Mine Pit **may** restrict access and displace existing recreational use of the pit.	No displacement or conflict.
Increase enrollment in local school systems.	No change in existing conditions.	No substantial increase in enrollment.	No substantial increase in enrollment.
Displace school facilities or conflict with local and regional plans for school system capacity and enrollment.	No change in existing conditions.	No displacement or conflict.	No displacement or conflict.

4.14 UTILITY SYSTEMS

4.14.1 Approach to Impacts Analysis

4.14.1.1 Region of Influence

The regions of influence for potential utility impacts from the Proposed Action include locations of existing and proposed potable water, sewer, HVTL, and natural gas utility lines and corridors. Process water supply and potential wastewater impacts to water quality are discussed in Section 4.5, Water Resources.

4.14.1.2 Method of Analysis

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

- Potential for increase in demand directly or indirectly on capacity of public water or wastewater utilities;
- Potential for insufficient water supply capacity for fire suppression demands;
- Disruptions of power or impaired electricity service in the region; or
- Potential for new construction of HVTLs, gas pipelines, and other transmission/conveyance utilities or extensive upgrades to existing utilities resulting in offsite impacts on other resources.

There are different options of routing HVTLs for each site alternative. Each HVTL option was evaluated for impacts and compared within each site alternative. Similarly, impacts associated with proposed natural gas lines, water lines and sewer lines were evaluated for the West Range Site and the East Range Site. Process water supply and industrial wastewater discharges are evaluated in Section 4.5, Water Resources.

4.14.2 Common Impacts of the Proposed Action

The Mesaba Energy Project would provide up to 1,200 MW of power within the Iron Range of Minnesota. This amount of electricity generation could supply approximately 900,000 households (CBO, 2003). Based on CapX2020 projections, this project could supply approximately one-fifth of the additional regional electricity demand projected for 2020 (see Section 3.14.3.2) (CapX2020, 2004).

4.14.2.1 High Voltage Transmission Lines

One bundled connector 230-kV transmission line could carry the peak electrical output of a single phase of the Mesaba Energy Project. A single 345-kV bundled conductor could carry the full 1,212-MW power output from both Phase I and II. However, to satisfy the North American Electric Reliability Council (NERC) N-1 single failure criterion design element (loss of one generator outlet HVTL without interrupting the Power Plant's delivery of its peak output to the point of interconnection [POI]), a minimum of three 230-kV, two 345-kV or a combination of two 230-kV and one 345-kV HVTL would be required (NERC, 2005).

The choice between transforming the output power of Phase I and/or Phase II to 230-kV or 345-kV is not solely dependent upon the distance between the Mesaba Generating Station and the POI, but also upon the voltage at which the substation currently operates and existing "down stream" power flow constraints.

The regional high voltage transmission system on the Iron Range operates mainly at 115-kV and 230-kV. Efforts to bolster Minnesota's ability to exchange power between regions with fewer attendant losses would dictate that new transmission developments in the region operate on higher voltages. Excelsior believes that 345-kV would be the future standard on which such transmission developments on the Iron

Range would be focused and has based its decision for the Mesaba Energy Project interconnection voltage on that premise.

Based upon the results of studies completed to date, MISO has determined that the output of Mesaba Phase I would be fully deliverable within the MISO footprint, and that no network upgrades would be required for either the West or East Range Sites. New text has been added to Sections 4.14.3.1 and 4.14.4.1 regarding the implications of these results. Also, see new text in Section 2.2.2.4 on the latest status of MISO's planning process.

4.14.2.2 Potable Water Supply

During construction of Phase I and II, the peak estimated potable water requirement would be 45,000 gallons per day, based on 1,500 construction personnel using an average of 30 gallons per day. The 30 gallon per day rate is based on estimated rates for construction (31 gallons per day) and heavy construction (20 gallons per day) (http://www.haestad.com/AWDMOnline). The annual usage for the construction phase is estimated at 16.5 million gallons. Once operational, potable water demand would drop to approximately **5,500** gallons per day for Phase I and II**, based on 182 workers and a 30-gallons per day rate (107 personnel for Phase I would consume 3,200 gallons per day and the additional 75 personnel for Phase II would increase potable water consumption by 2,300 gallons per day)**. The annual usage for the facility during normal operations is estimated at approximately 2.7 million gallons. Water used for fire-fighting or fire suppression would come from the process water sources, not the potable water sources, so there will be no potential for insufficient potable water supply capacity during fire fighting or suppression events.

4.14.2.3 Sanitary Wastewater

Approximately 1,500 construction personnel would be expected on site during peak construction activity. Assuming each worker would generate an average of 30 gallons per day of sanitary wastewater, the estimated peak wastewater flows would be approximately 45,000 gallons per day. Sanitary wastewater produced during the operation phase of the project would be reduced due to the smaller operational work force of both phases (approximately 182 workers), resulting in approximately 5,500 gallons of wastewater per day **(107 personnel for Phase I would generate 3,200 gallons per day and the additional 75 personnel for Phase II would increase wastewater generation by 2,300 gallons per day)**. To accommodate additional flows as a result of additional people on site during tours, special maintenance/construction activities, and outages, the capacity of the system would be designed to accommodate 7,500 gallons per day of sanitary wastewater. This flow is based on the facility providing restrooms, locker rooms, showers and break room facilities. Wastewater would contain 200 to 250 milligrams per liter BOD, 220 to 270 milligrams per liter TSS and 6 to 8 milligrams per liter total phosphorous. Impacts of discharge of water with this quality to surface water are discussed in Section 4.5.

4.14.2.4 Natural Gas

Natural gas would be used to start up Phase I and Phase II and as a backup fuel when syngas from the gasifiers is unavailable. When operating on natural gas, the power plant would not achieve the nominal **600** $MWe_{(net)}$ output attainable when operating on syngas. This is due, in part, to the lack of nitrogen that would otherwise be available for nitrogen dilution and power augmentation when operating the ASU to supply oxygen to the gasifiers. The maximum one day natural gas flow is expected to be about 105 million standard cubic feet of gas per phase of the Mesaba Generating Station. The Proponent would purchase natural gas through a series of contracts with gas suppliers in order to obtain the lowest overall fuel price and best contract conditions for this commodity. Due to the volume of natural gas required to fuel the Mesaba Generating Station, the Proponent would install and operate accurate metering equipment to confirm the extent of such purchases. The Proponent would contract with either GLG or NNG or both

entities for natural gas transportation capacity for quantities and at pressures sufficient to operate the Mesaba Generating Station at its limited capability when firing its backup fuel.

Minnesota Rule 4415.0010, Subpart 32, defines the permitted gas pipeline "route" as "the proposed location of a pipeline between two end points. A route may have a variable width from the minimum required for the pipeline ROW up to 1.25 miles." Excelsior is requesting a narrower 0.5-mile wide route for each of the proposed gas pipeline corridors. Within each alternative route, a minimum 100-foot wide temporary ROW for construction of the pipeline and a minimum 70-foot wide permanent ROW would be provided. New pipeline segments would consist of 16-inch diameter steel pipe, buried in trenches approximately 72 inches deep (Figure 4.14-1).

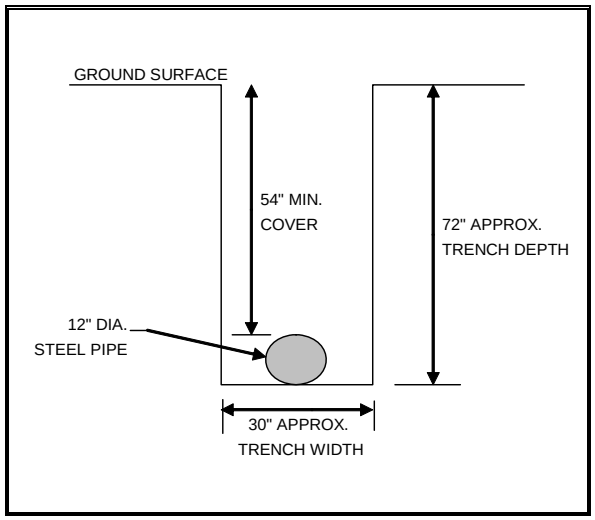

Figure 4.14-1. Typical Cross Section, Natural Gas Pipeline Open Trench Installation

The pipeline would fall under the jurisdiction of the Minnesota Office of Pipeline Safety. All facilities proposed for the natural gas pipeline project would be designed, operated and maintained in accordance with DOE Minimum Federal Safety Standards in Title 49, CFR Part 192.

4.14.3 Impacts on West Range Site and Corridors

4.14.3.1 High Voltage Transmission Lines

As discussed in Chapter 2, the West Range Site would connect to the Blackberry Substation via one or more HVTL routes depending on the voltage allowed. There are three plausible routes for HVTLs from the Power Plant to the Blackberry Substation. Plan A would connect to the substation using 345-kV lines, utilizing either route WRA-1 (preferred route) or WRA-1A (alternative route) (see Figure 2.3-4). If Plan A was not found to be viable, Plan B would be constructed to connect the Mesaba Generating Station to the Blackberry Substation using a combination of a double 230-kV lines for Phase I (WRB-1 (preferred) or WRB-1A (alternative)) and a single 230-kV or 345-kV line for Phase II (WRB-2 (preferred) or WRB-2A (alternative)). The **plans** and alternative routes are shown in Figure **2.3-4 (Chapter 2),** described in **Section 2.3.1.5, and listed in** Table 4.14-1**.**

Table 4.14-1. HVTL Route and Voltage Options for the West Range Site

Route	Plan A Preferred*	Plan A Alternative	Plan B Preferred*	Plan B Alternative
1 (also known as WRA-1 or WRB-1)	Double 345-kV (both phases) [Phase I initially at 230-kV]		Double 230-kV Phase I	Single 230-kV Phase II
1A (also known as WRA-1A or WRB-1A)		Double 345-kV (both phases) [Phase I initially at 230-kV]	Single 230-kV Phase II	Double 230-kV Phase I
2 (also known as **WRB**-2A, utilizes the 28L and 62L corridors)			Single 345-kV Phase II Alternative	Single 345-kV Phase II Alternate

***Preferred by Project Proponent (Excelsior)**

Plan A (WRA-1)

Plan A would utilize double-circuit 345-kV HVTLs, carried on single-pole steel structures. Single-pole structures are taller than wooden H-frame structures or other alternatives, but have longer spans and require less ROW. Longer spans between poles also mean fewer poles would be required compared to other structure types.

Excelsior estimates that approximately 80 single-pole HVTL structures would be required along the alignment ranging in height from 132 to 168 feet. Approximately 10 structures would be 150 feet or taller. The new structures would exceed the height of the existing 115-kV HVTL structures by a maximum of 70 to 85 feet. The existing abandoned section of 45L would be removed. The 115-kV 20L must be overbuilt or moved to the existing cross arms under the 83L. The line changes in the 83L/20L ROW would likely result in 1 mile of taller transmission structures for the double-circuit 345-kV line with its 115-kV underbuild (Excelsior, 2006b).

WRA-1 would follow two segments of existing ROW: 1) approximately 1.6 miles of existing ROW between the southern boundary of the West Range Site property and the retired Greenway Substation, and 2) approximately 1 mile of existing ROW shared with MP's 230-kV 83L and 115-kV 20L HVTLs just before their interconnection with the Blackberry Substation. This route would require acquisition of approximately 6 miles of new ROW between the former Greenway Substation and the point of intersection with MP's 83L and 20L HVTLs.

Plan A-Alternative (WRA-1A)

The alternative HVTL route, WRA-1A, would follow the same alignment as the preferred route for the first 3.2 miles from the southern boundary of the West Range Site property. This route would also share 0.9 miles of ROW in common with the 115-kV 62L route just prior to its interconnection with the Blackberry Substation.

The major difference between this route and the preferred route is that it runs 0.44 miles east of and parallel to Twin Lakes Road. It would require approximately the same length of new ROW (approximately 5.8 miles) and would be 0.5 mile shorter in overall length than WRA-1.

Plan B Preferred Route (WRB-1 (Phase I) and WRB-2 (Phase II))

In the event MISO would determine that the 345-kV transmission infrastructure was incompatible with regional transmission planning initiatives, or Excelsior determines that the timing for building 345-kV transmission in the region would be outside the proposed timeframes, then Excelsior would construct and install the 230-kV transmission scheme. **Excelsior's** preferred route **(WRB-1)** for the double-circuit 230-kV HVTLs for Phase I would be the same as route WRA-1 **(Plan A)**. However, the single-pole HVTL structures required for 230-kV HVTLs would be shorter, ranging in height from 107 to 143 feet. Approximately 10 structures would be 125 feet or taller.

An **electrical bus** is a physical electrical interface where many devices share the same electric connection. This allows signals to be transferred between devices (allowing power to be shared). A **busbar** is an electrical conductor that makes a common connection between several circuits.

Excelsior's preferred route for Phase II would be the route not selected for the double-circuit 230-kV HVTLs in Phase I of Plan B. Thus, assuming route WRA-1 were approved as the preferred route (WRB-1) for Phase I, the preferred route (WRB-2) for a single-circuit 230-kV HVTL in Phase II would be the same route as WRA-1A in Plan A.

Plan B – Alternative Route (WRB-1A (Phase I) and WRB-2A (Phase II))

For the alternative route in Phase I for Plan B**,** the 230-kV double circuit HVTLs would follow **the same alternative** route **(**WRA-1A**) as Plan A**. The structures and new ROW requirements would be comparable to those described for WRB-1.

The alternative route for Phase II would follow route WRB-2A, which combines segments from two existing HVTL corridors over 18 miles. These corridors (45L/28L and 62L/63L) are presently occupied by 115-kV HVTL structures owned by MP. Excelsior would use delta configuration 345-kV structures with an underbuild feature that would carry the existing 115-kV HVTLs below the arms holding the 345-kV conductors (Excelsior, 2006b).

Switchyard

The electrical layout of the switchyard for Phase I would be designed for 230-kV. Prior to commencing Phase II, additional autotransformers, a 345-kV busbar and associated breakers would be added to convert Phase I to a 345-kV operation.

Network Upgrades

Original text and Table 4.14-2 in the Draft EIS relating to potential network upgrades for the West Range Site have been deleted based on the results of MISO studies completed to date. MISO has determined that the output of Mesaba Phase I would be fully deliverable within the MISO footprint, and that no network upgrades would be required for the West Range Site. As discussed in Section 2.2.2.4, the original System Impact Study conducted in June 2006 had indicated a need for network upgrades between the Boswell and Riverton substations. More recently, an Optional System Impact Study conducted for Mesaba Phase I on behalf of MISO (Siemens PTI, 2008) confirmed that no network upgrades would be required to interconnect and inject 600 MW of power from Mesaba Phase I to the regional electric grid at the Blackberry Substation. The Optional System Impact Study was justified (1) by the addition of MISO Transmission Expansion Plan Projects to the regional electric grid after the original June 2006 System Impact Study for Mesaba Phase I had been completed, and (2) by the commencement of construction of energy-intensive projects in the immediate vicinity of the IGCC Power Station.

MISO studies are underway to identify network upgrades required to ensure that Mesaba Phase II would be deliverable within the MISO footprint at the West Range Site. A Feasibility

Study Report prepared by MISO's Transmission Asset Management (MISO, 2006) provided the starting point for such efforts by identifying the potential number and location of HVTLs that would exceed their rated capacity if the total electric power output of Mesaba Phase II (i.e., nominally 600 MWnet) was injected at the Blackberry Substation. Since completion of the Feasibility Study Report, MISO has completed System Impacts Studies for Mesaba Phase II, but each time the results of such studies have been rendered useless due to changes in the status of projects queued ahead of it (Sherner, 2009). Regardless of the uncertainties, it is likely that additional 230-kV and/or 345-kV network upgrades would be required to resolve local injection issues at the West Range Site and to ensure the full power deliverability of Mesaba Phase II to the regional grid.

With proper planning and conformance to MISO requirements, the addition of new HVTL lines and corridors would not have an adverse effect on the existing electric grid. During construction of HVTLs, existing electric service would remain uninterrupted to customers. Upgrades at the Blackberry Substation and other regional substations as required by MISO would ensure that interconnection of the Mesaba Energy Project would have no adverse impact on regional electricity transmission. The Mesaba Energy Project would utilize at least two HVTL routes to tie-in to the existing electricity grid, ensuring that a single failure of a line would not cause service interruption.

4.14.3.2 Potable Water Supply

Alternative 1 (Obtain Potable Water from the City of Taconite)

Excelsior's preferred alternative for potable water supply to the Mesaba Generating Station would be to connect to a municipal water system. The closest potable water source to the West Range Site is the City of Taconite, located 2.5 miles south of the West Range Site. To provide water to the Mesaba Generating Station, an 8-inch diameter pipeline would be constructed from the existing city's system to the plant. The preferred route (shown in Figure 2.3-3) is the most efficient route and installation would be more economical because it would be bundled along with pipelines serving other purposes (subject to required pipeline separation distances). The other alternative route considered would have extended the pipe east from the city to US 169, run parallel along the west side of US 169 to CR 7, parallel the west side of CR 7 and crossed under the highway to the generating station footprint. This routing is longer, would require more piping, and increased the cost of installing the pipe. A booster station would be needed near the connection point to the city water distribution system in order to provide the required water pressure to the Plant. The booster station would pump water at a variable rate from 20 to 100 gallons per minute, due to the fluctuations in water use that would occur throughout the day at the Mesaba Generating Station.

The Mesaba Energy Project would require a peak usage rate of 16.5 million gallons per year during construction and average roughly 2.7 million gallons of potable water during operations. The city of Taconite is presently authorized via MNDNR Water Appropriation Permit No. 1976-2206 to withdraw a total of 20 million gallons of groundwater per year to provide for its potable water needs. The most recently published records from the MNDNR show that between 1988 and 2005, inclusive, the Taconite's groundwater withdrawal rates varied between 11.3 and 17.3 million gallons per year. This indicates that, at present, the Taconite water supply system does not have sufficient capacity to supply potable water to the Mesaba Energy Project during the construction phase and that the system will be close to full capacity once operations of the Mesaba Energy Project begin.

In March 2007, the City of Taconite prepared and adopted a Water Management Plan (SEH, 2007) that identified the improvements required to supply for the needs of the community and the Mesaba Energy Project. These improvements include two additional groundwater wells, additional pumping facilities and booster stations, along with future expansion of water storage facilities. If these system improvements are completed by the time construction begins on the Mesaba Energy Project, there will be sufficient water supply capacity, without impacting the existing firefighting and community needs.

However, if these improvements are not completed prior to construction, Excelsior would provide potable water to meet construction workers' needs by bringing in tanker trucks or through development of its own wells.

Though fire suppression water demands have not been calculated for the project, it is likely that Excelsior would provide a water tower or other storage for fire suppression use and that the source of this water would be the same as the process water (mine pits) and not the City of Taconite drinking water supply system.

Due to the possible expansion of the water system to the north, the City of Taconite is considering adding a residential/industrial sub-division on the south side of CR 7 south of the West Range Site. The City has estimated the potable water requirement for the sub-division to be approximately 10,000 gallons per day with an annual use of 4 million gallons. The City has the capacity to supply water to both the proposed sub-division and the power plant after completion of the system improvements. Subsequently, there would be no adverse impact on current potable water supplies under this alternative.

Residential water use fluctuates widely over the course of a day so that a 50,000-gallon elevated water tank tower would be required to provide adequate flow and pressure for high use periods. If the city decides to install the tower, the size of the booster station pumps would need to be increased to accommodate the increased head pressure. The pumps in the booster station would be increased to a 200-gallon per minute capacity. The booster station would pump water into the tower and the tower would provide water to both the subdivision and the power plant. Water from the proposed water tower could also flow back to the city when the pumps were not running and provide additional water capacity to the city's existing system. Due to the higher elevation of the proposed tower, water pressure must be reduced prior to entering the existing system. The City of Taconite would own and maintain the booster station, pipeline, and tower and Excelsior would enter into an agreement with the city to purchase water (Excelsior, 2006b).

Construction of the potable water pipeline and booster station would require a full construction season. To ensure that potable water is available at the West Range Site during peak construction activities, construction of the pipeline and booster station must be initiated as soon as Excelsior obtains the preconstruction permits for the power plant. Until such time as potable water could be obtained from the City of Taconite, potable water could be supplied by tanker truck.

Alternative 2 (Construct On-Site Water Treatment Facility)

Alternative 2 would consist of constructing an on-site treatment facility with the capacity to treat 7,500 gallons per day of water from the CMP and HAMP Complex to provide potable water to the Mesaba Generating Station. A micro-filtration system would be used to treat raw water pumped to the site from the local mine pits at a rate of 10 gallons per minute to meet potable drinking water standards. This treatment rate was determined based on a run time of approximately 12.5 hours to provide the daily water requirement of the facility. Construction of a building to house the filtration system, a 5,000-gallon underground reservoir, and pump would be required. The pump would supply the water from the reservoir to the facility at the required flow rate and pressure. Excelsior would own the water treatment facility and be responsible for the operation and maintenance of the facility (Excelsior, 2006b).

The EPA classifies any facility that provides potable water to 25 or more of the same individuals every day as a non-transient non-community public water supply system. Because the Mesaba Generating Station would employ 182 permanent employees it would fall into that classification. Therefore, the treatment facility must be operated by a certified water operator and the treated water must meet all standards of the Federal Safe Drinking Water Act and the Minnesota Department of Health. **Also, plans and specifications of any new water treatment facility would require MDH approval prior to construction.**

During construction of the Mesaba Generating Station, potable water would not be available until the process water features were completed. Therefore, potable water would be supplied to the site by other means (e.g., tanker trucks) during construction.

The preferred alternative for obtaining potable water at the West Range Site is to connect to the City of Taconite potable water system.

4.14.3.3 Sanitary Wastewater

Sanitary wastewater from the West Range Site could be addressed through the following alternatives.

Wastewater Alternative 1 (On-Site Treatment)

The first alternative would be to construct a stabilization pond WWTF to treat 45,000 gallons of sanitary wastewater per day (the maximum projected flow from Phase I and Phase II). Once Phase I of the power plant is placed into operation, the WWTF would receive a maximum of 7,500 gallons of sanitary wastewater per day due to reduced staff as compared to the construction period. Due to the decrease in flow, part of the WWTF would be closed and abandoned in accordance with Minnesota Rules. Other modifications would be made to the WWTF at that time to link it to the power plant's domestic wastewater collection system.

Once treated, effluent from the WWTF would be routed off-site through 1) an 8-inch diameter gravity sewer pipeline to Little Diamond Lake (approximately 1.4 miles south-southeast of the Plant); or 2) via a cooling tower blowdown line leading to Canisteo Mine Pit and/or Holman Lake.

The MPCA has regulatory requirements for discharges to surface water. A new NPDES permit and a part-time licensed operator would be required in order to discharge treated sanitary wastewater to surface water. Section 4.5, Surface Water, discusses these regulatory requirements and potential impacts to surface water.

Wastewater Alternative 2 (Tie-in to Municipal Wastewater System)

The second option to dispose of sanitary wastewater would be to connect the Mesaba Generating Station to the CBT wastewater collection system connecting to the WWTF. This would consist of constructing approximately 1.9 miles of 12-inch gravity sewer pipeline, a pump station, and 2,400 feet of force main from the West Range Site, in a southerly direction, to the City of Taconite's main pump station, located in the northeast corner of the city (shown in Figure 2.3-3).

This alternative is **Excelsior's** preferred alternative as it holds several advantages over the on-site treatment option. First, the gravity sewer system would be an asset to the City of Taconite, allowing future connections to other residential, commercial, or industrial establishments north and east of the city. Second, Excelsior would not be required to hire an operator to monitor the system. Third, potential concern surrounding the addition of a new outfall discharging effluent from a sanitary wastewater treatment system to public waters would be avoided.

One issue concerning Taconite's collection system is the amount of inflow and infiltration 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 natural pond system. The amount of I/I entering the Taconite collection system can cause the natural pond system to overflow, releasing untreated wastewater into nearby surface waters. Larger pumps could be installed in the pump station to remedy this problem, or the City's collection system could be rehabilitated to prevent extraneous water from entering the sewers.

The addition of new flow to the Taconite collection system could possibly exacerbate existing overflow conditions. As a commercial user of the system, sanitary sewer revenue from the Mesaba Project could provide additional sources of funding for providing the necessary upgrades. With the

necessary upgrades put in place by the sewer authority, the Mesaba Energy Project would have no adverse impact on the capacity or operation of the current sanitary sewer system.

As discussed above, the CBT WWTF has the capacity available to treat sanitary wastewater from the Mesaba Energy Project; however, peak flows in collection sewers during wet-weather conditions can exceed the capacity of Taconite's main wastewater pump station and result in untreated sewage overflowing into a nearby wetland upstream of the Swan River. Also, during periods of heavy rainfall, the CBT collection system just north of Trout Lake can become overwhelmed by incoming wastewater. At such times, overflow pumps are activated to transfer untreated wastewaters into an adjacent holding tank. If the tank's capacity is exceeded, untreated wastewater can overflow into Trout Lake.

Therefore, in its commitment announced 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 Energy, 2008). 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. Such improvements would be a beneficial impact to regional water quality.

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.

4.14.3.4 Natural Gas

Natural gas would be supplied through a direct connection to the GLG Pipeline located approximately **12** miles due south of the West Range Site and/or from NNG's tapping point located in La Prairie, Minnesota, approximately **10** miles west-southwest of the West Range Site. Excelsior would contract with either or both entities for natural gas transportation capacity for quantities and at pressures sufficient to operate the power plant at maximum load while operating on backup fuel. There is sufficient regional capacity of natural gas to supply the Mesaba Energy Project.

There are three possible routes for the natural gas line (Figure 2.3-4 and Table 4.14-**2**). **Excelsior's** preferred alternative, Alternative 1, would have a permanent ROW length of approximately 13.2 miles, of which 10.7 would be new corridor. Alternative 2 would be 15 miles in length of which 4.5 miles would be new corridor. Alternative 3 would be 12.5 miles in length, of which 5.5 would be new corridor. All three alternatives would require four stream crossings. The Alternative 1 route would have the least number of residential dwellings within 300 feet of the proposed pipeline. The natural gas lines installed for the Mesaba Energy Project would be governed by the safety, design, and construction requirements of state and Federal pipeline safety offices. Subsequently, all three routes would have no adverse impact on existing natural gas service and would potentially expand service and capacity in the area of the West Range Site.

As described in Section 2.3.1.4, after publication of the Mesaba Draft EIS, the Minnesota PUC issued a Pipeline Route Permit dated April 16, 2008 for Nashwauk Public Utilities Commission to construct a proposed natural gas pipeline. The new pipeline would follow essentially the same alignment as proposed by Excelsior for its natural gas pipeline Alternative 1 between Blackberry and Taconite near the West Range Site. From Taconite, the proposed pipeline would follow an additional 9-mile alignment to the City of Nashwauk. Excelsior intends to enter into negotiations with Nashwauk Public Utilities Commission for the purchase of natural gas from the approved

pipeline and has stated that, if the pipeline is constructed in time to supply the requirements for the Mesaba Energy Project and negotiations are successful, Excelsior would not construct a separate pipeline for the Mesaba Energy Project.

Table 4.14-2. Environmental Comparison of Natural Gas Pipeline Alternatives – West Range Site

Environmental Attribute		Alternative 1	Alternative 2	Alternative 3
Pipeline Length	Existing Corridor	2.5 miles	10.5 miles	7 miles
	New Corridor	10.7 miles	4.5 miles	5.5 miles
Residential Dwellings	Pipeline within 300 feet	3	5	22
Water Crossings	Stream	4	4	4
	Lake	0	0	0

4.14.4 Impacts on East Range Site and Corridors

4.14.4.1 High Voltage Transmission Lines

Excelsior's transmission plan for the East Range Site consists of constructing two new 345-kV HVTLs to link the plant to the Forbes Substation POI. Even though one 345-kV HVTL is sufficient to accommodate the full load output of Phase I and Phase II, two lines must be constructed concurrently with the installation of Phase I to address the single failure criterion. Each line would follow existing corridors now occupied by 115-kV HVTLs owned by MP that interconnect the Syl Laskin Generating Station with the Forbes Substation**. The routes are shown in Figure 2.3-8 (Chapter 2) and described in Section 2.3.2.5**.

The **transmission plan** would utilize both the existing 39L/37L and 38L corridors. The 39L/37L corridor would be expanded by 30 feet on one side **for Excelsior's preferred alternative**. **Excelsior's** preferred configuration for the two 345-kV/115-kV double circuit HVTLs would require the acquisition of two new ROW segments. One new segment would be approximately 2 miles in length and travel alongside the 43L corridor and connect the power plant to the initiation point of the 39L and 38L corridors. The second section of new ROW would be approximately 2 miles in length and would link the 39L and 37L corridors.

The alternative configuration would be nearly the same as the preferred configuration. The only difference is that the 38L corridor would be widened by 30 feet on one side instead of widening the 39L/37L corridor.

According to MISO, there would be no additional transmission infrastructure required for these routes beyond those elements necessary to connect to the substation at the Forbes 230-kV bus. Because both alternatives would use or expand existing HVTL ROWs and the construction of new lines in these corridors would not interrupt existing electric service, neither alternative would have an adverse impact on the local electricity supply.

Based upon the results of studies completed to date, MISO has determined that the output of Mesaba Phase I would be fully deliverable within the MISO footprint, and that no network upgrades would be required for the East Range Site. The System Impact Study (Siemens PTI, 2006a) concluded that no network upgrades are required; however, the study was based on a maximum winter output of 552 MW. A sensitivity analysis conducted by the same contractor that performed the East Range Site System Impact Study, and using the same base models and methodology as that study, demonstrated that no injection limits requiring network upgrades were

identified if the East Range IGCC Power Station would distribute 600 MW (Siemens PTI, 2006b and Sherner, 2006).

4.14.4.2 Potable Water Supply

There are two alternatives for supplying potable water to the East Range Site.

Alternative 1 (Obtain Water from the City of Hoyt Lakes)

Excelsior's preferred alternative is to connect to the Hoyt Lakes Water System. Under this alternative, a 6-inch pipeline approximately 11,000 feet in length would connect the plant to the 12-inch water main that serves MP (Figure 2.3-7). The proposed routing would require a portion of the water main to cross Colby Lake. Directional drilling and installation of high-density polyethylene pipe would be assumed for the portion of the water main to be installed under Colby Lake. However, if bedrock were encountered beneath the lake, directional drilling could not be used and instead would be installed by microtunneling. The proposed pipeline would provide the required flow and pressure to Phases I and II without the need for a booster station. The City of Hoyt Lakes potable water treatment plant has sufficient capacity to provide the water needs of the power plant. Although fire suppression water demands have not been calculated for the project, it is likely that Excelsior would provide a water tower or other storage for fire suppression use and that this additional water use would not cause the City of Hoyt Lakes to exceed its current water allocation.

MP has discussed with the City the possibility of increasing their water usage in the future, but has not submitted a request at this time. The City has the potential to provide water to other industries that may locate to the north of the East Range Site. If the water demand from the existing 12-inch water main is increased, the flow and pressure of the water supplied to the power plant may be decreased, requiring Excelsior to consider adding a booster station and/or storage tower.

Under this alternative, the City of Hoyt Lakes would own and maintain the pipeline and Excelsior would enter into an agreement with the City to purchase water. This is the preferred alternative for obtaining potable water for the East Range Site. With proper planning and design, this alternative would not have an adverse impact on existing potable water supplies.

Alternative 2, On-Site Potable Water Treatment Facility

The second potable water supply option is the construction of an on-site water treatment facility with the capacity to treat and supply 7,500 gallons per day of water for Phase I and Phase II, combined. A micro-filtration system would be used to treat a portion of the process water procured for project cooling systems that would be pumped from nearby mine pits near the East Range Site. Chemicals, in addition to chlorine, may be required for this treatment based on the chemical constituents in the source water and would be determined during the engineering design phase of the project.

One advantage of this alternative is that Excelsior would not have to purchase water from the City and would have control over its own water supply. However, Excelsior would be required to operate, maintain and upgrade the water treatment system per Minnesota Department of Health standards.

4.14.4.3 Sanitary Wastewater

Sanitary wastewater would either be discharged to the Hoyt Lakes POTW or to on-site septic tanks coupled to a leach field. **Excelsior's** preferred alternative is to tie-in to the POTW (shown in Figure 2.3-7). This alternative would consist of constructing approximately 1.8 miles of 12-inch gravity sewer pipeline, a pump station, and approximately 0.5 mile of 4-inch force main. The wastewater pipeline would parallel the high voltage power line easement along the west side of the proposed property boundary, south to Colby Lake. The 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 POTW has adequate capacity to treat

wastewater from the Mesaba Energy Project and the project would not pose an adverse impact on the current system.

4.14.4.4 Natural Gas

The only natural gas supplier within the immediate vicinity of the East Range Site is NNG. NNG's existing pipeline serves CE and abuts the East Range Site on its eastern boundary. In order to provide natural gas in the quantity and at the pressure required to supply Phase I and Phase II, the following would be required:

- Installation of approximately **28.8** miles of new, 16- to 24-inch pipe placed within the existing ROW for the 10-inch branch line currently serving CE.
- Addition of a new 2,500-horsepower compressor at the existing point where the GLG and NNG pipelines interconnect.
- Installation of an ultrasonic meter facility to serve the power plant.

For the East Range Site, the proposed natural gas pipeline (see Figure 2.3-8) would be constructed, owned and operated by NNG, and would be an extension of NNG's interstate pipeline system. As an interstate pipeline, the East Range natural gas supply pipeline would not be subject to Minnesota Pipeline Route Permit requirements, but would be permitted by NNG under the FERC review process. The installation of this pipeline would provide the benefit of providing additional natural gas infrastructure in the region. The addition of this new pipeline would comply with all Minnesota and Federal natural gas pipeline safety standards and would not have an adverse impact on existing natural gas supplies.

4.14.5 Impacts of the No Action Alternative

Under the No Action Alternative, expansion of commercial, industrial and residential areas would continue to occur in the vicinity of the West Range and East Range Sites. Expansion of potable water lines, sanitary sewer, electrical power and natural gas would continue to occur as a result of overall economic growth in the area. It is probable that some of the expansion, such as the proposed residential growth north of the West Range site may proceed at a slower pace due to the lack of cost sharing with the Mesaba Energy Project.

4.14.6 Summary of Impacts

Basis for Impact	No Action	West Range	East Range
Cause potential for increase in demand directly or indirectly on capacity of public water or wastewater facilities.	No additional demand on public water or wastewater treatment would occur, except for that posed by other planned projects in the region. The Taconite wastewater collection system is in need or repair and upgrade, which would need to occur regardless of the outcome of the Mesaba Energy Project. However, the upgrades may occur at a slower pace in the absence of cost-sharing that could occur if the Mesaba Energy Project at the West Range went forward.	The Mesaba Energy Project would not adversely affect sanitary wastewater treatment capacity. The wastewater collection system in Taconite currently overflows during heavy rain and high water table events, which may be exacerbated by new flow from the West Range Site. **To address this issue, Excelsior agreed to make significant capital improvements to the CBT WWTF.** The Taconite potable water system would need to be expanded to accommodate the project and anticipated future growth. This planned expansion has been adopted by the City of Taconite.	The East Range Alternative would not adversely impact existing potable and sanitary sewer systems, as both have capacity to serve the project.
Cause potential for insufficient water supply capacity for fire suppression demands.	No additional demand on existing potable water systems serving the Taconite and Hoyt Lakes areas, except for that posed by other planned projects in the region.	The mine pits would be the source of water for fire suppression; therefore there would be no increased demand from public water systems. The mine pits have sufficient capacity for fire-fighting needs.	The mine pits would be the source of water for fire suppression; therefore there would be no increased demand from public water systems. The mine pits have sufficient capacity for fire-fighting needs.
Cause disruptions of power or impaired electricity service in the region.	Power disruptions due to tie-in of the Mesaba Energy Project to the grid would not occur. Power disruptions due to mishaps and force majeure may still occur in the region. The region would not benefit from the additional source of power from the Mesaba Energy Project.	The project would tie-into the existing grid without service interruptions and would ensure necessary upgrades to substations and other infrastructure are installed to prevent system failures. The project would provide another source of power for the region that could reduce outages and help meet future demand.	Same as West Range site.
Cause potential for new construction of HVTLs, gas pipelines, and other transmission/ conveyance utilities or extensive upgrades to existing utilities resulting in offsite impacts on other resources.	No new construction of utility lines would occur except for those for other planned projects in the region.	The project's proposed utility lines would be constructed in accordance with all Federal and state regulations and would pose no adverse impact on other resources.	The project's proposed utility lines would be constructed in accordance with all Federal and state regulations and would pose no adverse impact on other resources.

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4.15 TRAFFIC AND TRANSPORTATION

4.15.1 Approach to Impacts Analysis

4.15.1.1 Regions of Influence

The region of influence for transportation resources is described in terms of the existing public roadways in the vicinity of the proposed sites and the rail lines that would service the Mesaba Generating Station. Both alternative sites under the Proposed Action would be located within the Mn/DOT District #1 planning area. The proposed sites and associated project components (i.e., new utility lines) are located either in Itasca County or St. Louis County.

With respect to roadways, discussions of traffic impacts were limited to the vicinity of the alternative sites for the Mesaba Generating Station (i.e., Phases I and II). Any reference to the proposed utility corridors (e.g., HVTL, natural gas pipelines) and their impacts to local traffic were generally discussed and specific roads were not identified.

The primary rail lines that serve northeast Minnesota are the BNSF and CN railways. Discussions of rail impacts were focused on the potential routes provided by these railways that would serve the Proposed Action. More specifically, the region of influence for rail lines servicing the West Range includes the BNSF line from Grand Rapids to the project site. For the East Range site, the region of influence includes the CN line from Clinton Township to the project site.

4.15.1.2 Method of Analysis

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

- Increase in traffic volumes so as to degrade level of service (LOS) conditions to unacceptable levels (e.g., increase traffic delays and cause significant congestion);
- Increase in rail traffic compared to existing conditions on railways in the region of influence; and
- Conflicts with local or regional transportation plans.

Impacts to vehicular traffic on the local roadway network are analyzed based on three elements:

- Existing traffic volumes;
- “No Build” volumes – estimated future traffic volumes *without* the project; and
- “Build” volumes – estimated future traffic volumes *with* the project (“No Build” volumes in addition to the project-generated traffic volumes).

Existing traffic data for the West Range and East Range project areas were provided by Mn/DOT and discussed in Section 3.15.2. In addition to the AADT volumes, historical annual growth rate factors for traffic were estimated to forecast future traffic volumes. Based on the projected traffic volumes, LOSs, as defined in Section 3.15.2, were then estimated using the Highway Capacity Manual guidelines.

In this section, impacts related to the use of rail transport were examined in terms of rail traffic densities. Impacts to emergency vehicles and safety issues at railroad crossings are discussed in Sections 4.13, Community Services and 4.17, Health and Safety, respectively.

The following planning documents were reviewed to identify any potential conflicts with transportation projects: *Minnesota Statewide Transportation Plan (2003-2023); Northeast Minnesota Long Range Transportation Plan (2008-2030); Itasca County 5-Year Plan for Highway Improvement Projects; Itasca County Comprehensive Land Use Plan;* and *Zoning Ordinance of St. Louis County*.

4.15.2 Common Impacts of the Proposed Action

Potential impacts to transportation resources would arise during the construction and operation of the Mesaba Generating Station as a result of additional employee vehicles and material deliveries. The potential impacts include increased rail and vehicular traffic that could lead to traffic congestion and delays and increased road hazards.

The distribution of site-generated trips (i.e., traffic patterns) is based on the characteristics of the road network, existing traffic patterns, historical and projected development in the area, locations where workers would likely reside, and the location of other potential trip origins and destinations.

4.15.2.1 Impacts of Construction

Excelsior's schedule has been revised to reflect current planned construction of Phase I from 2010 through 2014 and Phase II from 2012 through 2016. Therefore, the years stated throughout this section have been adjusted accordingly. Phase I construction would require approximately 48 months, during which time the size of the work force would vary. Construction for Phase I is anticipated to start **in 2010** and end **in 2014**. Phase II construction is expected to **begin** in **2012** and operation is expected to begin in **2016**. The majority of the construction activities are expected to occur between 7:00 am and 5:30 pm, Monday through Saturday. In the event that additional hours would be necessary to complete critical construction activities, a second shift during the warm weather season may be used.

Project-generated traffic volumes during construction would be produced by employees commuting to and from the job site, as well as owner, contractor, supplier, regulator, and service vehicles (including trucks of various sizes) doing business at the site. Excelsior has estimated the number of personnel and supply/material deliveries, which is discussed in further detail below. These estimates are based on the potential number of workers on-site for each construction craft and trade, the number of management staff on-site, truck deliveries of equipment, heavy equipment deliveries, and deliveries of site preparation materials.

Construction material and equipment would be delivered to the construction site by truck and rail. It is expected that semi-trailer trucks would be required to initially bring material to the construction site. This number may be reduced depending on availability of rail delivery once the rail spur is constructed (anticipated to be completed near the start of the construction period). The rail spur would also allow major plant equipment to be delivered to the construction site. It is anticipated that because project-related rail traffic during construction would be limited to approximately two trains per week, impacts to baseline rail traffic conditions would be minimal.

Construction Traffic Volume

Staff and Visitors

It is estimated that the work force on site would peak at approximately 1,500 personnel, which includes Excelsior staff and visitors. The peak period for Phase I is expected to occur from **approximately 2011** through **2012**.

For the purposes of the traffic analysis, it is assumed that there would be a 20 percent vehicle reduction as a result of car pooling (SEH, 2006c). Therefore, it is estimated that there would be a total of 1,200 vehicles per day during the peak construction period, which translates into 2,400 vehicle trips per day. A vehicle trip is defined as a single or one-direction vehicle movement with either the origin or destination (exiting or entering) inside the project site.

Material and Supply Trucks

Construction materials would be procured by the contractor. Materials would be shipped from suppliers located throughout the country and globally. Materials and equipment would be transported to the site by rail and truck. Local procurement can be expected to be the cost-effective choice for concrete

ready-mix suppliers, road base and gravel fill suppliers, reinforcing steel fabrication, construction equipment rentals, office supplies, temporary sanitation facilities, and other commodities and services. Construction deliveries would likely total two trains per week. At this time the number of truck deliveries that may be reduced because of potential rail transport use for construction purposes is uncertain. As a conservative estimate, it is projected that a maximum of 140 trips per day would result from construction supply and material deliveries (SEH, 2006c).

Construction of Utility Corridors

Access to the HVTL, gas, and other utility corridors would come from various existing roadways at the points that they are crossed by the proposed utilities. As design and construction progress, there could be a need for temporary access roads to be constructed to facilitate utility construction.

Most construction traffic would use the temporary HVTL ROW for construction, with possible placement of a few temporary access roads to the ROW. In some areas additional temporary ROW would be required for access.

In general, construction of utility lines would cause temporary and localized congestion, particularly where these lines would cross existing roads that would provide access to the construction areas.

4.15.2.2 Common Impacts of Operation

Operations Traffic Volume

Personnel & Staff

During Phase I operations, approximately 107 employees would be needed to staff the power plant daily, with an additional 75 employees for Phase II. It is expected that the majority of the employees would work during standard office hours. **The number of total personnel vehicle trips per day would be 165 and 280 for Phases I and II, respectively (assumes approximately 23 percent commuters carpool).**

Material Transport

During operations most of the feedstock would be transported via rail; however, some materials and supplies would still require trucking. Depending on economic feasibility, the truck volumes would vary. It is anticipated that project-generated average daily traffic (ADT) volumes for material transport during Phase I operations would be minimal **(approximately 30 truck trips per day)** because a majority of the required material (e.g., coal) would be shipped via the rail line. **For Phase II operations, the number of truck trips would double.**

The project would require coal and other materials to be delivered to the power plant by train. Coal is the most significant material input that would be delivered to the project site. It is anticipated that most of the coal requirements would be met with supplies from the PRB, which is located approximately 1,200 miles from the northeast region of Minnesota. The PRB is the largest coal-producing region in the U.S. and spans an area from northeastern Wyoming to southeastern Montana. Wyoming alone is the single largest coal-producing state in the U.S. with its PRB region producing approximately 390.2 million tons of coal in 2005 (BLM, 2006). Under peak use scenarios for both Phases I and II, the Mesaba Energy Project could utilize up to 6 million tons of coal annually, which represents 1.5 percent of the PRB's annual output for 2005. Other incoming materials using train delivery could include petroleum coke, slag, and flux. Material shipped out via train would likely include elemental sulfur and slag. Coal and petroleum coke feedstocks would be received by rail in dedicated unit trains from the mine (or refinery).

It is estimated that during Phase I operations, one unit train per day would be required for the transport of coal to the proposed facility. For Phase II a maximum of two unit trains per day would be required for coal transport. Assuming an average speed of 25 miles per hour, it would take a unit train approximately two days to travel from the PRB region to the northeast region of Minnesota. A unit train

would consist of up to 135 cars with the average unit train shipment expected to comprise 115 cars. Three unit trains per day (midnight to midnight) is the maximum feedstock shipment that could be received and unloaded at the Mesaba Generating Station, but such a schedule would not normally occur. One 135-car unit train can deliver about 16,100 tons of coal and each 115-car unit train about 13,700 tons. Approximately four hours time would be required to unload one unit train.

Potential impacts to receptors along existing rail corridors would result from the increase in the number of additional unit trains (up to two roundtrips per day during Phase II). Impacts include increased levels of fugitive dust emissions, noise, and vibration along the existing rail corridors and increased vehicular traffic congestion and delays, frequency of train horns, and safety hazards at grade crossings. The magnitude of noise (including train horns at grade crossings) and vibration levels from project-related train pass-bys would essentially remain the same as existing train passing events; however, the frequency at which these impacts occur would increase with the additional train trips. As previously stated, Phases I and II would require up to 6 million tons of coal annually, which represents 1.5 percent of what the PRB produced in 2005. Therefore, although receptors along the existing rail corridors would endure these impacts more often, it is expected that the incremental increase in train frequency is small enough as to not create significantly different conditions as what currently exists given the existing levels of coal production and rail transportation in the PRB.

The impacts of rail operations on resources other than traffic-related resources are described elsewhere in this chapter. The risks from accidents involving trains at grade rail crossings are discussed in Section 4.17.2.2. The impacts of rail noise and vibration on local receptors are described in Section 4.18.2.2. Sections 4.13.3.2 and 4.13.4.2 for the respective West Range and East Range corridors describe the potential delays for emergency vehicles at grade rail crossings that may be caused by the additional trains for the Mesaba Generating Station. Air quality impacts from fugitive dust and train emissions are addressed in Section 4.3. **Section 4.3.2 has been updated to include a subsection on emissions from truck and train deliveries.**

4.15.3 Impacts on West Range Site and Corridors

4.15.3.1 Impacts of Construction (West Range)

Site Access

As described in the Draft EIS, Excelsior considered two access road components to provide access to the West Range Site—Access Road 1 (i.e., the proposed realignment of CR 7) and Access Road 2. The proposed realignment of CR 7 was under consideration by Itasca County when the scope of the EIS was initially determined. Following publication of the Draft EIS, Itasca County deferred its planned realignment of CR 7 due to changes in funding priorities at the state level. Also, following publication of the Draft EIS, DOE coordinated with Excelsior toward the consideration of an additional road access alternative, Access Road 3, to meet the objective of avoiding and minimizing impacts on wetlands in response to comments by USACE and other agencies. Therefore, the construction of Access Road 1 and Access Road 2 as presented in this section of the Draft EIS is no longer anticipated to be practicable for the Mesaba Energy Project. Access Road 3, now Excelsior's preferred alternative, would directly connect the existing alignment of CR 7 to the plant footprint via the southwestern corner of the property boundary as shown in Figure 2.3-2. This section has been revised to reflect these changes for the Final EIS. [Text in the Draft EIS discussing the construction of Access Roads 1 and 2 has been deleted at this point.]

Construction traffic would be required to access the site through use of the existing CR 7. Access Road **3** would be extended to the existing CR 7 from the **plant footprint**. Special turning lanes onto CR 7 and US 169 would be required to improve the safety conditions at this intersection. Although no formal plans have been submitted to Mn/DOT to date, conceptual plans have been initiated. The following improvements are recommended by the conceptual plan (SEH, 2006d and e):

- The northbound left turn lane on US 169 would be lengthened to allow for deceleration on the downhill grade;
- An acceleration lane (i.e., truck climbing lane) on US 169 traveling south from CR 7 would be constructed;
- A standard right turn lane from CR 7 to US 169 would be added;
- CR 7 would be widened to allow for a southbound left turn lane; and
- A standard northbound right turn lane from CR 7 to the plant entrance road (i.e., Access Road 3) would be constructed.

As described in Sections 2.2.4.1 and 2.3.1.1, Excelsior would establish off-site construction staging and laydown areas on 85 acres of land selected from among four potential sites for Phase II construction. Figures 2.3-1 and 2.3-3 show the candidate locations for the West Range Site. All of the sites are located on lands that have been disturbed or cleared during prior uses by mineral extraction companies and all have access to local roadways. Excelsior would select appropriate sites for the necessary acreage prior to construction of Phase II taking into consideration potential effects on traffic. Additional traffic volumes (up to eight vehicle trips for each peak a.m. and p.m. hour) from construction truck deliveries would potentially result in increased congestion, delays, and traffic hazards on routes between the potential laydown areas and the construction site. However, these impacts are expected to be minor as this increase in traffic would be relatively minor and the routes between the laydown areas and the construction site do not traverse large towns.

The 30 acres located adjacent CR 7 would present the least traffic impacts as it would require driving approximately 1,500 feet on CR 7, between the laydown area and the new Access Road 3. The 30-acre laydown area just south of Taconite would also result in minimal traffic impacts, but driving distance is approximately 3 miles from the Phase II construction site. A half mile north of this laydown area, another 30-acre area may potentially be used. This location is situated adjacent the western edge of the Taconite residential area, and driving distance is approximately 5 miles to the construction site. A 250-acre laydown area is located approximately 7 miles from the construction site and would require driving on CR 7, US 169, and CR 10 between sites.

Rail access into the West Range Site would be from existing BNSF and CN tracks. Since the frequency of rail use is considered low during the construction phase (deliveries would likely total two trains per week), the impacts to existing rail resources and traffic safety are expected to be minimal. **In response to concerns raised by USACE and other agencies about the need to avoid and minimize wetland impacts identified in the Draft EIS, Excelsior identified a new preferred rail alignment, Alternative 3B. The alignment would follow the same route as Alternative 1A from the point of interconnection with the CN and BNSF main line to the Mesaba plant site. However, Alternative 3B would begin its rail loop approximately at a point in between the footprints for Phases I and II (see Figure 2.3-2). Impacts to transportation resources from the new alignment are expected to remain unchanged.**

Traffic Volumes and Level of Service

New traffic volume projections were performed for Excelsior's new preferred road alignment, Access Road 3. This section has been revised to reflect the new analysis. Table 4.15-1 has been revised to include updated traffic projections during construction for Phase I (i.e., 2010).

As discussed in Section 4.15.1.2, historic traffic data was collected and used to forecast future traffic volumes in the vicinity of the West Range Site. Existing ADT volumes were gathered along US 169 and CR 7 (see Section 3.15). In addition, historic traffic volumes along other nearby routes were analyzed to develop historic average annual traffic growth rates for the project area. A 1.5 percent average annual traffic growth rate was applied to the existing traffic volumes to determine future traffic volumes with and

without the project during construction ("Build" and "No Build" volumes, respectively). **The "No Build" traffic volumes were revised as new data from 2006 was obtained after publication of the Draft EIS and incorporated for the Final EIS.**

The historical traffic volumes were projected to the year 2010 (approximate time that construction for Phase I would peak) as shown in Table 4.15-1 **(revised for Final EIS)**. The construction-related traffic (during peak conditions) was added on top of the "No Build" volumes to estimate the "Build" volumes.

Table 4.15-1. "No Build" and "Build" ADT Volumes and LOS at West Range Site (to year 2010)

Year	US 169		CR 7	
	West of CR 7	East of CR 7	North of New Access Road 3	South of New Access Road 3
2000	5,800	5,500	1,100	1,100
2002	6,500	5,800	NA	NA
2004	7,200	5,700	NA	NA
2006	7,000	6,500	1,300	1,300
2010 "No Build"				
2010 "No Build" (construction)	7,400 (LOS C)	6,900 (LOS C)	1,380 (LOS A)	1,380 (LOS A)
2010 "Build"				
2010 Additional Traffic Volumes (construction)	1,170 total (70 trucks)	1,170 total (70 trucks)	260 total (0 trucks)	2,340 total (140 trucks)
2010 "Build"	8,570 (LOS C)	8,070 (LOS C)	1,640 (LOS A)	3,720 (LOS B)

Note: Revised estimates for the "No Build" scenario reflect more recent data (i.e., 2006) collected since publication of the Draft EIS (see Table 3.15-1). "Build" volumes for Access Road 1 as shown in the Draft EIS have been deleted with Excelsior's decision to construct Access Road 3 as their preferred alternative.
Source: SEH, 2006 (f and g); (SEH, 2009)

The traffic forecast in Table 4.15-1 assumes peak construction conditions (i.e., 2,400 personnel vehicular trips and 140 truck trips per day) to provide an upper bound estimate for traffic volumes. Therefore, the percent increases in traffic represent conservative estimates as it uses the peak number of personnel and the initial use of trucks prior to completion of the rail spur. It is anticipated that truck trips would begin to decrease as the construction period progressed because of rail use and the fact that the majority of construction equipment would remain on site.

Table 4.15-1 shows that ADT volumes on US 169 would increase between 15 to 17 percent and volumes on CR 7 (north of the plant site) would increase at approximately 20 percent as a result of Phase I construction activities. Traffic flow on CR 7 (south of the plant site) would **increase 1.7-fold**.

Based on the ADTs estimated in Table 4.15-1, the LOSs were also determined. Although traffic volumes on US 169 and CR 7 would generally see an increase in traffic volume and delays, these roads would continue to operate at **an** LOS **C or better, which represents stable and manageable traffic flow**. Though plans to renovate the intersection of CR 7 and US 169 are in a conceptual phase, it is anticipated that the improvements would be implemented before the peak construction period began and would help minimize the traffic hazards currently associated with this intersection.

[Text in the Draft EIS relating to the realignment of CR 7 (Access Road 1) has been deleted.]

In general, construction-related impacts to traffic would be localized and temporary and have the greatest influence at CR 7 and US 169 nearest the project site. Since the West Range Site is located in a characteristically rural area that does not typically see heavy traffic flows, the existing regional roads would have the capacity to handle the additional traffic volumes resulting from peak construction activities and would, therefore, have a moderate impact to the regional roadway system.

4.15.3.2 Impacts of Operation

Site Access

For the Draft EIS, Excelsior considered two access road components—Access Road 1 (i.e., realignment of CR 7) and Access Road 2 (connecting with the realignment of CR 7)—to provide access to the West Range Site. This section has been revised to reflect Excelsior's decision to implement Access Road 3 as their preferred alternative; discussions on Access Road 1 and Access Road 2 have been deleted in this section for the Final EIS based on the deferment by Itasca County of plans to realign CR 7.

Primary access to the West Range Site during operations would be **the** same as that during construction—via the new Access Road **3 (see Figure 2.3-2)**. Access Road **3** would be used by all of the site-generated traffic, including truck hauls, during operation of the power plant.

Traffic Volumes and Levels of Service

Projected traffic volumes during plant operations were estimated in the same manner as that which were calculated for the projected construction traffic volumes. Table 4.15-2 **(revised for Final EIS)** includes ADT traffic estimated during operations for both Phases I and II and is projected to the year 2028.

The incremental increase of traffic resulting from the Mesaba Generating Station would be minor with respect to "No Build" conditions in 2028. ADT volumes on US 169 and CR 7 (north of Access Road 1) would increase approximately 2 percent, except for CR 7, which would actually decrease because of the new CR 7 (south of new Access Road 1).

Table 4.15-2. "No Build" and "Build" ADT Volumes and LOS at West Range Site (to year 2028)

Year	US 169		CR 7	
	West of CR 7	East of CR 7	North of New Access Road 3	South of New Access Road 3
2000	5,800	5,500	1,100	1,100
2002	6,500	5,800	NA	NA
2004	7,200	5,700	NA	NA
2006	7,000	6,500	1,300	1,300
2028 "No Build"				
2028 "No Build"	9,700 (LOS D)	9,000 (LOS D)	1,800 (LOS B)	1,800 (LOS B)
2028 "Build"				
2028 Additional Traffic Volumes	190 total (30 trucks)	190 total (30 trucks)	40 total (0 trucks)	340 total (60 trucks)
2028 "Build"	9,870 (LOS D)	9,170 (LOS D)	1,840 (LOS B)	2,140 (LOS B)

Note: Revised estimates for the "No Build" scenario reflect more recent data (i.e., 2006) collected since publication of the Draft EIS (see Table 3.15-1). "Build" volumes for Access Road 1 as shown in the Draft EIS have been deleted with Excelsior's decision to construct Access Road 3 as their preferred alternative.
Source: SEH, 2006 (f and g); (SEH, 2009)

The ADTs estimated in Table 4.15-2 **show that traffic volumes on US 169 and CR 7 (north of the plant site) for the "Build" scenario in 2028 would have moderate increases that are not significantly different from the forecasted "No Build" scenario and** the LOSs for the "Build" condition would remain the same as the "No Build" condition. Though the LOS for traffic on US 169 would operate at an LOS of D (in either condition), flow of traffic is still considered stable at this level. **CR 7 (between US 169 and the plant site) would see its maximum volumes (about 3,720 vehicles per day) during peak construction periods expected in 2010, then decline after construction with an estimated 2,140 vehicles per day in 2028.** Because the West Range Site is located in a relatively rural area that sees very little traffic congestion, the operating capacity of US 169 and CR 7 would be able to handle the new traffic. The conceptual plans for improving the intersection of CR 7 and US 169 would help minimize the traffic congestion and hazards associated with this area.

Rail Transport

Existing Rail Routes for Material Transport to West Range Site

The existing rail routes to the West Range Site were discussed in Section 3.15 and are shown in Figure 2.3-2. The shortest route for delivering coal from the PRB to the West Range Site is via the BNSF trackage across North Dakota. The preferred route would pass through Fargo, North Dakota, north to Grand Forks, North Dakota, and across Minnesota through Grand Rapids to Gunn and then to Taconite (approximately 1,200 miles).

An alternative route to the West Range Site via BNSF trackage would be from Brookston northward to Kelly Lake and Keewatin and westward to the plant site. It is anticipated that this route would primarily be used for non-coal train operations because of its greater distance and significant grade changes north of Brookston.

The CN delivery of coal would be from the Superior, Wisconsin area northward to Virginia and then west past Hibbing and Keewatin to Taconite/Bovey. CN unit coal trains would be required to undertake the following steps to access the West Range Site:

1) Approach the West Range IGCC power plant from the east;
2) Travel past the site and either
    a) Back into the site, or
    b) Stop in Bovey, have the locomotives disconnect from in front of the train, reconnect to the other end of the train, and access the site from the west.

A reverse move would be required for the empty train. To accommodate such maneuvers, unit coal trains supplied by CN would use an existing siding in Bovey that would need to be lengthened. Other CN deliveries to the plant would occur via the same type of movement, but with much shorter trains. Neither CN unit train movements nor non-coal movements required to access the West Range site in the manner described would block any public at-grade crossings near the site.

The short length of CN track in the vicinity of the West Range Site is temporarily out of service because of rising water levels in the CMP as was discussed in Section 3.15.3.2. **[Text in the Draft EIS relating to the Mesaba Energy Project's involvement in maintaining water levels in the CMP has been removed.]** At the request of the BNSF or another local shipper, the track would be required to be placed back in service under current common carrier regulations of the Surface Transportation Board.

Rail Alignment Alternatives

In response to concerns raised by USACE and other agencies about the need to avoid and minimize wetland impacts identified in the Draft EIS, Excelsior identified a new preferred rail alignment, Alternative 3B. The alignment would follow the same route as Alternative 1A from the point of interconnection with the CN and BNSF main line to the Mesaba plant site. However, as

shown in Figure 2.3-2, Alternative 3B would begin its rail loop approximately at a point in between the footprints for Phases I and II. The rail loop would follow a relatively level grade around a hill located northeast of the plant footprint and rejoin the rail spur near Dunning Lake at the southeastern corner of the property. The coal dumper would be located on the straight segment of rail alignment before the first curve in the loop, at a point approximately 2,000 feet closer to the southeastern property boundary.

Impacts to transportation resources as discussed below are expected to remain unchanged regarding Alternative 3B. Alternative 1B was eliminated from further consideration by Excelsior following publication of the Draft EIS. Therefore, text regarding Alternative 1B in this section has been deleted.

In considering siting criteria as described in Chapter 2, two rail alignments were evaluated by Excelsior as being feasible (Alternative 1A and **3**B). The physical descriptions and layout of the alternative rail alignments are discussed in Chapter 2 and shown in Figure 2.3-2.

Both Alternatives 1A and **3**B would meet acceptable alignment, grade, and rail operations criteria. The length of rail line required for construction of these alternatives would total approximately 4 miles **each**. A rail bridge over **Diamond Lake Road** to the West Range Site would be constructed to avoid an at-grade crossing that could **block local traffic on Diamond Lake Road during unloading of coal trains.**

4.15.4 Impacts on East Range Site and Corridors

4.15.4.1 Impacts of Construction

Site Access

After publication of the Draft EIS, Excelsior reconsidered the need for a looped access road based on comments received from USACE regarding potential impacts on wetlands. Access to the East Range Site would still be provided from CR 666 (Kensington Drive) to the east; however, instead of a looped access road with two connection points, only the southern portion would be implemented—the northern portion would not be constructed (see Figure 2.3-6). Therefore, this section has been revised to reflect this change and discussion of a looped access road system with two access points on CR 666 as included in the Draft EIS has been deleted. Traffic impacts as discussed in the Draft EIS would essentially remain the same (e.g., same number of projected traffic volumes), except that the flexibility of having two access points as discussed in the Draft EIS would no longer be available to vehicles entering/exiting the East Range Site.

Section 3.15.2.2 discusses the existing roadway system near the East Range Site, shown in Figure 2.3-5. A new road would be constructed off of CR 666. The proposed access road would be a new two-lane roadway **directly accessed from** CR 666, just east of the plant. The road would be utilized for worker daily access and trucked material deliveries. It is expected that most of the construction traffic to the site would be from the west where some of the larger communities in the area of St Louis County are located.

[Text describing traffic flow on the looped access road in the Draft EIS has been deleted.] As part of the Proposed Action, other roadway improvements near the East Range site include a proposed 2-inch mill and overlay of CR 666 **(Kensington Drive)** from Hoyt Lakes to the plant site and a full reconstruction of Hampshire Drive, a short connector between CR 110 and CR 666.

In order to access the East Range Site, traffic approaching from the west would travel on CR 110 and turn north onto CR 666 at the first major intersection in Hoyt Lakes. This intersection is controlled as a four-way stop. CR 666 travels to the north about 1.6 miles where it adjoins the eastern boundary of the East Range Site for a distance of about 1.4 miles. CR 666 continues beyond the East Range Site a distance of approximately 2 miles further north-northeast to the CE administration building. Traffic

approaching Hoyt Lakes from the east would travel on CR 110, turn north onto Hampshire Drive at the first major intersection upon coming into town and turn northeast onto CR 666 toward the site.

As described in Sections 2.2.4.1 and 2.3.2.1, Excelsior would establish off-site construction staging and laydown areas on 85 acres of land from two potential sites for Phase II construction. Figures 2.3-5 shows the candidate locations for the East Range Site. Both sites are located on lands that have been disturbed during prior uses by mineral extraction companies and are accessible by mining roads and an abandoned rail grade that would be improved for truck access. The laydown areas are located approximately 2 to 3 miles from the project site. Additional traffic volumes (up to eight vehicle trips for each peak a.m. and p.m. hour) from construction truck deliveries would potentially result in increased congestion, delays, and traffic hazards on CR 110 and CR 666 between the potential laydown areas and the construction site. However, these impacts are expected to be minor as potential routes between the laydown areas and the construction site are located outside of any residential area and the routes currently experience very limited traffic since the surrounding land use is primarily industrial.

It is anticipated that large equipment required at the site would be shipped by rail. The Duluth, Missabe, and Iron Range Railway Company (DMIR) **owned by CN Railway** has interchanges with all major railroads operating in northern Minnesota and large equipment shipments would generally utilize rail service to the site.

Traffic Volumes and Levels of Service

As discussed in Section 4.15.1.2, historic traffic data was collected and used to forecast future traffic volumes in the vicinity of the East Range Site. Existing ADT volumes were gathered along CR 110 and CR 666 (no ADT data available for Hampshire Drive, see Section 3.15.2.2). In addition, historic traffic volumes along other nearby routes were analyzed to develop historic average annual traffic growth rates for the project area. Average annual traffic growth rates between 1.0 to 3.4 percent were applied to the existing traffic volumes to determine future traffic volumes with and without the project during construction ("Build" and "No Build" volumes, respectively). The historical traffic volumes were projected to the year 2010 as shown in Table 4.15-3.

Table 4.15-3. "No Build" and "Build" ADT Volumes and LOS at East Range Site (year 2010)

Location	Average Daily Traffic Volume	
	"No Build"	"Build"
CR 110 (west of CR 666)	3,170 (B)	4,470 (B)
CR 110 (east of CR 666)	850 (A)	2,150 (B)
CR 666 (north of CR 110)	900 (A)	2,200 (B)
CR 666 (east of Hampshire Road)	570 (A)	3,170 (B)
Hampshire Road (between CR 110 and CR 666)	285(A)	1,585 (A)

Source: SEH, 2006 (b and g)

The two primary roads in the vicinity of the East Range Site are CR 666 and CR 110. The volume of traffic on CR 666 would peak during the Phase I construction period at 3,170 trips per day and would be lower thereafter. The volume on CR 110 would peak at 4,470 trips per day to the west and 2,150 to the east. Though some of the relative traffic increases as a result of the project would be more than a doubling of volume in some instances, these volumes still reflect lower than average ADTs for rural two-lane highways and would not cause a significant degradation in LOS. As shown in Table 4.15-3, the

lowest LOS that would result during the construction period is B, which represents free flow traffic and very little congestion. CR 110 and CR 666 would have more than enough capacity to handle the additional traffic volumes resulting from peak construction activities and would therefore have a minimal overall impact to the local roadway system.

The intersection of CR 666 and CR 110 in Hoyt Lakes is predicted to have some congestion at peak hours (e.g., shift changes) during the peak construction periods. However, with the proposed reconstruction of Hampshire Drive, traffic to/from the east would most likely use this road as a shortcut between CR 666 and CR 110, and therefore, minimize the extent of congestion at this intersection.

4.15.4.2 Impacts of Operation

Site Access

Primary access to the East Range Site during operations would be same as that during construction—via the new access road. This primary access would be used by nearly all of the site-generated traffic, including truck hauls, during operation of the power plant.

Traffic patterns (i.e., distribution of vehicle trips) during plant operations are estimated to be similar to that as the construction phase, mainly with the majority of incoming traffic to the power plant coming from the larger communities to the west of the site. **As discussed for the construction phase, access to the East Range Site would still be provided from CR 666 to the east, but with a single access road.**

Traffic Volumes and Levels of Service

Projected traffic volumes during plant operations were estimated in the same manner as calculated for the projected construction traffic volumes. Table 4.15-4 includes ADT traffic estimated during operations for both Phases I and II **in** the year 2028.

Table 4.15-4. "No Build" and "Build" ADT Volumes and LOS at East Range Site (year 2028)

Location	Average Daily Traffic Volume	
	"No Build"	"Build"
CR 110 (west of CR 666)	3,735 (B)	3,925(B)
CR 110 (east of CR 666)	1,335 (A)	1,525 (A)
CR 666 (north of CR 110)	1,435 (A)	1,625 (B)
CR 666 (east of Hampshire Road)	1,020 (A)	1,400 (A)
Hampshire Road (between CR 110 and CR 666)	485 (A)	675 (A)

Source: SEH, 2006 (b, g, and h)

The incremental increase of traffic resulting from the Mesaba Generating Station ranges from minor to significant relative to existing local traffic volumes. CR 110 (west of CR 666) would see approximately 5 percent increase in new traffic as are result of the Mesaba Generating Station. The other locations listed in Table 4.15-4 would see significant increases as a result of the power plant (up to 40 percent). However, because the East Range Site is surrounded by rural county roads that see very little traffic flow, the existing operating capacity of CR 666 and CR 110 would be able to handle the new traffic. Though CR 666 (north of CR 110) would experience a degradation in LOS (from A to B), an LOS of B still represents free flow traffic conditions with very little congestion. The "Build" volumes shown in Table 4.15-5 still reflect relatively low ADT and the roads would continue to operate at LOS B or better, and therefore, very minimal adverse impacts are expected to occur during the operational phase.

Rail Transport

The rail lines near the East Range Site are discussed in Section 3.15.3.3 and shown in Figure 2.3-5. The site does not provide the option of immediate competition between rail providers. Realistically, the CN (the current owner of the DMIR rail line) would be the only feasible near-term rail service provider into the East Range generating station. The nearest competitive railroad is the BNSF Railway near Hibbing, 40 miles from the East Range Site. Longer term, it may be possible to utilize the port at Taconite Harbor and CE's privately-owned railroad to provide feedstock transport to the East Range Site; however, this option is currently considered unlikely.

Existing Rail Routes for Material Transport to the East Range Site

Figure 3.15-1 shows the rail network in northeastern Minnesota. The CN Railway would deliver coal to the site from Eveleth. Empty unit trains would return by the same route. The layouts of the proposed rail alignments are presented in Figure 2.3-6.

Rail Alignment Alternatives

Alternative 1 for the East Range Site is a traditional coal loop that would handle a complete coal train and allow return in the same direction. The track would start near MP's Laskin spur and travel east-northeast to the proposed generating station. The track would be about 17,800 feet long plus additional plant track sidings for miscellaneous chemicals and products. The track would begin at an elevation of approximately 1,455 feet and the coal loop would be at set at about 1,465 to 1,470 feet.

Alternative 2 is an alignment that would handle a complete coal train, but would cross the site (rather than looping within it) and connect with the CN north-south track just north of Wyman Junction. This track would be about 18,500 feet long and have the coal dumper centered in the middle. The train would leave the track at an elevation of 1,455 feet, climb to a dumper elevation of about 1,465 to 1,470 feet and continue to climb to the about 1,485 feet at the north-south CN track. To maintain a workable grade, this track would have to cross under CR 666, requiring construction of a new roadway bridge.

With respect to transportation resources, there are no discernable differences in impacts between either alternative, other than some minor congestion at CR 666 during construction of the new bridge for Alternative 2.

4.15.5 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. As a result, the No Action Alternative would maintain the status quo with respect to future transportation conditions near the West Range Site (Itasca County) and East Range Site (St. Louis County).

Traffic demand on the roadway system is composed of existing traffic and estimated future "No Build" traffic (i.e., non-project traffic). As stated in 4.15.2, estimated future traffic growth is generally composed of additional traffic from land development and/or roadway improvement projects and effects of population and business growth.

The historical and projected (without the Proposed Action) traffic volumes for the roadways within the vicinity of the West Range and East Range study intersections are discussed in Sections 4.15.3 and 4.15.4, respectively. The projected volumes were based on assumed traffic growth rates, which closely followed historical traffic trends. The traffic growth rates used accounts for the effects of general population and business growth predicted in the project areas. Assuming that future development and growth trends discussed in this section closely follow actual trends, the ADT volumes and LOSs of the existing and the projected "No Build" conditions for the roads that were analyzed indicate that these roads would continue to operate at LOS D or better under the No Action Alternative.

The No Action Alternative would not alter these baseline conditions and would, therefore, have no adverse impact on transportation resources.

4.15.6 Summary of Impacts

Basis for Impact	No Action	West Range	East Range
Increase in traffic volumes so as to degrade level of service (LOS) conditions to unacceptable levels (e.g., increase traffic delays and cause significant congestion).	There would be no additional vehicular traffic that would occur, and therefore, LOS conditions would remain the same**. [Text in the Draft EIS relating to Access Road 1 has been deleted.]**	During construction: temporary LOS degradation of **CR 7 (south of plant site)** – from an LOS of **A** to **B**. During operation: LOSs would remain the same **and in stable operating conditions** on nearby roadways.	During construction: temporary LOS degradation of most of nearby roads; however, lowest LOS would be B (represents free flow traffic with little congestion). Reconstruction of Hampshire Drive expected to minimize potential congestion at intersection of CR 666 and CR 110. During operation: LOSs would remain the same on nearby roadways, except for CR 666 (north of CR 110), which would degrade from A to B.
Increase in rail traffic compared to existing conditions on railways in the region of influence.	There would be no additional rail traffic that would occur, and therefore, rail operations would remain the same.	Rail use during construction and operations is expected to have minimal adverse impacts to baseline rail traffic conditions.	Rail use during construction and operations is expected to have minimal adverse impacts to baseline rail traffic conditions.
Conflicts with local or regional transportation plans.	There would be no development, thus, no conflicts with transportation plans.	No conflicts with regional transportation plans were identified.	No conflicts with regional transportation plans were identified.

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4.16 MATERIALS AND WASTE MANAGEMENT

4.16.1 Approach to Impacts Analysis

4.16.1.1 Regions of Influence

Two regions of influence were identified for evaluating impacts associated with materials and waste management at both the West Range and East Range Sites and the proposed corridors. The first region of influence was the area within the buffer land boundaries of each proposed site where the Mesaba Generating Station, access roads, and rail spurs would be located, as well as the construction ROWs along the proposed HVTL and gas pipeline corridors. A second, larger region of influence was also considered that included any potential off-site sources that could affect the West Range or East Range Sites, as well as the commercial availability of treatment, storage and disposal facilities located in Minnesota, Itasca County (West Range Site), St. Louis County (East Range Site), or out of state that could receive waste streams from the construction and operation of either site.

4.16.1.2 Method of Analysis

The potential for materials or waste to affect the environment was considered for both the construction phase and the operational phase. The analysis considered the types and quantities of materials expected to be used and stored for construction and operations, the quantity and type of non-hazardous and hazardous waste that would be generated from construction and operation, storage practices and containment, and whether available treatment, storage and disposalfacilities had the capability and the capacity to accept the non-hazardous and hazardous waste generated.

The evaluation of potential impacts from the use of hazardous and non-hazardous materials or the generation of hazardous and non-hazardous waste considered whether the Proposed Action or an alternative would cause any of the following conditions:

- The use of hazardous materials would create reasonably foreseeable conditions that would increase the risk of a hazardous material release;
- The volume of solid waste generated would (directly or indirectly) affect the capacity of solid waste collection services and landfills;
- Wastes would be created for which there are no commercially available disposal or treatment technologies;
- The quantity of hazardous wastes generated would (directly or indirectly) affect the capacity of hazardous waste collection and disposal services; and
- Waste generation would create reasonably foreseeable conditions that would increase the risk of a hazardous waste release to the environment.

4.16.2 Common Impacts of the Proposed Action

Potential impacts associated with the construction and operation of the proposed Mesaba Generating Station, access roads, rail lines, HVTLs, water lines, and gas pipeline corridors would, for the most part, be the same at either the West Range Site or the East Range Site. Therefore, common impacts associated with construction and operations are discussed in this section. Specific impacts from materials and waste management unique to the West Range Site and the East Range Site are discussed in Sections 4.16.3 and 4.16.4, respectively.

4.16.2.1 Impacts of Construction

Construction of Phase I and Phase II of the Mesaba Generating Station would occur over a period of **approximately** six years between **2010 and 2016**. Construction activities would include the construction of the Phase I and Phase II Mesaba Generating Station and associated access roads and rail lines,

construction of the HVTL corridors, and construction of natural gas pipelines. Construction of the power plant, rail lines and access roads would occur within the buffer land boundary. Construction of the HVTLs, water lines, and gas pipelines would occur outside of the buffer land boundary as previously described in Chapter 2.

Construction Materials

Construction materials would include water used for hydrotesting, diesel fuel, gasoline, cleaning materials, solvents, concrete, wood, metal, glass, construction equipment, power plant equipment, materials to operate and maintain equipment (oil, batteries, etc.), and other materials commonly used for building construction. Construction water would be supplied **as described in Section 4.14**. Gravel and road base would be used for temporary roads, material storage, and parking areas. General office materials such as paper, packaging, etc., would also be used. In addition to the materials listed, construction of the rail lines would require ballast, subballast, and railroad ties. Materials required for the construction of the HVTLs would include power lines and structures, and gas pipeline construction would require piping and welding materials in addition to the above-listed materials.

Construction materials would be delivered to the construction site (or to the gas pipeline and HVTL corridors) primarily by truck. Completion of the on-site rail spur would also allow rail deliveries to the site. Local, regional, or national suppliers would provide the necessary construction materials. Whenever feasible, supplies would be obtained from local suppliers.

Construction material storage areas would be located within the planned construction **staging and laydown areas described in Sections 2.2.4.1 and 2.3.1.1. The staging and laydown areas for Phase I plant construction would be established on the Phase II plant footprint. For Phase II construction, Excelsior would establish off-site construction staging and laydown areas comprising a total 85 acres of land in one or more locations. In identifying candidate locations, Excelsior considered properties owned by mineral extraction firms or tax forfeiture lands that have been cleared or disturbed during prior activities and, therefore, do not contain surface waters, wetlands, or sensitive natural resources. Candidate sites also have access to local roadways and are within a 10-mile radius of the respective plant footprint. Excelsior would select one or more of the candidate locations for staging and laydown use near the permitted generating station site prior to Phase II construction. Access to construction sites and staging areas** would be controlled for personnel and vehicles by a security fence around the site boundary, and all construction materials would be stored within the secured fence area. Secondary containment would be provided for liquid hazardous material storage. Staging areas up to several acres also would be required along the HVTL and gas pipeline corridors for storing construction materials and equipment. These areas would be fenced to control access, and secondary containment would be provided for liquid hazardous material storage.

Preventative measures such as providing fencing around the construction site, establishing contained storage areas, and controlling the flow of construction equipment and personnel would reduce the potential for a release to occur. In the event that a release should occur, immediate action would be taken to contain and clean up a release in accordance with Federal, state, and local regulations. Construction personnel would be trained in the proper handling and storage practices for construction materials, as well as the response to any leaks or spills during construction. **Among other requirements, the Mesaba Generating Station would be subject to an Emergency Response Program to be developed in compliance with OSHA Standard 1910.120, which would include an Emergency Response Plan (1910.120[q]) as explained in Section 4.13.**

Construction Waste

Non-Hazardous Waste

Non-hazardous waste generated during construction would include trees and debris from site clearing activities, scrap materials, and sanitary waste. Table 4.16-1 lists the non-hazardous wastes and the quantities expected to be generated during construction **for each phase of the Mesaba Generating Station**. To the extent practical, surplus materials and non-hazardous wastes generated during construction would be recycled.

Solid waste and sanitary waste generated during construction would be limited to common construction-related waste streams. In-state or out-of-state landfills or recycling facilities would have the capability and capacity to accept these wastes.

Hazardous Waste

The primary hazardous wastes generated during construction would include spent hydrotest water, used oils, cleaning wastes and solvents, spent welding materials, used oil filters, fluorescent/mercury lamps, oily rags and absorbents, empty hazardous material containers, and used batteries. The quantity of each hazardous waste stream that would be generated during construction **for each phase of the Mesaba Generating Station** is shown in Table 4.16-1.

Based on the estimated quantities of hazardous waste that would be generated during construction, the Mesaba Generating Station could be regulated as a large-quantity generator of hazardous waste. Under RCRA of 1976, a large-quantity generator generates 1,000 kilograms per month or more of hazardous waste, or more than 1 kilogram per month of acutely hazardous waste. RCRA requirements for large-quantity generators include:

- May only accumulate waste on site for 90 days (certain exceptions apply).
- Do not have a limit on the amount of hazardous waste accumulated on site.
- Must always have at least one employee available to respond to an emergency. This employee is the emergency coordinator responsible for coordinating all emergency response measures. Large-quantity generators must have detailed, written contingency plans for handling emergencies.
- Must submit a biennial hazardous waste report that reports to EPA the generation, management, and final disposition of hazardous waste generated by the facility.

Hazardous waste generated during construction would be properly managed and stored on site in accordance with RCRA. Preventative measures such as providing fencing around the construction site, establishing contained storage areas, responding immediately to spills, and controlling the flow of construction equipment and personnel would help reduce the potential for a release to occur.

The quantity and type of hazardous waste that would be generated during construction would be limited to typical construction-related waste streams commonly accepted by treatment, storage and disposal facilities, and commercially available treatment or disposal would be available.

Non-Hazardous and Hazardous Waste Minimization and Storage

To reduce the risk of a release of non-hazardous or hazardous construction wastes to the environment, an Environmental Management System and a Pollution Prevention/Waste Minimization Program would be developed, which would include an evaluation of alternatives to eliminate, reduce, or minimize the amounts of materials used and, subsequently, the amounts of wastes generated. Project planning would include reviews of forecasted hazardous material purchases and use, and the investigation of less-hazardous substitutes. Potential areas for source reduction and recycling would also be identified to reduce the quantity of materials used and waste generated. In accordance with state and county recycling goals, construction wastes would be reused or recycled whenever feasible.

Table 4.16-1. Estimated Construction Waste Streams (Phase I and II)

Waste Description	Approximate Quantity Per Phase	Likely Disposal or Treatment Method
Non-Hazardous Solids		
Site clearing – waste vegetation, salvageable timber, and miscellaneous debris clearing	Cut: 3,100,000 cubic yards (West Range Site) 3,349,000 cubic yards (East Range Site) Fill: 2,350,000 cubic yards (West Range Site) 1,146,000 cubic yards (East Range Site)	Sell salvageable timber for pulp and paper production, sell or donate waste wood for use as fire wood, mulch for recycle, or dispose in non-hazardous landfill. Reuse soils for berms and landscaping, mulch and recycle organic debris, recycle or landfill inorganic debris.
Scrap materials, debris, and trash (wood, metal, plastic, paper, packaging, office wastes, etc.)	40 cubic yards/week	Recycle or non-hazardous waste landfill
Non-Hazardous Liquids		
Sanitary waste from workforce (Portable chemical toilets)	400 gallons/day	Pumped and disposed by contractor
Hazardous Solids		
Spent welding materials	400 pounds/month	Hazardous waste landfill
Used oil filters	100 pounds/month	Hazardous waste landfill
Fluorescent/mercury vapor lamps	30 units/year	Recycle
Misc. oily rags, oil adsorbents	1 drum/month	Recycle or Hazardous waste landfill
Empty hazardous material containers	1 cubic yard/week	Hazardous waste landfill
Used lead/acid and alkaline batteries	1 ton/year	Recycle
Hazardous Liquids		
Used lube oils, flushing oils	10 drums/month	Recycle
Hydrotest water (One time during commissioning, reuse as practical, test for hazardous characteristics)	1.2 million gallons (total Phases I and II)	Hazardous – approved disposal facility Non-hazardous – drain to detention basin and release (need permit)
Steam turbine and HRSG cleaning wastes (Chelates, mild acids, Total suspended particulate matter, and/or EDTA - one time during commissioning)	700,000 gallons (total Phases I and II)	Approved hazardous or non-hazardous disposal facility
Solvents, used oils, paint, adhesives, oily rags	200 gallons/month	Recycle or approved hazardous waste disposal facility

Construction management personnel, contractors, and their employees would be responsible for minimizing the amount of waste produced by construction activities, and would be required to fully cooperate with project procedures and regulatory requirements for waste minimization and proper handling, storage, and disposal of hazardous and non-hazardous wastes. Each construction contractor would be required to include waste management and waste minimization components in their overall project health, safety, and environmental site plans. Typical construction waste management measures would include:

- Dedicated waste management areas and a system for waste management and segregation of incompatible wastes, with waste segregation occurring at time of generation.
- A waste control plan detailing waste collection and removal from the site. The plan would identify where waste of different categories would be collected in separate stockpiles or bins, and appropriate signage provided to clearly identify the category of each collection stockpile.
- Storage of hazardous wastes separate from non-hazardous wastes (and other non-compatible hazardous wastes) in accordance with applicable regulations, project-specific requirements, and good waste management practices.
- Periodic construction supervision inspections to verify that wastes are properly stored and covered to prevent accidental spills and releases.
- Appropriately labeled waste disposal containers.
- Good housekeeping procedures. Work areas would be left in a clean and orderly condition at the end of each working day, and surplus materials and waste would be transferred to the waste management area.
- Appropriate waste management training for the construction workforce.

Consistent with standard construction practices, a Spill Prevention, Control and Countermeasures (SPCC) Plan would be implemented that would include the use of secondary containment in storage and use areas, as well as best management practices and procedures for handling materials. Spill response kits would be available for use in the event of an accidental spill. In the event of a reportable release, notifications would be made to all applicable Federal (e.g., National Response Center), state (e.g., Minnesota Duty Officer), and local (e.g., Fire Department) agencies. Remediation activities, if necessary, would be done in accordance with all applicable Federal, state, and local regulations.

4.16.2.2 Impacts of Operation

Operations Materials

Once operational, the main materials used at the Mesaba Generating Station would include feedstock and natural gas. As described in Chapter 2, the power plant would be fuel flexible, using various fuels or blends of fuels, which would include bituminous coal (e.g., Illinois No. 6); sub-bituminous coal (e.g., Powder River Basin), petroleum coke blended up to 50 percent with coal, or other blends of these fuels. Phase I and II operations would utilize approximately 6 million tons of feedstock annually.

Though the primary fuel source for electric power production would be coal-derived, the Mesaba Generating Station would also be capable of operating on natural gas. Natural gas would be provided **as described in Section 4.14**. The maximum natural gas flow would be approximately 105 million standard cubic feet of gas per day per phase.

Hazardous materials that would be used or stored once the plant is operational include petroleum products, liquid oxygen and nitrogen, molten sulfur, catalysts, flammable and compressed gases, amine replacement and reclamation chemicals, water treatment chemicals, solvents, and paints. Table 2.2-**8** provides a list of potentially hazardous materials that would be used and stored on site.

Operations Material Storage

Material storage requirements for feedstocks are shown in Table 4.16-2. The numbers presented are for each phase, with the total storage requirements for both phases being double those shown.

Table 4.16-2. Feedstock Storage Requirements (Each Phase)

Material	Storage Requirements
Coal Pile	**385,000 tons (20/25 days active/inactive storage based on maximum PRB1 coal usage);** **D**ust control**; W**ater runoff control.
Petroleum Coke Pile	**105,000 tons (20/25 days active/inactive storage)'** **D**ust control**; W**ater runoff control.
Flux Silo	**4,660 tons (20 days active storage).**
Sulfur Tanks	**Max 162 tons/day generated, based on Illinois No.6 coal (7 days on-site storage; 30 rail cars parked on site)**
Slag Pile	**34,800 tons (45 day storage, wet basis, using PRB2:PRB3 coal blend)**

Feedstocks would be delivered by rail cars that would be unloaded using a state-of-the-art rapid discharge rotary dumper with an automatic railcar positioner. Each rail car would be rotated inside the rotary dumper building to unload the coal contained therein. The dumper building would be enclosed and maintained under negative pressure during the unloading process to minimize fugitive emissions.

Natural gas would be piped directly to the site (i.e., not stored on site). The gases that make up the syngas (carbon monoxide, hydrogen, and carbon dioxide) would be stored in pressurized gas tubes on a multi-tube trailer outdoors in accordance with required building and fire codes. Carbon dioxide would be stored and utilized for purging of the generators after normal and emergency shutdowns. Bulk quantities of liquid oxygen and nitrogen would be stored in tanks in the ASU.

Other gases (e.g., acetylene and oxygen) would be stored in approved standard-sized portable cylinders generally located at the point of use. Petroleum-containing materials such as lube oils, steam turbine hydraulic fluid, and transformer oils would be stored indoors in 55-gallon drums or in aboveground storage tanks. These materials would be delivered in approved containers, stored in areas with appropriate secondary containment, and used within curbed areas that only drain to internal drains connected to an oil-water separator system. Oil reservoirs, containment areas, and the separators would be checked regularly for potential leaks and to ensure they are working properly. Bulk chemicals, such as acids and bases for pH control, would be stored in appropriately designed tanks equipped with secondary containment and monitoring systems. Gaseous chlorine (used and stored in compliance with all applicable regulatory requirements) or hypochlorite bleach may be used for biological control of the various circulating water and cooling tower streams. Other water treatment chemicals would be stored in containers ranging from 55-gallon drums to 500-gallon tanks stored indoors or in secondarily contained outdoor storage areas. Smaller containers of miscellaneous oils, chemicals and cleaners would also be used and would be stored indoors in appropriate containers and storage locations.

Diesel fuel would be used for the emergency generator and for the fire-water pumps. The stored quantity would allow for approximately eight hours of operation of the diesel generator at full output (about 3 MW). Appropriate containment and monitoring for spill control would be provided.

An SPCC Plan would be implemented that would include the use of secondary containment in storage and use areas, as well as best management practices and procedures for handling materials. Spill response kits would be available for use in the event of an accidental spill. In the event of a reportable release,

notifications would be made to all applicable Federal (e.g., National Response Center), state (e.g., Minnesota Duty Officer), and local (e.g., Fire Department) agencies. Remediation activities, if necessary, would be done in accordance with all applicable Federal, state, and local regulations.

Preventative measures such as providing secondary containment would help reduce the potential for a release to occur. In the event that a release should occur, immediate action would be taken to contain and clean up a release in accordance with Federal, state and local regulations. Facility personnel would be trained in the proper handling and storage practices for materials used, as well as in spill response actions.

Operations Waste

Non-Hazardous Waste

Non-hazardous waste generated during operations would, for the most part, be confined to the operation and maintenance of the Mesaba Generating Station. Only incidental amounts of non-hazardous waste would be generated from the operation of the HVTLs, gas pipelines, and rail lines from routine maintenance activities and clearing of vegetation.

IGCC power plants do not produce the coal combustion ash associated with conventional coal-fired power plants. Slag, a black non-hazardous glass-like material, would be the primary non-hazardous waste generated during operations. **Toxicity Characteristic Leaching Procedure test results for slag from the E-Gas™ process are provided in Table 4.16-3.** Depending upon the fuel being used, Phase I would produce between 500 and 800 tons of slag per day (both phases would produce twice that amount). During operations, 45-day storage would be provided for slag, which equates to a maximum of approximately 32,000 tons of slag being stored on site at any time for Phase I or 64,000 tons of slag for Phase I and II combined. Approximately 292,000 tons of slag would be generated annually per phase.

Minnesota Rules 7035.2860 (Beneficial Use of Solid Waste) addresses standing beneficial use determinations in Subparagraph 4. Item K applies to the use of coal combustion slag as a component in manufactured products such as roofing shingles, ceiling tiles, or asphalt products. Item L applies to the use of coal combustion slag as a sand blast abrasive. The rules permit these uses as specified without contacting the MPCA.

Although no large-scale market exists for slag at this time, successful applications of slag reported by the Wabash River **Project** include concrete cement feedstock, road construction applications (filler for asphalt, blasting grit), roofing material, structural fill, and alternative landfill cover. It has been determined that the blasting grit and roofing granules market provides the best opportunity at this time; however, the single local slag dealer contacted does not have the capacity to accept all of the slag generated from the Mesaba Power Plant. Additional slag dealers or blasting grit/roofing materials manufacturers would need to be identified to maximize marketing of slag (EERC, 2006). If the Mesaba Energy Project generates more slag than the market can accept, then the slag will be land filled. Two existing landfills (in Virginia and Canyon, MN) have roughly 8.7 million cubic yards of permitted capacity (combined), with land available for additional expansion beyond the currently permitted capacities. **If eventually expanded, these landfills would require approval through the state permitting process.**

Elemental sulfur will also be generated as a **non-hazardous** byproduct of power plant operations **and stored in molten form**. It is estimated that approximately 60,000 tons of sulfur would be generated per year per phase of the project. In the United States, production of sulfuric acid is the major use of elemental sulfur, accounting for 90 percent of elemental sulfur consumption. **For comparison, the Wabash River Project reportedly markets its high-purity elemental sulfur in the agricultural chemicals market.** Excelsior is in the process of identifying local markets for elemental sulfur, most likely within the fertilizer manufacturing industry, which utilizes elemental sulfur for manufacture of sulfuric acid (EERC, 2006).

Table 4.16-3 Toxicity Characteristic Leaching Procedure test results for E-Gas™ Slag

Toxicity Characteristic Leaching Procedures	RCRA Regulatory Level, mg/l	Leachate from E-Gas Slag, mg/l
Metals		
Arsenic	5	<0.5
Barium	100	<0.5
Cadmium	1	<0.5
Chromium	5	<0.1
Lead	5	<1
Mercury	0.2	<0.002
Selenium	1	<0.1
Silver	5	<0.1
Organics		
Pyridine	5	<0.5
1,4-Dichlorobenzene	7.5	<0.5
o-Cresol	200	<0.5
m- & p- Cresol	200	<0.5
Hexachloroethane	3	<0.5
Nitrobenzene	2	<0.5
Hexachloro-1,3-butadiene	0.5	<0.5
2,4,6-Trichlorophenol	2	<0.5
2,4,5-Trichlorophenol	400	<0.5
2,4-Dinitrotoluene	0.13	<0.5
Hexachlorobenzene	0.13	<0.5
Pentachlorophenol	100	<0.5
Volatile Organics		
Vinyl Chloride	0.2	<0.005
1,1-Dichloroethylene	0.7	<0.005
Methyl Ethyl Ketone	200	<0.005
Chloroform	6	<0.005
1,2-Dichloroethane	0.5	<0.005
Benzene	0.5	<0.005
Carbon Tetrachloride	0.5	<0.005
Trichloroethylene	0.5	<0.005
Tetrachloroethylene	0.7	<0.005
Chlorobenzene	100	<0.005
1,4-Dichlorobenzene	7.5	<0.005

Source: Excelsior Energy. 2006a

Other non-hazardous solid wastes generated annually during operation of Phase I and Phase II would include refractory brick and insulation from gasifier repairs (360 tons), spent catalyst materials associated with the COS hydrolysis and SRU systems (approximately 70 tons), scrap metal (200 cubic yards), waste paper and cardboard (320 cubic yards), and combined industrial waste (320 cubic yards) as shown in Table 4.16-**4**. Non-hazardous solid wastes would be recycled or reused on site when possible. If recycling or reuse were not feasible, non-hazardous solid waste would be disposed of at an off-site non-hazardous waste landfill.

Sanitary wastewater generated during operation of the Mesaba Generating Station **is addressed in Section 4.14. [Text in the Draft EIS on this subject has been deleted at this point.]**

Hazardous Waste

Table 4.16-**4** summarizes the expected hazardous waste streams that would be generated during Mesaba Generating Station operation. **The wastes generated for the Mesaba Energy Project Phase I would be approximately half the quantities listed for the combined Phases I and II.** Hazardous waste generated during operations would be limited, for the most part, to the operation of the generating station. Any hazardous waste generated from the operation and maintenance of the HVTLs, gas pipelines, and rail lines would likely be limited to small amounts of oils and cleaning solvents generated from the maintenance of equipment.

Operational hazardous wastes would include ZLD filter cake; process waste sludges, residues, and spent cleaning materials (acids and ash); used oils and fluids; and cleaning and maintenance wastes. The predominant hazardous wastes generated annually would include spent sulfuric acid (14,000 gallons) and ZLD filter cake (4,400 tons **per year from treatment of process water and an** additional <24,500 tons per year **from treatment of cooling tower blowdown water)**. Spent sulfuric acid would be disposed of off site at a licensed disposal facility. **[Text addressing sulfur in the Draft EIS has been deleted at this point and relevant information has been added to the preceding subsection]** Filter cake would likely be classified as a hazardous waste due to metals content, and would be disposed in an approved hazardous waste landfill or other licensed facility. Other hazardous wastes generated would be recycled, treated, or disposed of at a permitted hazardous waste landfill.

Due to the quantity of hazardous waste generated, the Mesaba Generating Station would likely be regulated as a large-quantity generator of hazardous waste and would need to adhere to the requirements under RCRA for the handling **of generated hazardous waste**. Hazardous waste generated during operations would be properly managed and stored on site in accordance with RCRA and Minnesota regulations (Minnesota Rules, Chapter 7045).

The quantity and type of hazardous waste that would be generated during operations would be accepted by treatment, storage and disposal facilities, and therefore, commercially available treatment or disposal would be available. Although specific hazardous waste landfills have not been identified, Excelsior is currently negotiating with a waste management company that operates 13 permitted hazardous waste treatment, storage and disposal facilities throughout the U.S., which can accept the types of wastes expected from construction and operation of the Mesaba Generating Station. The nearest permitted facilities operated by this company are located within eastern Wisconsin.

Waste Minimization and Storage

The Mesaba Generating Station would be designed to minimize process-related discharges to the environment compared to other coal-powered plants. For instance, the use of a ZLD process would prevent the discharge of heavy metals and other gasification wastes in wastewater. The advanced features of E-Gas™ technology would also eliminate two solid waste streams (flue gas desulfurization solids and ash) associated with some other types of coal-based power generation. Table 2-2.6 lists the storage, waste minimization, or recycling processes that would be incorporated into the design of the Mesaba Generating

Station to further minimize generation of waste. In accordance with state and county recycling goals, whenever possible, operational wastes would be reused or recycled.

Table 4.16-4. Annual Quantity of Non-Hazardous and Hazardous Waste Generated from Phase I and Phase II Operations

Waste Description	Comments	Annual Quantity[a]	Status[b]	Likely Disposal or Treatment Method
Used Catalysts and Sorbents				
COS hydrolysis catalyst	Proprietary composition	42 tons	NH	Non-hazardous landfill
Hydrolysis catalyst support balls	Alumina silicate	14 tons	NA	Recycle
Claus sulfur recovery catalyst	Activated alumina	28 tons	NH	Non-hazardous landfill
Claus catalyst support balls	Activated alumina	10 tons	NA	Recycle
Hydrogenation catalyst	Cobalt molybdenum	6 tons	NA	Metals reclaim
Hydrogenation. catalyst support balls	Alumina silicate	2 tons	NA	Recycle
Amine regenerator carbon filter	Activated carbon	26 tons	H	Stabilize, hazardous waste landfill
Syngas treatment carbon	Activated carbon	60 tons	H	Stabilize, hazardous waste landfill
Mercury removal carbon	Impregnated carbon	14 tons	H	Stabilize, hazardous waste landfill
Sour water carbon	Activated carbon	48 tons	H	Stabilize, hazardous waste landfill
MDEA reclaim ion exchange	Ion exchange resin	0.4 tons	NH	Non-hazardous waste landfill
Other Process Wastes				
Slag	IGCC by-product	584,000 tons	NH	Market for reuse or landfill
Elemental Sulfur	IGCC by-product	120,000 tons	NH	Market for reuse or off-site treatment
ZLD filter cake (Gasification Island)	Inorganic and organic salts	4,400 tons	H	Stabilize, hazardous waste landfill
ZLD filter cake (**Cooling Tower Blowdown**)	Inorganic and organic salts	<24,500 tons	**NH[c]**	**Characterize, dispose as non-hazardous or hazardous wastes**
Refractory brick and insulation	Gasifier repairs	360 tons	NH	Non-hazardous waste landfill

Table 4.16-4. Annual Quantity of Non-Hazardous and Hazardous Waste Generated from Phase I and Phase II Operations

Waste Description	Comments	Annual Quantity[a]	Status[b]	Likely Disposal or Treatment Method
MDEA sludge	Reclaimer bottoms	10,000 gallons	H	Incinerate or hazardous waste landfill
Sour water sludge	Char carryover in syngas	30 tons	H	Incinerate
Waste char and ash	Maintenance cleaning	160 tons	NH	Non-hazardous waste landfill
Amine absorber residues	Iron and salts	20 cubic yards	NH	Non-hazardous waste landfill
Other Process Wastes				
Metallic filter elements		60 cubic yards	H	Stabilize, hazardous waste landfill
Spent citric acid	Cleaning solution	40 drums	H	Approved disposal facility
Spent soda ash	Cleaning solution	40 drums	H	Approved disposal facility
Spent sulfuric acid	Line cleaning solution	14,000 gallons	H	Approved disposal facility
Off-line combustion turbine wash wastes	Detergent and residues	15,000 gallons	NH[c]	Characterize, dispose as non-hazardous or hazardous wastes
HRSG wash water (infrequent)	Detergent, residues, neutralized acids	100,000 gallons	NH[c]	Characterize, dispose as non-hazardous or hazardous wastes
Raw water treatment sludge and used water filter media	Solids removed from makeup water to plant	TBD	NH[c]	TBD

Table 4.16-4. Annual Quantity of Non-Hazardous and Hazardous Waste Generated from Phase I and Phase II Operations

Waste Description	Comments	Annual Quantity[a]	Status[b]	Likely Disposal or Treatment Method
Miscellaneous Streams				
Used oil	Lube oils, oil from oil/water separator	8,000 gallons	NA	Send to reclaimer
Spent grease		16 drums	NH	Blend to gasifier feed
Miscellaneous solvents, coal tars		2 drums	H	Solvent reclaimer
Flammable lab waste		2 drums	H	Blend to gasifier feed
Scrap metal	Steel, aluminum, etc.	200 cubic yards	NH	Recycle
Waste paper and cardboard	Office, shops, packing, etc.	320 cubic yards	NH	Recycle
Combined industrial waste	Used PPE, materials, small amounts of refractory, slurry debris, etc.	320 cubic yards	NH	Non-hazardous waste landfill

Notes:
[a] **Approximate quantities for Phases I and II combined of the Mesaba Generating Station. A Phase I power plant alone would generate approximately half these amounts.**
[b] NH= non-hazardous, H=hazardous, NA=not applicable **(subject to recycling rules)**
[c] This waste stream would likely be non-hazardous, however, testing would have to be done to determine if it exhibits hazardous waste characteristics

To reduce the risk of a hazardous substance release to the environment, an Environmental Management System and a Pollution Prevention/Waste Minimization Program would be developed during the planning, construction, and operational phases, which would include an evaluation of alternatives to eliminate, reduce, or minimize the amounts of hazardous materials used and hazardous wastes generated. Project planning would include reviews of forecasted hazardous material purchases and use, and the investigation of less-hazardous substitutes. Potential areas for source reduction and recycling could also be identified to reduce the quantity of materials used and waste generated.

In addition, the SPCC Plan would anticipate contingency spill events, thereby protecting environmental media from the effects of accidental releases. All aboveground storage tanks would be lined or paved, curbed/diked, and have sufficient volume to meet all regulatory requirements. The plant would have a drainage plan that would isolate routine, process-related operations from affecting the surrounding environment. Facility design features and management programs would be established to address hazardous materials storage locations, emergency response procedures, employee training requirements, hazard recognition, fire control procedures, hazard communications training, personal protective equipment training, and accidental release reporting requirements. The Mesaba Generating Station would comply with all applicable OSHA hazardous material requirements. **An Emergency Response Plan would be required by OSHA Standard 1910.120[q] as explained in Section 4.13.** Emergency services would be coordinated with local fire departments, police departments, paramedics, and hospitals. A first aid office would be maintained on site for minor first aid incidents. Trained/certified Health Safety and Environmental personnel would be continuously on site to respond to and coordinate emergencies.

Waste minimization and pollution prevention programs would be implemented, and hazardous and non-hazardous wastes would be properly collected, segregated, and recycled or disposed at approved waste management facilities within regulatory time limits and in accordance with requirements. Plant staff would be adequately trained in proper waste handling procedures. Waste manifests and other records and reporting would be maintained as required by regulations and company procedures. A comprehensive secondary containment program would ensure that appropriate tanks, walls, dikes, berms, curbs, etc., would be used to provide adequate secondary containment for liquid storage. Worker training and safety programs would be established to ensure that workers are aware and knowledgeable of spill containment procedures and related health and environmental protection policies.

4.16.3 Impacts on West Range Site and Corridors

4.16.3.1 Impacts of Construction

No additional materials would be used or wastes generated during construction of the West Range Site other than those described in Section 4.16.2.1. The quantity of solid waste generated would be more than for the East Range Site because the HVTL alternatives would be located on more new ROW than for the East Range Site; therefore, more clearing of trees and vegetation would likely be required.

Based on the conclusions of a Phase I assessment performed for the West Range Site (described in Section 3.16.2.1) (SEH, 2005a), several on-site and off-site areas of potential concern were identified that could be affected by the West Range Site. The Phase I Site Assessment identified solid waste (trash, batteries, old equipment) on and adjacent to the site, and stained areas along railroad ties located along the eastern boundary of the West Range Site. During construction, any such materials located within the construction site would be removed and disposed of properly, and would not have an adverse impact on construction of the site. If any evidence of a release from these materials at the site were noted during construction (stained soil or stressed vegetation), the affected soil or vegetation would be removed from the site, necessary remediation or cleanup would be conducted, and removed materials would be disposed of properly. A Phase I assessment was not performed for the HVTLs and gas pipeline corridors that would be associated with the West Range Site.

Based on information available from MPCA, two closed landfills are located in Itasca County: the Iron Range Sanitary Landfill and the Grand Rapids Landfill. 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. Exceedances of VOCs and metals were detected in monitoring wells at the Iron Range Landfill during 2002 to 2003 (MPCA, 2004a). Based on the MPCA report, groundwater flow from the landfill is to the south/southeast away from the West Range Site; therefore, West Range Site groundwater conditions would not be expected to be affected by the closed landfill. The closed Grand Rapids Landfill is located approximately 10 miles to the southwest of the West Range Site and would not affect the West Range Site.

4.16.3.2 Impacts of Operation

The West Range Site would not use any materials or generate any additional non-hazardous or hazardous wastes other than those presented in Section 4.16.2.1. No adverse impacts would be expected to occur from the operation of the proposed Mesaba Generation Station at the West Range Site beyond those discussed in Section 4.16.2, Common Impacts of the Proposed Action.

4.16.4 Impacts on East Range Site and Corridors

4.16.4.1 Impacts of Construction

No additional materials would be used or wastes generated during construction of the East Range Site other than those described in Section 4.16.2.1. The quantity of non-hazardous solid waste generated would be less for the East Range Site than for the West Range Site because the HVTLs would be located along existing utility lines and therefore, less clearing of trees and vegetation would likely be required for the East Range Site.

One closed landfill, the Hoyt Lakes Sanitary Landfill, is located approximately 3,000 feet south of the East Range Site along Hoyt Lakes Road. Groundwater monitoring has detected low levels of intermittent VOCs in the groundwater beneath the closed landfill site (MPCA, 2006d). Groundwater in the area flows southward; therefore, East Range Site groundwater conditions would not be expected to be affected by the closed landfill.

4.16.4.2 Impacts of Operation

The East Range Site would not use any materials or generate any additional non-hazardous or hazardous wastes other than those presented in Section 4.16.2.**2**. **[Text in the Draft EIS pertaining to the use of an enhanced ZLD system exclusively at the East Range Site has been deleted at this point]** No adverse impacts would be expected to occur from the operation of the proposed Mesaba Generating Station at the East Range Site beyond those discussed in Section 4.16.2, Common Impacts of the Proposed Action.

4.16.5 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. Under the No Action Alternative, materials would not be delivered and stored for the construction or operation of the Mesaba Generating Station, access roads, rail lines, HVTLs, or gas pipelines. Subsequently, no non-hazardous or hazardous waste would be generated from the construction or operation of the Mesaba Generating Station.

4.16.6 Summary of Impacts

Basis for Impact	No Action	West Range	East Range
Create reasonably foreseeable conditions that would increase the risk of a hazardous material release.	No increase in the risk of a hazardous waste release.	Proper handling and storage of wastes in accordance with RCRA would be adhered to minimize potential for a release of a hazardous material to the environment.	Proper handling and storage of wastes in accordance with RCRA would be adhered to minimize potential for a release of a hazardous material to the environment.
Volume of solid waste generated would directly or indirectly affect the capacity of solid waste collection services and landfills.	No solid waste would be generated.	In-state or out-of-state solid waste collection services and landfills would have the capability and capacity to accept solid wastes generated. Additional market analysis would be required to secure a market and avoid disposal of slag (500-800 tons per day generated).	In-state or out-of-state solid waste collection services and landfills would have the capability and capacity to accept solid wastes generated. Additional market analysis would be required to secure a market and avoid disposal of slag (500-800 tons per day generated).
Wastes would be created for which there are no commercially available disposal or treatment technologies.	No wastes would be generated.	Commercially available treatment, stabilization, or disposal for waste streams generated.	Commercially available treatment, stabilization, or disposal for waste streams generated.
Quantity of hazardous waste generated would directly or indirectly affect the capacity of hazardous waste collection and disposal services.	No hazardous wastes would be generated.	In-state or out-of-state hazardous waste collection services and treatment, stabilization or disposal facilities would have the capability and capacity to accept hazardous wastes generated.	In-state or out-of-state hazardous waste collection services and treatment, stabilization or disposal facilities would have the capability and capacity to accept hazardous wastes generated.
Waste generation would create reasonably foreseeable conditions that would increase the risk of a hazardous waste release to the environment.	No hazardous wastes would be generated.	No substantial increase in risk of a hazardous waste release to the environment. Proper handling and storage of wastes in accordance with RCRA would be adhered to.	No substantial increase in risk of a hazardous waste release to the environment. Proper handling and storage of wastes in accordance with RCRA would be adhered to.

4.17 SAFETY AND HEALTH

4.17.1 Approach to Impacts Analysis

4.17.1.1 Region of Influence

The public health and safety region of influence consists of the persons residing within 3 kilometers (1.9 miles) of the proposed IGCC facility footprint (for air emissions); public roads and at-grade crossings near the proposed plant sites (for transportation safety); and residences adjacent to proposed HVTLs and natural gas corridors. Safety of on-site workers (construction and operation) is also evaluated.

4.17.1.2 Method of Analysis

Human health and safety-related impacts were considered from both contaminant exposure and worker safety perspectives. Methods to assess worker safety-related impacts were based on application of accident and incident rate data as described in Section 3.17 for activities that are expected to be associated with the Proposed Action.

Transportation safety issues related to traffic accidents were evaluated by using the average traffic fatality rate for the state of Minnesota. The estimated number of potential vehicular traffic fatalities was based on assuming a total distance traveled from workers commuting during both the construction and operational phases. Based on Mn/DOT traffic accident data over the years 2001 through 2005, an average fatality rate of 1.2 per 100 million vehicle miles traveled was used to predict fatalities as a result of the Proposed Action during construction and operations. Regarding rail transport and at-grade crossings, safety impacts as a result of increased rail activity from the project are discussed in a qualitative manner.

An AERA was conducted on the Mesaba Energy Project (see Appendix C) to identify the sources or groups of sources, chemicals, and associated pathways that may pose a risk to the public as a result of air emissions. The AERA, as prescribed by the MPCA, includes both quantitative and qualitative evaluation of emissions and potential **exposure** pathways.

Since emission source stacks for the plant would be less than 100 meters in height, the AERA evaluation was completed for an area within a 3-kilometer radius of the proposed facility emission points (MPCA, 2004b). Several methods of quantitative analysis were conducted.

The first method was to estimate risk using the Risk Assessment Screening Spreadsheet (RASS) developed by MPCA. The RASS method is used to predict both acute and sub-chronic risks associated with the facility, and as a screening tool it uses very conservative default dispersion assumptions.

The second method, the **Q/CHI** approach, estimates risk from each emission source stack by computing **a Q/CHI** quotient for the chemicals of concern. The **Q/CHI** has several advantages over the RASS, in that it models dispersion specific to each emission unit, automatically calculates hazard indices with respect to time and space, and takes into consideration exhaust parameters (exit velocities and temperatures) and terrain.

In both the RASS and **Q/CHI** methods, risk due to the inhalation pathway is estimated for chemicals causing carcinogenic and non-carcinogenic effects. Risk at any location is additive for all sources. Risk levels for chemicals having cancer endpoints are considered to be within U.S. EPA standards if an individual chemical produces a cancer risk less than one in one million (10^{-6}) and an individual chemical, having non-cancer endpoints, produces a hazard index less than 0.1 (EPA, 2005). Also, if the sum of the individual chemical cancer risks is less than one in 100,000 (10^{-5}) and the sum of the individual non-cancer hazard quotients (hazard index) is less than 1, risk is also considered to be within U.S. EPA standards.

A third method, the Industrial Risk Assessment Program (IRAP) – Health View model, was used to predict chronic risks. IRAP was developed by Lakes Environmental Software, Inc., to comply with the

requirements of the U.S. EPA Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities guidance document (EPA, 2005). This complex protocol was developed to estimate human health risk at hazardous waste combustion facilities from multi-pathway exposure to chemicals released to the ambient air. With IRAP, risk is predicted via direct (inhalation) and indirect (ingestion of or contact with soil, plants, fruits, vegetables, beef and milk, chicken and eggs, and fish) pathways for each scenario (resident adult, resident child, farmer adult, etc.) specified. Worst-case annual emission rates are used in the IRAP evaluation.

Risk associated with ingestion of fish tissue potentially contaminated with mercury was evaluated using the MPCA's Draft Mercury Risk Estimation Method for the Fish Consumption Pathway (Local Impacts Assessment) (MPCA, 2006f). The method combines current fish tissue mercury concentrations with potential increases in atmospheric deposition to arrive at an estimate of future methylmercury tissue concentrations. Risk from ingestion of fish tissue potentially affected by other contaminants of concern associated with the facility was also evaluated using the IRAP model.

Emission rates for **chemicals of potential concern** were estimated using the following sources (listed in order of preference):

- Results of regulatory test programs at the existing Wabash River **Plant**, Indiana, E-Gas™ IGCC facility - adjusted, if appropriate, for the expected worst-case feeds to the Mesaba Energy Project;
- Equipment supplier information;
- Published emission factors and reports applicable to IGCC facilities;
- Engineering calculations and judgment; and
- U.S. EPA emission factors (AP-42).

The chemicals of potential concern evaluated in the AERA are shown in Table 4.17-1. **Based on comments from MPCA, the emission rates were revised to reflect additional conservatism for the purposes of risk assessment.** Table 4.17-2 shows the exposure pathways evaluated.

Table 4.17-1. Chemicals Evaluated in the AERA (Phases I and II) Reflecting Additional Conservatism for Risk Assessment

Compound	Total Phase I Tons/year	Phase I and Phase II Tons/year
Acetaldehyde	**0.045**	**0.089**
Acetophenone	**0.022**	**0.045**
Acrolein	**0.44**	**0.87**
Antimony	**0.030**	**0.059**
Arsenic	**0.11**	**0.21**
Benz[a]anthracene	**5.7E-05**	**1.1E-04**
Benzene	**0.52**	**1.0**
Benzo(k)fluoranthene	**1.6E-04**	**3.2E-04**
Benzo[a]pyrene	**5.7E-05**	**1.1E-04**
Benzyl chloride	**1.0**	**2.1**
Beryllium	**0.006**	0.013
Biphenyl	0.003	0.005
Bis(2-ethylhexyl)phthalate (DEHP)	**0.11**	**0.22**

Table 4.17-1. Chemicals Evaluated in the AERA (Phases I and II) Reflecting Additional Conservatism for Risk Assessment

Compound	Total Phase I Tons/year	Phase I and Phase II Tons/year
Bromoform	**0.057**	**0.11**
Cadmium	**0.46**	**0.92**
Carbon disulfide	**1.1**	**2.29**
Carbonyl sulfide	**0.000**	**0.000**
Chloroacetophenone, 2-	**0.010**	**0.020**
Chlorobenzene	**0.032**	**0.065**
Chloroform	**0.089**	**0.18**
Chromium, total	**0.018**	**0.036**
Chromium, (trivalent)	**0.013**	**0.027**
Chromium, (hexavalent)	**0.005**	**0.011**
Chrysene (Benzo(a)phenanthrene)	**1.5E-04**	**3.0E-04**
Cobalt	**0.023**	**0.046**
Cumene	**0.008**	**0.016**
Cyanide (Cyanide ion, Inorganic cyanides, Isocyanide)	**0.18**	**0.36**
Dimethyl sulfate	**0.072**	**0.14**
Dinitrotoluene, 2,4-	**4.3E-04**	**8.5E-04**
Ethyl benzene	**0.48**	**0.95**
Ethyl chloride (Chloroethane)	**0.062**	**0.12**
Ethylene dibromide (Dibromoethane)	**0.002**	**0.004**
Ethylene dichloride (1,2-Dichloroethane)	**0.060**	**0.12**
Formaldehyde	**0.43**	**0.85**
Hexane	**0.10**	**0.20**
Hydrochloric acid	**0.097**	**0.19**
Hydrogen fluoride (Hydrofluoric acid)	**1.2**	**2.4**
Indeno(1,2,3-cd)pyrene	**9.2E-05**	**1.8E-04**
Isophorone	**0.87**	**1.7**
Lead	**0.22**	**0.044**
Manganese	**0.046**	**0.092**
Mercury	**0.017**	**0.035**
Methyl bromide (Bromomethane)	**1.3**	**2.6**
Methyl chloride (Chloromethane)	**0.82**	**1.6**
Methyl chloroform (1,1,1 -Trichloroethane)	**0.029**	**0.059**
Methylchrysene, 5-	**3.2E-05**	**6.5E-05**

Table 4.17-1. Chemicals Evaluated in the AERA (Phases I and II) Reflecting Additional Conservatism for Risk Assessment

Compound	Total Phase I Tons/year	Phase I and Phase II Tons/year
Methyl ethyl ketone (2-Butanone)	**0.59**	**1.2**
Methyl hydrazine	**0.25**	**0.51**
Methyl methacrylate	**0.029**	**0.059**
Methyl tert butyl ether	**0.052**	**0.10**
Methylene chloride (Dichloromethane)	**0.059**	**0.12**
Naphthalene	**0.081**	**0.16**
Nickel	**0.057**	**0.11**
Phenol	**1.9**	**3.8**
Proprionaldehyde	**0.57**	**1.1**
Selenium	**0.025**	**0.049**
Styrene	**0.037**	**0.075**
Sulfuric acid and sulfates	**62.8**	**125.6**
2,3,7,8-Tetrachlorodibenzo-pdioxin (as equivalents)	**1.7E-09**	**3.5E-09**
Tetrachloroethylene (Perchloroethylene)	**0.064**	**0.13**
Toluene	**0.098**	**0.20**
Vinyl acetate	**0.011**	**0.022**
Xylenes	**0.17**	**0.33**

HAP – Hazardous Air Pollutant

Table 4.17-2. IRAP Exposure Pathways Evaluated

Exposure Pathways	*Exposure Scenarios (Receptors)*					
	Adult Farmer	Child Farmer	Adult Resident	Child Resident	Adult Fisher	Child Fisher
Inhalation of vapors and particulates	X	X	X	X	X	X
Incidental ingestion of soil	X	X	X	X	X	X
Ingestion of drinking water from surface water sources	X	X	X	X	X	X
Ingestion of homegrown produce	X	X	X	X	X	X
Ingestion of homegrown beef	X	X				
Ingestion of milk from homegrown cows	X	X				
Ingestion of homegrown chicken	X	X				
Ingestion of homegrown pork	X	X				
Ingestion of fish					X	X

In response to comments by MPCA on the Draft EIS, a more conservative basis was established for the AERA emissions inventory and is reflected in the information presented in Table 4.17-1. Specifically, the highest measured value of any chemicals of potential concern quantified in a valid stack test was used instead of the average of several valid tests (chemicals of potential concern emission rates were derived by averaging the results from valid stack tests at the Wabash River Plant).

The AERA determined that chemicals of potential concern emissions at the Mesaba Generating Station would be reduced by the inherently low polluting IGCC technology and many of the same process features that control criteria emissions. A large portion of the heavy metals and other undesirable constituents of the feedstock would be immobilized in the non-hazardous, vitreous slag by-product and prevented from causing adverse environmental effects. Gaseous and particle-bound chemicals of potential concern that may be contained in the raw syngas exiting the gasifiers will be totally or partially removed in the syngas particulate matter removal system, water scrubber, and AGR systems.

4.17.1.3 Evaluation of Impacts

The evaluation of potential impacts on public safety and health considered whether the Proposed Action or an alternative would cause any of the following conditions:

Construction and Operational Safety

- Increase the risk to worker safety and health during facility construction and/or operation.

Transportation Safety

- Increase traffic fatalities.
- Increase safety risks for at-grade rail crossings.

Community Health Risks

- Create a cancer risk to the public exceeding one in one million (10^{-6}) for an individual chemical or a risk exceeding one in 100,000 (10^{-5}) for the sum of individual chemicals (EPA, 2005).
- Create a non-cancer health (morbidity) risk to the public as expressed by a hazard index exceeding 0.1 for an individual chemical or exceeding 1.0 for the sum of individual chemicals (EPA, 2005).
- Create an incremental health risk to subsistence fishers as expressed by a hazard index exceeding 1.0 for mercury via the fish ingestion pathway (MPCA, 2006f).
- Create a risk to public health and safety from EMF exposure.
- Create a risk to public health and safety from exposure to charged particulates.

4.17.2 Common Impacts of the Proposed Action

4.17.2.1 Worker Safety

Construction and Operation Safety Statistics

Worker safety-related impacts associated with the Proposed Action would be associated with facility construction, operation of industrial equipment, and transportation of materials and wastes to and from the sites. For these project-related areas, notable differences are not expected between the two alternative site locations. Therefore, a comparative discussion of worker safety-related impacts is not provided in this section. Based on the incident rates developed by the Bureau of Labor Statistics (see Section 3.17), the potential for work-related incidents and accidents are presented in Table 4.17-3.

Table 4.17-3. Predicted Incidents for the Proposed Action

Industry	Estimated Number of Workers	Potential for Recordable Incidents per Year	Potential Lost Workday Cases per Year	Potential Number of Fatalities (based on rate per 100,000 FTEs)
Construction (peak)	2,985	173	66	<1 (0.4)
Utilities (nominal)	107	3	<1	< 1 (0.01)

Coal Gasification Plant Health and Safety Risk Factors

In 1978, the National Institute for Occupational Safety and Health issued a publication on the occupational exposures in coal gasification plants (NIOSH, 1978). This document does not necessarily reflect the decades of advances in coal gasification technology, including the combined-cycle process that would be included in the Mesaba Energy Project. However, it provides useful information regarding the types of occupational health and safety factors associated with coal gasification plants.

According to **the National Institute for Occupational Safety and Health** , a significant source of worker exposure in all coal gasification plants would be periodic, unpredictable leaks from process lines, vessels, flanges, valves, pumps, and other equipment (NIOSH, 1978). Design and operational measures that can reduce accidents may include performing routine inspections of equipment and process lines, providing adequate general ventilation in closed process areas, designing relief valves piped to emergency vents away from work spaces, isolating hot process equipment or lines to prevent contact, and installing automatic gas leak monitoring systems and alarms. Noise can present significant chronic and acute health hazards to workers unless adequate controls are integrated into plant design, and unless such controls are satisfactorily maintained and strictly enforced (NIOSH, 1978).

The principal occupational hazards associated with coal handling (excluding mining) result from chronic dust inhalation, fire, and explosions. To reduce dust dispersion, coal should be stored in closed bins or silos and kept thoroughly moistened during handling and transport.

4.17.2.2 Transportation Risks

Estimated Fatalities During Construction and Operation

During the construction and operation phases, personnel and material would be moved by personal vehicles and trucks. Such movements of personnel and material could lead to roadway accidents.

It is estimated that there would be a maximum of 1,500 personnel on site during the peak construction period. The accident analysis performed in this section assumes an average of 700 workers per month over a five-year construction period (including Phase I and II construction and material transport). It is assumed that each worker would make two trips per day over six days a week each year. To provide a conservative upper bound estimate of roadway accidents, it was assumed that all workers would individually make daily vehicle trips of 50 miles per day on roadways (same for both West Range and East Range Sites), even though it is likely that many construction workers would reside closer to the project sites and carpool often with other workers. If each trip is assumed to be 50 miles in length, then collectively, over the five-year period, the total number of miles driven by all workers would be approximately 101 million miles.

Based on a fatal accident rate of 1.2 fatalities per 100 million vehicle miles traveled, approximately 1.2 fatalities could occur due to the movement of workers and material via trucks and personal vehicles during construction (estimate is same for both West Range and East Range Sites).

During operations, it is assumed that approximately 107 employees would be required for Phase I and 75 employees for Phase II, for a total of 182. Assuming every employee travels an average of 50 miles per day to work, five days per week for 48 weeks a year, this would collectively total approximately 44 million miles traveled over a 20-year period over operations. Based on a fatal accident rate of 1.2 fatalities per 100 million vehicle mile traveled, approximately 0.53 fatalities could occur due to the travel of workers during operation (estimate is same for both West Range and East Range Sites).

Rail Transport and At-Grade Crossing Safety During Construction and Operation

Concerning safety issues, particular attention is paid to public at-grade rail-highway crossings because of the project's use of the rail transport of material inputs and outputs. It is anticipated that a unit train could include up to 135 cars (approximately 8,000 feet total length) with an average unit train comprising 115 cars. Most of the trains in the region travel at speeds of up to 25 miles per hour. Therefore, 115- and 135-car unit trains could take approximately three and four minutes, respectively, to clear a public at-grade crossing, which would cause delays for local emergency vehicles (see Section 4.11, Community Services).

The examination of at-grade crossing safety typically considers the expected numbers and locations of grade crossings, the volume of both vehicle and rail traffic at crossings, the nature of road traffic (e.g., trucks versus passenger vehicles), the design and safety features of the crossings, and train and vehicle speeds in the vicinity of any crossings.

Because the transport of coal from the PRB to the northeastern Minnesota region is approximately 1,200 miles long, it traverses many public at-grade crossings and any addition of train trips would increase the likelihood of crossing accidents within this existing rail corridor. Up to one roundtrip (i.e., two train trips) a day is anticipated for Phase I, and for Phase II, up to two roundtrips (i.e., four train trips) are anticipated. As discussed in Section 4.15.2.2, the proposed incremental increase to train traffic would not be significantly different in comparison to existing rail conditions given the highly active and well established coal production and rail activities in the region. Therefore, the increase in safety hazards within the existing rail route is expected to be minimal.

The location of at-grade crossings on rail routes near the West Range and East Range Sites were identified in Sections 3.15.3.2 and 3.15.3.3, respectively. Since the frequency of train trips for both Phases I and II is considered a relatively low number and the vehicular traffic volumes are considered low to moderate at these crossings, the increase in safety hazards at the rail crossings would be low. In general, details on the operating characteristics of the trains are unknown at this time; however, it is expected that the proposed rail operations for transport of coal and other potential materials would coordinate with other rail transport movements and rail travel would occur at recommended speeds of up to 25 miles per hour, and therefore, would minimize potential rail accidents at both project sites.

4.17.2.3 Human Health Risks

Carcinogenic and Non-Carcinogenic Morbidity Risks

Human health risks are generally evaluated in comparison to thresholds established by regulatory agencies, including EPA and MPCA, having jurisdiction for standards of exposure. A threshold is determined by the concentration of a chemical or airborne particle below which no appreciable adverse health effects are expected to occur. Examples of thresholds include reference doses, Health Advisories, NAAQS, and American Conference of Governmental Industrial Hygienists Threshold Limit Values for workers. With respect to carcinogens, the product of the chemical-specific exposure and the respective Slope Factor results in a predicted excess lifetime risk. The threshold or "acceptable" excess lifetime cancer risk comprises a range of 10^{-6} (per million) to 10^{-4} (per ten thousand). These values represent excess cancer risks ranging from one additional person per million people exposed to one additional person per ten thousand people exposed. Excess cancer risks to exposed populations lower than one per million people are

considered negligible, and risks greater than one in ten thousand people exposed constitute a significant elevation in excess cancer risk.

Human health-related risks associated with release of potentially harmful contaminants from stack emissions were evaluated under the AERA (**see Appendix C**). Based on analysis in Section 4.3, health-related risks would not be expected from emissions of criteria pollutants from the proposed power plant, because the concentrations are well below EPA's NAAQS, which are set to protect public health and the environment.

Screening-level results using the RASS methodology were calculated in the original AERA (SEH, 2006i) and were above levels of potential concern. As approved by MPCA, subsequent revisions of the AERA did not update or include RASS results because the results were known to exceed screening levels, and compliance relied on the more rigorous Q/CHI and IRAP methodologies instead. [Text in the Draft EIS presenting specific results of the RASS screening test was deleted, because some emission rates have since been revised.]

The **Q/CHI** approach calculated chemical-specific air toxic quotients for chemicals having both carcinogenic and non-carcinogenic endpoints. These quotients were then evaluated at multiple receptors on a grid using AERMOD, a refined dispersion model, with five years of meteorological data. The acute and sub-chronic health risks calculated by the equivalent risk emission rate (ERER) method indicate:

- The maximum-modeled inhalation acute non-cancer hazard index is **0.72**.
- The maximum-modeled **inhalation** sub-chronic non-cancer index is **0.041**.

Both modeled ERER hazard indices are below the MPCA total hazard criterion of 1.0.

Next, the IRAP method of estimating risk was used to evaluate the impacts of the proposed facility for six representative areas of concern that include adult and child residents, farmers and fishers (Table 4.17-2). Eleven receptor locations were evaluated within the 3-kilometer buffer radius from the proposed West Range facility sources.

Total chronic health risks attributable to facility emission sources were calculated by the IRAP method at each receptor location **and the highest cumulative results were reported**. The results indicate that the predicted **cumulative** carcinogenic risk from all combined facility sources is less than 10^{-5} and non-carcinogenic hazard indices are less than 1.0 at all representative locations. Specifically, as can be seen from Table 4.17-4 the highest **cumulative** cancer risks posed by the project to adult and child residents are **$1.4x10^{-6}$** and **$2.3x10^{-7}$**, respectively. The highest **cumulative** risks to adult and child farmers are **$2.5x10^{-6}$** and **$4.6x10^{-7}$**. The highest **cumulative** risks to adult and child fishers are **$1.4x10^{-6}$** and **$2.5x10^{-7}$**. The highest **cumulative** morbidity hazards posed by the project to adult and child residents are **0.080** and **0.081**, respectively. The highest **cumulative** morbidity hazards to adult and child farmers are **0.081** and **0.082**. The highest **cumulative** morbidity hazards to adult and child fishers are **0.080** and **0.081**.

Table 4.17-4. IRAP Summary of Highest Total Risks and Hazard Indices by Exposure Scenarios [(1)]

Receptors with Highest Risk [(2)]	Exposure Scenario Evaluated						Comparison to Criteria
	Resident		Farmer		Fisher		
	Adult	Child	Adult	Child	Adult	Child	
Cancer Risk (Criterion = $1x10^{-5}$)							
RI-3 – **Property Boundary**	**$1.4x10^{-6}$**	**$2.3x10^{-7}$**	**$2.5x10^{-6}$**	**$4.6x10^{-7}$**	**$1.4x10^{-6}$**	**$2.5x10^{-7}$**	Passed
Morbidity Hazard Index (Criterion = 1)							
RI-3 – **Property Boundary**	**0.080**	**0.081**	**0.081**	**0.082**	**0.080**	**0.081**	Passed

(1) Included all chemicals and pathway/route of exposure.
(2) Distance and direction from center of power plant footprint: RI-3 – **0.6** miles to the southeast

Mercury Risks from Fish Consumption

Fishable bodies of water are those that contain water year-round in a year that receives at least 75% of the normal annual precipitation for that area.

Based on AERA guidance for facilities with stack heights less than 100 meters, fishable lakes within a 3-kilometer radius should be considered under the fish consumption pathway. **For the West Range Site, four** fishable bodies of water lie, at least in part, within 3 kilometers of the proposed facility stacks: Dunning Lake, Big Diamond Lake, Little Diamond Lake, and the Canisteo Mine Complex. Since Big Diamond Lake has the most residences surrounding it**,** has the most readily available data (including a fish species survey), and **is in the approximate center of the release plume of potential future facility emissions (based on dispersion modeling for mercury), and therefore, the most impacted lake**, it was chosen to evaluate consumption of potentially contaminated fish tissue.

The methodology used to estimate human health risk for subsistence fish consumption is based on the *Summary of MPCA's Mercury Risk Estimation Method for the Fish Consumption Pathway (Local Impacts Assessment)* (MPCA, 2006f). Estimation of risk associated with fish consumed by adult subsistence fishers on Big Diamond Lake indicated the following:

- Background mercury deposition to the lake (other sources) = 16.5 grams per year
- Mercury deposition to the lake from the proposed plant = 0.08 grams per year
- Incremental increase in mercury in fish tissue from the proposed plant = 0.003 parts per million
- Ambient Subsistence Fisher Hazard Quotient = **11.1**
- Incremental Subsistence Fisher Hazard Quotient from the proposed plant = **0.06**

As noted above, the predicted increment attributable to the proposed facility emission results in **a** hazard quotient **of 0.06**. Thus, **any additional** risk to a subsistence fisher resulting from ingestion of fish tissue after the facility is constructed is negligible. The **incremental hazard** quotient is less than the MPCA risk value of 1.0 via the fish ingestion pathway. **However, the hazard quotient from background mercury sources already exceeds the MPCA risk threshold as indicated above.**

While the ERER, IRAP and mercury impacts to subsistence fishers calculations focused on features of the West Range Site, the results would be similar for the East Range Site. Since the West Range Site is located near more fishable lakes, the mercury impacts to fishermen would potentially be less at the East Range Site.

The 1854 Authority, an inter-tribal natural resource management organization governed by the Bois Forte Band and Grand Portage Band of Lake Superior Chippewa, expressed concerns during the public scoping period of the Mesaba Project about the impacts of the project's air pollutants on fish consumption. The analysis based on the subsistence fishers exposure scenario demonstrates that human health impacts from fish consumption would be negligible even within 3 kilometers of the power plant.

Mercury Risks from Consumption of Other Traditional Food Sources

The 1854 Authority also expressed concern over the effects to water quality, fisheries, and wild rice. The Minnesota Sea Grant College Program sponsored a study between 2001 and 2003 addressing similar concerns regarding the potential health risks associated with consuming aquatic-based Native American traditional foods, such as wild rice, waterfowl, and moose (Renwick, et.al., 2003). The study focused on the bioaccumulation of mercury and lead contaminants within these food sources and analyzed samples of waterfowl tissue, wild rice, and moose muscle and liver from the reservation of the Fond du Lac Band of Ojibwe, located in the Lake Superior Basin of Minnesota. Methylmercury had already been found in high levels in a variety of fish from several of the reservation's lakes, which prompted the further study of other food sources. The study's preliminary results revealed that the potential health risks of consuming wild rice, water fowl, and moose were minimal and that the nutritional, cultural, and economic benefits

appeared substantial. Based on the findings of this study and given the very low increment of mercury and other pollutants that would be emitted from the Mesaba Energy Project and its distance from the closest reservation lands (greater than 20 and 50 miles from the West Range and East Range sites, respectively), the health risks associated with the consumption of traditional Native American foods would be negligible.

Risks from Dioxins, Furans, and Chromium

Emissions of one chemicals of potential concern group—chlorinated dioxins and furans—are expected to be negligible from the Mesaba Generating Station. The chlorine concentration in the product syngas is expected to be low, as chlorine is expected to be removed both by the gasification process itself and also during the water wash treatment process before syngas combustion. Data from the Wabash River Plant shows that chlorine concentrations are below test detection limits. The activated carbon bed treatment system at the Mesaba Generating Station is expected to scrub any potential organic compounds to *de minimis* levels, thereby avoiding the potential for formation of dioxins or furans during their subsequent combustion.

The combustion characteristics of syngas (i.e., carbon monoxide and hydrogen precursors in the presence of excess air at high temperatures in the combustion turbine) further support the expectation that dioxin and furan emissions would be insignificant. Those two precursors would quickly be oxidized to carbon dioxide and water, thereby decreasing the probability of an intermediate formation of high molecular weight condensation substances.

Although dioxin and furan emissions are expected to be insignificant, a sensitivity analysis on the risk impact of dioxin (as equivalents) was conducted at the MPCA's request at two receptor locations near the proposed Mesaba Generating Station. In this analysis, annual emissions rates of dioxin from all emission sources were adjusted to result in a carcinogenic risk due to dioxin equivalents alone of 10^{-6} (one in one million). The two scenarios selected for this evaluation were the adult farmers and adult fishers, because these two populations are predicted to be most at risk at these two locations.

The analysis was conducted under two separate operating scenarios. In the first scenario, both Mesaba Phases I and II would operate at full capacity with the emission sources being two CTGs, one flare, and one TVB for each phase. In the second scenario, only Phase I on the eastern-most footprint would be operational at maximum emission rates.

Two receptor locations were selected for the analysis. The Receptor 3 location, southeast of the property boundary, is the area predicted to receive the maximum project impacts outside of the property boundary. Receptor 3 is closest to fishable waters. The Receptor 7 location, northwest of the property boundary, is in an area that is relatively clear of trees and brush and represents the more likely location for a working farm.

The results of this analysis indicated that dioxin emission rates predicted to result in a 10^{-6} dioxin equivalent carcinogenic risk would be lowest at the Receptor 3 location for the farmer scenario. The emission rates that would result in a 10^{-6} dioxin equivalent carcinogenic risk at Receptor 3 location for the fisher scenario would need to be one order of magnitude higher. These emission rates would be the lowest with either both phases or one phase operating. Operation of Phase I alone would result in emission rates that are roughly one-half of those from both phases. Therefore, the emission rate required to produce a risk of 10^{-6} with Phase I operating alone would be approximately double that with both phases running.

The analysis also indicated that the emission rates, which would result in a 10^{-6} dioxin equivalent risk for the fisher scenario at the Receptor 7 location, would be lower than those for the farmer scenario at the same location. All modeling conducted for this analysis resulted in a cumulative risk from all chemicals of potential concern which did not exceed one in 100,000 (10^{-5}).

Emissions for another chemicals of potential concern —total chromium—were based on testing of product (cleaned) syngas at the Wabash River Plant. Chromium exists primarily in two oxidative states, hexavalent chromium (Cr^{+6}) and trivalent chromium (Cr^{+3}). Because Cr^{+6} is significantly more toxic than Cr^{+3}, it is important that the appropriate inhalation health benchmarks and emission rates are used in the calculation of risk. The following information documents the approach for calculating the chromium emission rates used in the IRAP risk model in order to demonstrate that the approach is conservative. Although the test result showed the chromium concentration was below the detection limit, one-half the test's detection limit was used as the basis for the chromium emission rate calculation for the Mesaba Generating Station. Since there were no test data for hexavalent chromium, the ratio of the AP-42 emission factors for hexavalent chromium to total chromium (30 percent) was used as a surrogate.

The method of estimating hexavalent chromium emissions was very conservative. First, the only chromium species stable enough to survive the high temperatures within the gasifier are the metal itself, chromium (III) nitride, chromium (III) sulfide, chromium (II) sulfide, chromium (II) selenide, or chromium (III) oxide. As noted below, these species have melting points at or near the operative temperature in the gasifier (approximately 2,500°F in the first stage and 1,700°F in the second stage). Therefore, whereas those species will not be gases, they will likely be retained on particles and ultimately partitioned within the slag matrix. Second, chromium (VI) oxide melts at 390°F and decomposes above 480°F to chromium (III) oxide. Third, there are several steps in the syngas cleanup process that will remove particles and the chromium bound to them so that the amount of total chromium entering the turbines is very low.

As a point of reference, emission factors for hexavalent and total chromium from turbines burning natural gas/refinery gas, and distillate oil (published by the California Air Resources Board) were compared with the AP-42 ratios used in the AERA. The ratios of hexavalent to total chromium emission factors for turbines burning those fuels are 14 percent, 11 percent, and 2.5 percent, respectively, which are considerably less than the 30 percent assumed in the AERA for Mesaba.

Particulate Matter (2.5 microns or less) Risks

Particulate matter (PM) comprises both solid particles and liquid droplets found in air. PM in the atmosphere is the result of direct emission of natural and manmade sources, or emissions of other pollutants that react in the atmosphere to form PM. These solid and liquid particles come in a wide range of sizes. Specifically, sources of particles with aerodynamic diameters between 2.5 and 10 microns (referred to as "coarse") include crushing or grinding operations and dust from paved or unpaved roads. Particles less than 2.5 microns in aerodynamic diameter ($PM_{2.5}$) (referred to as "fine" particles) can be emitted directly (e.g., smoke from a fire), or they can form from chemical reactions of gases such as sulfur dioxide, nitrogen dioxide, and some organic gases. Sources of $PM_{2.5}$ include power plants, gasoline and diesel engines, wood combustion, high-temperature industrial processes such as smelters and steel mills, and forest fires. However, the source of $PM_{2.5}$ can be difficult to ascertain because half or more of the $PM_{2.5}$ mass is often composed of secondarily formed species, thereby masking the point of origin. Additionally, $PM_{2.5}$ has a lifetime on the order of several days, allowing it to disperse widely and travel long distances.

PM_{10} emissions pose a health concern because they can be inhaled into and accumulate in the respiratory system. Health effects associated with short-term exposure to coarse particles include premature death in people with heart or lung disease, hospital admissions for heart disease, increased hospital admissions and doctors' visits for respiratory disease, increased respiratory symptoms in children and decreased lung function. However, there is no evidence to suggest that there is a link between long-term exposure to coarse particles and health problems.

As with other pollutants, the health risks associated with exposure to elevated levels of $PM_{2.5}$ are greatest with sensitive populations, such as the young, elderly and those with underlying medical issues. The small size of $PM_{2.5}$ (less than one-seventh the average width of a human hair) facilitates particles lodging deeply into the lungs. Health studies have shown a significant association between exposure to fine particles and premature mortality. Other important effects include aggravation of respiratory and cardiovascular disease (as indicated by increased hospital admissions, emergency room visits, absence from school or work, and restricted activity days), lung disease, decreased lung function, asthma attacks, and certain cardiovascular problems, such as heart attacks and cardiac arrhythmia. Individuals particularly sensitive to fine particle exposure include older adults, people with heart and lung disease, and children. Health effects associated with long-term exposure to $PM_{2.5}$ include premature death in people with heart and lung diseases, death from lung cancer, reduced lung function, and development of chronic respiratory disease in children.

In a study of fine particulate air pollution and mortality in nine California counties, Ostro et al. (2006) presented pooled estimates with 95 percent confidence intervals of percent changes in different daily mortality categories per 10 ug/m^3 of $PM_{2.5}$ increment. Their predictions were as follows:

Mortality Category	Percent Change (95% CI)
All-cause	0.6 (0.2 to 1.0)
Cardiovascular	0.6 (0.0 to 1.1)
Respiratory	2.2 (0.6 to 3.9)
Age >65 years	0.7 (0.2 to 1.1)
Ischemic heart disease	0.3 (–0.5 to 1.0)
Diabetes	2.4 (0.6 to 4.2)

CI – confidence interval

$PM_{2.5}$ was included in the AERA analysis because of the potential health effects associated with this pollutant. To demonstrate that the risks associated with $PM_{2.5}$ emissions from the Mesaba Generating Station would be within acceptable limits, the results of the NAAQS Dispersion Modeling effort, showing the impacts of PM_{10} emissions from the plant, were considered. As explained in Section 4.3, $PM_{2.5}$ emissions were scaled from PM_{10} emissions based on research reported by EPA (USEPA, 2005) and using a conservative multiplier of 0.11 for relative $PM_{2.5}$ from PM_{10} values. As reported in Tables 4.3-9 and 4.3-10, the impacts from both PM_{10} and $PM_{2.5}$ emissions would meet Minnesota and Federal ambient standards. The combined particulate emissions from the Mesaba Generating Station, nearby sources, and background concentrations would be less than Minnesota and Federal $PM_{2.5}$ ambient standards. In addition, although MPCA does not publish a $PM_{2.5}$ background concentration, the $PM_{2.5}$ background concentration is expected to be less than the PM_{10} background concentration.

As indicated in Section 4.3.2.5, 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).

Although the Mesaba Generating Station is expected to release particulates during operation, the newest technologies will be used to ensure minimization of releases. The anticipated health impacts from the incremental increase in $PM_{2.5}$ emissions by the facility are expected to be negligible. The current elevated air impacts to the region are primarily attributable to transboundary input from sources outside of Minnesota.

4.17.3 Corridor-Specific Impacts

The primary public safety aspects of utility corridors are associated with EMF from HVTLs and accidents related to natural gas lines.

4.17.3.1 HVTL Lines

As stated in Section 3.17, only four states have edge of ROW electric field standards and only two states have edge of ROW magnetic field standards (NIEHS, 2002). **Minnesota has a standard for the electric field within the ROW of 8-kV per meter but no standard applicable to the edge of the ROW.** For the purposes of this EIS, the standard for assessing human health impacts **is 8-kV per meter within the ROW. In addition, a target of less than 2-kV per meter** at the edge of the ROW for electric fields and **a target of** 150 mG for 69-kV to 230-kV lines or 200 mG for lines up to 500-kV for magnetic fields **are considered protective of human health**.

The EMF values presented in this section are based on calculations performed with the ENVIRO computer program (ENVIRO is a program originally designed for the Electric Power Research Institute as part of the EPRI EMF Workstation under project RP2472-3, which is now licensed for use through ENERTECH Consultants; see http://www.enertech.net/emfw/products/emfw_products.html#ENVIRO). It provides calculations for conductor surface gradients, electric field, magnetic field and audible noise.

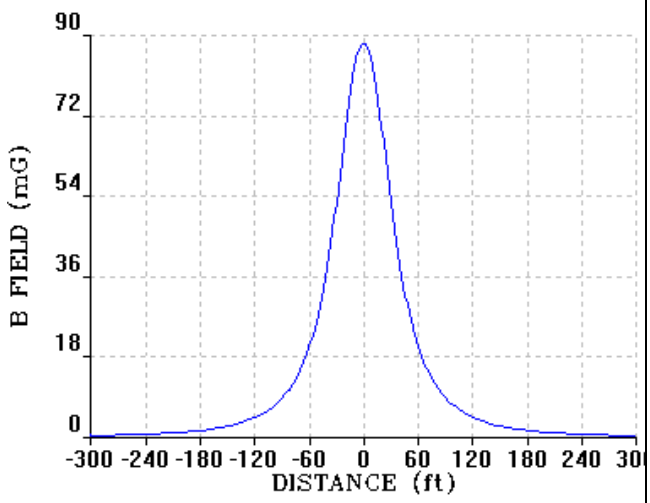
West Range

The current 28L ROW is 145 feet in width and the 62L ROW varies from 160 to 340 feet. The proposed new ROWs between the former Greenway Substation and the Blackberry Substation would be 100 to 150 feet under all alternatives. Though different configurations of the lines and support structures can greatly influence the electric and magnetic fields, the most conservative configurations (showing the greatest field strength at 50 feet from the centerline [CL]) are provided here. Based on the minimum width of proposed and existing ROWs, 50 feet from centerline (100 feet total) is considered the point of compliance (edge of ROW) with the human health standards **for these lines**.

Figure 4.17-1 **(revised for the Final EIS)** shows the electric and magnetic field levels for the 230-kV double circuit without the 115-kV underbuild. Figure 4.17-2 **(revised for the Final EIS)** shows the electric and magnetic field levels for the 345-kV single circuit with a delta configuration without a 115-kV underbuild on the new ROW route.

The magnetic fields at 50 feet from centerline are below both the 150 mG and 200 mG **targets** for 230-kV and 345-kV lines, respectively. The **electric fields for the 230-kV and 345-kV lines would be within the 8-kV per meter Minnesota standard inside the ROW, and the electric field for the 230-kV line would be within the 2-kV per meter target at the edge of the ROW. The** electric field for the 345-kV **single-circuit delta** configuration **would be slightly above the** 2-kV per meter **target at the edge of the ROW (this configuration would be used off-site in one very short segment inWRB-2A on the West Range site and for the new ROW segment linking the 37L and 39L HVTLs that would serve the East Range site)**. Since the nearest residence to any of the HVTL routes for the West Range Site would be greater than 100 feet from the centerline, there would be no permanent receptors within an electric field greater than 2-kV per meter.

Magnetic Field (mG)		Electric Field (kV/m)	
At CL	88.30	At CL + 18	1.71
At CL + 50 ft	28.06	At CL + 50 ft	0.47
At CL + 100 ft	7.02	At CL + 100 ft	0.02
At CL + 300 ft	0.44	At CL + 300 ft	0.009



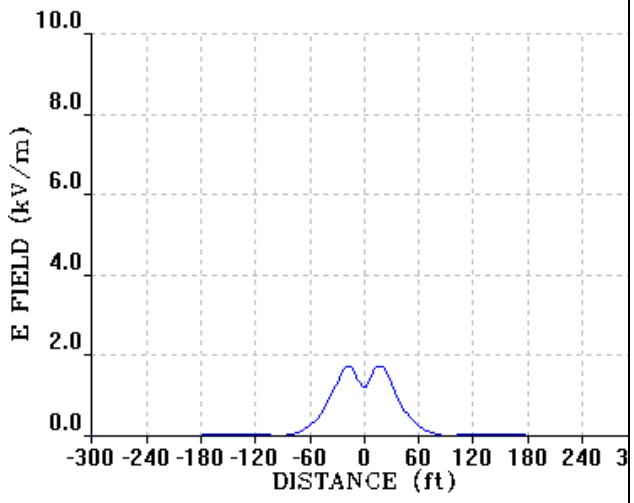
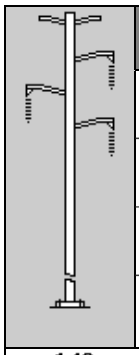


Figure 4.17-1. West Range, EMF for 230-kV – 2 Circuit Vertical Configuration



Magnetic Field (mG)		Electric Field (kV/m)	
At CL+10	140.0	At CL + 20	4.52
At CL + 50 ft	76.57	At CL + 50 ft	2.17
At CL + 100 ft	27.04	At CL - 100 ft	0.55
At CL + 300 ft	3.03	At CL - 300 ft	0.05

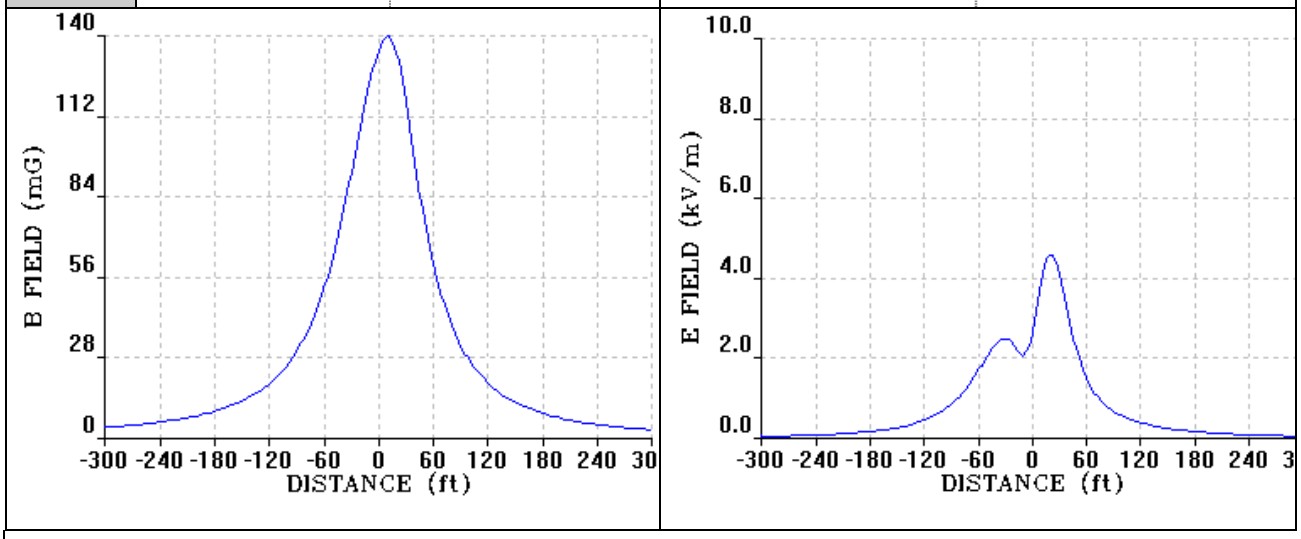
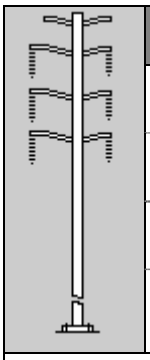


Figure 4.17-2. West Range, EMF for 345-kV – 1 Circuit Delta Configuration

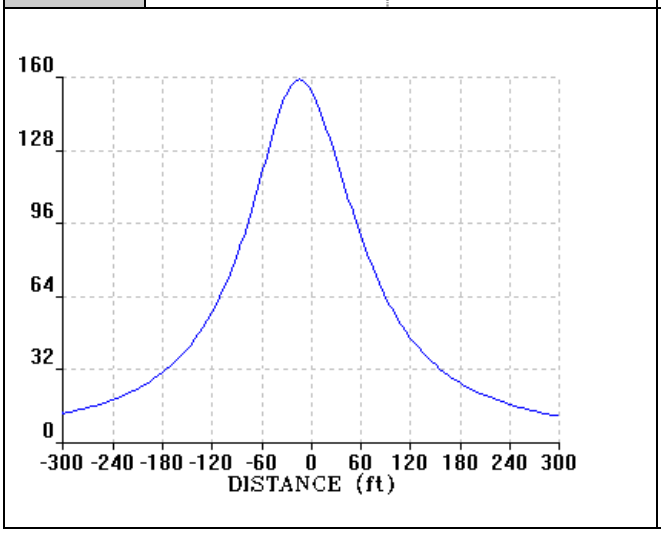
East Range

The 37L, 38L, and 39L ROWs are currently 100 feet in width. The proposed new ROW to parallel the 43L corridor would be 100 feet in width. Under the two alternatives for routing, existing ROWs would be widened by 30 feet.

Figure 4.17-3 shows the electric and magnetic field levels for the 345-kV vertical configuration and 115-kV vertical configuration on a single steel pole (worst case fields under the Proposed Action). The magnetic field at 50 feet from centerline is well below the 200 mG **target** for the 345-kV lines. The electric field is below the **8-kV per meter Minnesota standard within the ROW and below the** 2-kV per meter **target** at 50 feet from the centerline. There is one residence within 50 to 100 feet of the centerline of the current 38L route, and 2 residences are within 50 to 100 feet of the centerline of the current 39L/37L route. These residences **would not be exposed to EMF above the 8-kV per meter standard for Minnesota, but they could** fall **within** areas where the electric fields exceed 2-kV per meter under the Proposed Action.



Magnetic Field (mG)		Electric Field (kV/m)	
At CL - 16	158.97	At CL - 16	2.741
At CL - 50 ft	130.47	At CL - 50 ft	1.67
At CL - 100 ft	72.16	At CL - 100 ft	0.257
At CL - 300 ft	12.83	At CL - 300 ft	0.066



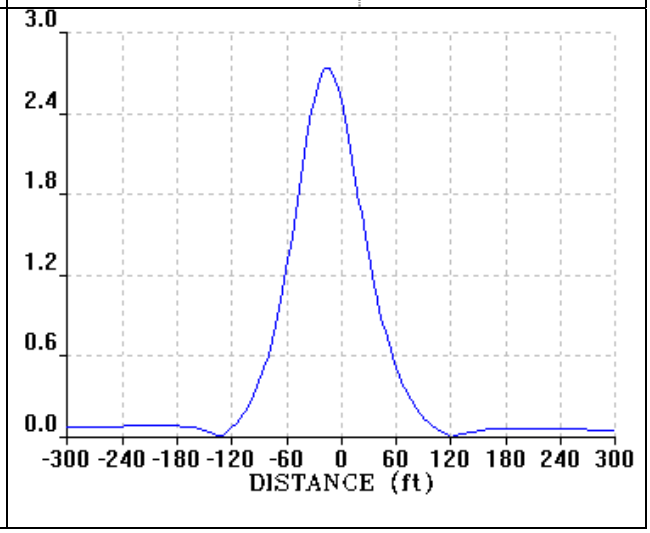


Figure 4.17-3. East Range, EMF for 345-kV – Vertical Configuration Bundle with 115-kV - Vertical Configuration Rail

Henshaw Effect

As discussed in Section 3.17.5.3, Professor Denis L. Henshaw of England hypothesized that electric fields at the surface of power line conductors cause increased charges on particles, thereby increasing the likelihood of inhaled particles being deposited on surfaces inside the lungs and airways, even at considerable distances from the line. In theory, these events could lead to increases in respiratory ailments and other diseases. Similarly, a British study **(Draper, 2005)** found elevated rates of childhood leukemia at distances up to 600 meters (2,000 feet) from electric lines, where magnetic fields are similar to background levels. **However, the author of the study found no causal link between childhood leukemia and EMF. Moreover, a recent study (Jeffers, 2007) could not support the hypothesis that ion exposure from HVTL charges increases lung deposition of airborne particles.**

As stated previously, all the electric fields at the edge of the ROWs would be below 2-kV per meter (a standard based on other state guidelines). The medical basis for some of the state standards relating to electric fields from HVTLs is unknown, though there is research that indicates that some older models of active implantable medical devices, such as pacemakers, begin to show inappropriate behavior at fields as low as 1.5 to 2-kV per meter (although newer models may be unaffected at fields as high as 20-kV per meter) (National Grid, 2006). Consequently, it is not known whether the 2-kV per meter electric field standard at the edge of the ROW would be protective with respect to reducing or eliminating potential Henshaw Effects.

It also is not possible to accurately calculate the levels of charge that pollutant particles acquire near HVTLs. The nature of pollutant particles depends on location; although for the purposes of calculation, a typical pollutant population may be specified together with an assumed particle size distribution. How such particles may charge near a power line also depends on their initial charge. Nevertheless, it seems likely that the pollutant particles downwind of a power line in corona do have somewhat larger average charges on them as a result of corona discharge. The distribution and deposition of such charged particles is another variable which is greatly influenced by atmospheric charges, humidity, wind speed and direction, terrain, vegetation, and other weather conditions (NRPB, 2004).

The potential impact of corona ions on health would depend on the extent to which they increase the dose of relevant pollutants to target tissues in the body. It is not possible to estimate the impact precisely, because of uncertainties about the:

- Extent to which corona effects increase the charge on particles of different sizes, particularly within buildings;
- Exact impact of this charging on the deposition of particles in the lungs and other parts of the respiratory tract; and
- Dose-response relation for adverse health outcomes in relation to different size fractions of particle.

However, it seems unlikely that corona ions would have more than a small effect on the long-term health risks associated with particulate air pollutants, even in the individuals who are most affected. In public health terms, the proportionate impact will be even lower because only a small fraction of the general population live or work close to sources of corona ions (NRPB, 2004).

Since the research regarding the Henshaw Effect and its potential health implications in real-world conditions is inconclusive at this time, any potential health effects from charged particles resulting from HVTLs introduced by the Proposed Action cannot be quantitatively ascertained in this EIS. **As described in Section 3.17.5.3, 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 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.**

4.17.3.2 Natural Gas Pipelines

The Pipeline and Hazardous Materials Safety Administration, Office of Pipeline Safety governs natural gas pipeline safety. Natural gas pipelines and their operators are subject to numerous safety requirements and regulations. Operator requirements include routine maintenance and inspection, integrity testing, installation and monitoring of automatic leak detection systems and alarms, establishing written emergency preparedness and response plans, and ensuring that their employees are fully trained and qualified (OPS, 2006a).

Within Minnesota, there are approximately 27,800 miles of gas transmission and distribution lines. Between 2003 and 2005, there was an average of 5.6 accidents associated with these lines (OPS, 2006b). This translates to approximately one accident per every 5,000 miles of gas transmission or distribution lines. The project would require the installation of between 13 and 33 miles of new natural gas transmission lines depending on the site and route selected. Statistically, the accident rate associated with these lengths of new natural gas line would be negligible.

4.17.4 Intentional Destructive Acts

Although concerns have been raised about the vulnerability of nuclear power plants to terrorist attack (Behrens and Holt, 2005), the potential for such attacks on coal-based power plants has not been

identified as a threat of comparable magnitude. However, as with any U.S. energy infrastructure, the proposed power plant could potentially be the target of terrorist attacks or sabotage. In light of two recent decisions by the U.S. Ninth District Court of Appeals (*San Luis Obispo Mothers v. NRC, Ninth District Court of Appeals, June 2, 2006; Tri Valley Cares v. DOE, No. 04-17232, D.C. No. CV-03-03926-SBA, October 16, 2006*), DOE has examined the potential environmental impacts from acts of terrorism or sabotage against the facilities proposed for the Mesaba Energy Project.

Although risks of sabotage or terrorism cannot be quantified, because the probability of an attack is not known, the potential environmental effects of an attack can be estimated. Such effects may include localized impacts from releases of toxic substances at the proposed power plant and associated facilities, which may be similar to what would occur under an accident or natural disaster. To evaluate the potential impacts of sabotage or terrorism, DOE considered failure scenarios without specifically identifying the cause of failure. For example, potentially harmful chemicals could be released as a result of component failure or human error (or a combination of both), or from such external events as aircraft crashes, seismic events, or other natural events as high winds, tornadoes, floods, ice storms, other severe weather, and fires (both natural and human-caused). Likewise, for truck and rail tanks, releases can occur from accidents or component failure during transport or from human error during transfer to the storage tanks at the facility.

Hazardous events considered for the proposed power plant caused by intentional destructive acts included: gas releases and exposure to toxic gas clouds, fires, and vapor cloud explosions. A particular concern associated with the release of a gas is exposure to a toxic component within the dispersing gas cloud. Evaluations of these hazards indicate:

- Toxic hazards would be dominated by the potential releases of H_2S and SO_2 from the Sulfur Recovery Unit (Claus process). The potential releases may pose a health hazard to plant workers and residents in the immediate vicinity of the proposed power plant. Based on information in Section 3.17.4.2, there are no schools, daycare centers, recreation centers, playgrounds, nursing homes, or hospitals located within 0.5 miles of the West Range Site or East Range Site. The nearest residences are approximately 0.6 to 0.8 miles from the West Range Site and about 1 mile from the East Range Site.
- Potential releases of carbon monoxide from the syngas process stream of the gasifiers could result in the longest downwind toxic impact distance. The potential releases may pose a health hazard to plant workers and closest residents to the proposed power plant.
- Fire hazards at the plant site would not extend beyond the West Range Site or East Range Site.
- Under all worst-case scenarios, plant workers would be the most at-risk of injury or death.

4.17.5 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. Under the No Action Alternative, worker accidents associated with other regional industrial sites and construction projects would still occur. Incremental health risks associated with the operation of the power plant and its associated air emissions would not occur. Furthermore, the electric and magnetic fields introduced by new or reconfigured HVTLs would not occur under the No Action Alternative.

4.17.6 Summary of Impacts

Basis for Impact	No Action	West Range	East Range
Increase the risk to worker safety and health during facilities construction and/or operation.	If the power plant were not constructed, there would be no increase in the probability of construction or operational health and safety risks.	Construction workers would follow a safety plan and standard construction safety practices. Therefore, construction-related health and safety impacts would be comparable to those of similar industrial projects. The storage and handling of coal can release inhalable dust, although this too would be minimized through engineering controls and plant safety practices	Impacts would be **comparable to** those for the West Range Site **based on comparable project conditions at both sites**.
Increase traffic fatalities	There would be no increase in vehicular traffic, and therefore, no increase in traffic-related fatalities on public roads would occur.	During the 5-year construction period, statistically less than 2 traffic-related worker fatalities would occur. During the operational timeframe of the plant, statistically no more than 1 traffic-related worker fatality would occur.	Impacts would be **comparable to** those for the West Range Site **based on comparable project conditions at both sites**.
Create safety risks for at-grade rail crossings	There would be no increase in rail traffic, and therefore, there would be no increase in safety hazards at at-grade crossings.	Because of relatively low incremental addition of daily train trips, it is expected that increases to safety hazards at at-grade crossings would be low.	Impacts would be **comparable to** those for the West Range Site **based on comparable project conditions at both sites**.
Create a cancer risk to the public, including particular receptor categories, exceeding the EPA standard ($1x10^{-5}$).	No change in cancer risk beyond existing conditions, although other projects planned for the region could emit pollutants of concern that may pose additional cancer risk.	Based on **AERA** results, cancer risks posed by the project would be small. As presented in Table 4.17-4, the highest cumulative cancer risks posed by the project to adult and child residents are **$1.4x10^{-6}$** and **$2.3x10^{-7}$**, respectively. The highest risks to adult and child farmers are **$2.5x10^{-6}$** and **$4.6x10^{-7}$**. The highest risks to adult and child fishers are **$1.4x10^{-6}$** and **$2.5x10^{-7}$**.	**The risks would be comparable to, or less than, those for the West Range Site as explained in Appendix C, Section 2.1 (Volume 2).**
Create a morbidity hazard to the public, including particular receptor categories, exceeding the EPA standard (1.0).	No change in morbidity rate beyond existing conditions, although other projects planned for the region could emit pollutants of concern that may pose additional morbidity risk.	Based on **AERA** results, the morbidity hazards to the public would be small. As presented in Table 4.17-4, the highest cumulative morbidity hazards posed by the project to adult and child residents are **0.080** and **0.081**, respectively. The highest morbidity hazards to adult and child farmers are **0.081** and **0.082**. The highest morbidity hazards to adult and child fishers are **0.080** and **0.081**.	**The hazards would be comparable to, or less than, those for the West Range Site as explained in Appendix C, Section 2.1 (Volume 2).**
Create a risk to public health and safety from EMF exposure.	No change in existing EMF exposure from current power lines in the region.	EMF exposure from utility lines would be within the 2-kV/m limit at the edge of the ROW. There would be no permanent residential receptors located in areas exceeding 2-kV/m.	Impacts would be **comparable to** those for the West Range Site **based on comparable project conditions at both sites**.

Basis for Impact	No Action	West Range	East Range
Create a risk to public health and safety from exposure to charged particulates.	No change in the risk of health hazards associated with existing power lines and any current exposure to charged particulates.	Because the Henshaw Effect is largely unverified in terms of human health impacts, there is no conclusive means to determine whether charged particulates from new HVTLs would cause public health risks.	Impacts would be **comparable to** those for the West Range Site **based on comparable project conditions at both sites**.

4.18 NOISE

4.18.1 Approach to Impacts Analysis

4.18.1.1 Region of Influence

The region of influence for noise impacts encompasses areas that include receptors potentially sensitive to noise during construction and operation of the Mesaba Generating Station. The region of influence is dependent on the magnitude of new noise emissions that would be generated and existing ambient noise levels, which would affect the extent of the noise impact. Noise receptor locations were chosen based on their land use category (e.g., residential and church) and proximity to the proposed plant site and associated transportation corridors (e.g., rail alignments and public roadways).

Recent aerial photographs of the proposed plant sites were reviewed to identify the locations of receptors that may be affected by noise resulting from the Proposed Action. Ambient noise levels were measured at receptor locations as discussed in Sections 3.18.2.1 and 3.18.2.2 for the West Range and East Range Sites, respectively. These baseline noise levels were then used as a basis to predict noise levels as a result of proposed construction, plant operations, rail, and traffic activities. The locations of the receptors are dependent on the type of noise analysis being performed (e.g., plant noise vs. traffic noise) and are identified in the respective analysis in this section.

4.18.1.2 Method of Analysis

The evaluation of potential impacts from noise or vibration considered whether the Proposed Action or an alternative would cause any of the following conditions:

- Conflict with a jurisdictional noise ordinance or Minnesota regulations (i.e., MPCA) during construction.
- Conflict with a jurisdictional noise ordinance or Minnesota regulations (i.e., MPCA) during operations.
- Permanently increase ambient noise levels at nearest residential neighborhoods in the region of influence.

To determine whether the Proposed Action would result in any of the above listed conditions for noise, a noise evaluation study for both sites was performed for noise generated from Mesaba Generating Station (i.e., Phases I and II) activities, including plant construction, operations, rail facilities, and traffic. Estimating techniques used to conduct these analyses, and key considerations with respect to these models, are described below. The full noise reports for both proposed sites are included in Appendix 5 of the Mesaba Energy Project Environmental Supplement (Excelsior, 2006b).

After publication of the Draft EIS, changes were made to various components at the West Range Site, including: plant footprint adjustment, the new Rail Alignment Alternative 3B, and new Access Road Alignment 3. Based on these new adjustments, revised noise analyses were conducted for construction activities, rail line operations, rail yard operations, rail line vibration effects, and plant operations at the West Range Site. Additionally, some errata in the Draft EIS were also corrected. In general, the revisions reflect minor differences from initial analyses discussed in the Draft EIS, either in A-weighted sound levels or in VdB vibration levels (AAC, 2009 and HDR, 2009). New text was added throughout this section to reflect the most recent noise analyses.

Construction Noise

Construction equipment typically utilized for this type of project were used to predict the noise levels during various construction phases as identified in Table 4.18-1. The noise levels presented in Table 4.18-1 reflect levels at a distance of 50 feet from the equipment source. Noise levels at the receptor locations as a result of the construction equipment were estimated by simply examining the rate of attenuation and distance between the noise source (assumed to be at the construction boundary) and the receptor.

Table 4.18-1. Noise Levels of Typical Construction Equipment at 50 feet from Source

Equipment	Noise Level at 50 feet from Source (dBA)
Trucks	91
Crane	83
Roller	89
Bulldozers	80
Pickup Trucks	60
Backhoes	85
Jack Hammers	88
Rock Drills	98
Pneumatic Tools	86
Air Compressors	81
Compactor	82
Grader	85
Loader	85

Source: Excelsior, 2006b

No specific local standards govern construction noise at either site locations. Therefore, the MPCA limits for residential receptor properties were used for comparison. As discussed in Section 3.18.1.2, the MPCA standards are grouped according to land activities by the noise area classification system. Thresholds for NAC-1 **and NAC-3** are shown in Table 4.18-2 **(updated for the Final EIS)**. **All of the receptors that were analyzed for this project are represented by NAC-1, except for R1, which is represented by thresholds under NAC-3.**

Table 4.18-2. 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**; Bold typeface indicates inclusion of new data for the Final EIS.**

Facility Operation Noise

The noise evaluation study was conducted to simulate the operation of the Mesaba Generating Station and predict the noise emissions by using a proprietary computerized noise prediction program. The modeling program uses industry-accepted propagation algorithms based on American National Standards Institute and International Standards Organization standards. The modeling program was used to predict future noise conditions during the combined operation of both Phase I and Phase II and to recommend mitigation methods, as needed. Noise acceptability was judged in terms of the MPCA standards for residential receiving properties as shown in Table 4.18-2.

Proposed project equipment noise level emissions were determined using vendor-supplied noise level information, reference data for similar equipment, and/or industry-accepted estimation techniques. These predicted equipment levels were modeled to synthesize the expected future noise conditions for the plant site and adjacent land uses (residential and church receptors). The project site plan drawings were used to establish the location of the noise sources and other relevant physical characteristics of the site. For conservatism, the modeling assumed stable atmospheric conditions suitable for reproducible measurements (i.e., under "standard-day" conditions of 59°F and 70 percent relative humidity), that are favorable for propagation. These inherent conservative factors and assumptions resulted in a noise model that tended to be biased to higher predicted values than would be expected in the actual environment around the proposed project. The modeling results were compared to the project criteria to assess potential impacts. Noise mitigation treatments were then applied to the individual noise contributors that were estimated to have the greatest influence on receptor locations.

The noise model was run for the base plant configuration. All currently planned, continuous-operation equipment items that were deemed to be significant noise sources at the Mesaba Generating Station (Phases I and II) were included in the noise model. The major process areas of the project include the ASU, the Feed Handling Unit, the Gasification Island, the Gas Treating Unit, the Sulfur Recovery and Tail Gas Recycling systems, the Power Block, and General Facilities (such as cooling, utilities, and auxiliary/support systems). The major process units would be used at either the West Range Site or East Range Site with only minor modifications to the equipment design and plant layout. Therefore, for the purposes of the noise impact assessment, both potential sites would be the same from an aggregate noise emissions standpoint.

The Mesaba Generating Station was assumed to operate 24 hours per day at its design capacity; consequently, its noise output would be constant, regardless of time of day and the statistical sound levels would all be the same (i.e., $L_{100}=L_{90}=L_{50}=L_{10}$). As a secondary information source, model inputs derived from generic industry reference information for construction equipment were used.

No special noise control options were initially assumed. The standard-design levels from the significant noise sources were converted into octave band sound power levels (abbreviated PWL or L_w) to serve as the initial inputs for the noise-modeling program. Major buildings, as well as stepped terracing, were included as barriers to account for propagation losses due to shielding between a given noise source and a receptor location. However, for a conservative worst-case analysis, low-lying buildings, such as power distribution centers and water treatment buildings, and the coal piles were not included in the model for shielding benefits.

Rail Noise and Vibration Levels

Noise from rail operations was estimated for the surrounding sensitive receptors using FRA and Federal Transit Administration methodologies. Additionally, the American Public Transportation Association provides guidelines that are based on maximum train pass-by noise (L_{max}). The noise levels

generated by freight train operations were compared to the American Public Transportation Association threshold of 70 dBA for residential areas.

A maximum noise level guideline was used to evaluate the noise from freight train operations given the limited amount of daily rail operations. An L_{max} of 75 for single family residences was used as the maximum allowable single event noise level for this analysis.

There are no local standards for ground-borne vibration. However, the FRA and Federal Transit Administration provide ground-borne vibration impact criteria for various types of building uses. The residential category of vibration criteria was applied for assessing ground-borne vibration from rail operations. Table 4.18-3 lists the FRA criteria for residential land uses for both frequent and infrequent vibration events. The residences in proximity to the project sites fall under this residential land use classification. The maximum vibration of 80 VdB was used as vibration assessment criteria for this project. Adjustments were made to the vibration calculations to conservatively account for stiff rail car suspension systems, welded rail, train speed, and efficient soil propagation conditions.

Table 4.18-3. Ground-Borne Vibration Guideline for Residential Land Use

Land Use Category	Equivalent Ground-Borne Vibration Impact Velocity, inch/second
Residences and buildings where people normally sleep	80 VdB (infrequent events[a]) 72 VdB (frequent events[b])

Notes: [a]less than 70 vibration events per day, [b]greater than 70 vibration events per day; Source: SEH et al., 2005

The train and yard noise were estimated based on the operational data contained in Table 4.18-4. During operating hours, there would be one train either entering or leaving the project site and any instance.

Table 4.18-4. Proposed Train Operating Conditions

Train Data	Future Operations
Number of trains per week	6
Estimated Number of trains per day	1
Locomotives per train	3
Number of Cars per train	115 – 135
Train Speed	10 mph

Federal Highway Administration Noise Analysis

The FHWA does not have actual noise standards, but implements guidelines, which are used to trip a federal funding mechanism for noise abatement on highway projects; FHWA procedures for highway traffic noise analysis and abatement are contained in 23 CFR 772, "Procedures for Abatement of Highway Traffic Noise and Construction Noise." These procedures specify the requirements that state highway agencies must meet when using Federal-aid funds for highway projects. Thus, for a FHWA noise analysis to be required, a proposed roadway would have to include substantial realignment and additional lanes. Therefore, because the West Range Site includes a substantial realignment of CR 7 and the East Range Site does not require any new roadway project, the FHWA noise analysis was performed only for the West Range Site. The noise related to increased traffic

in and around proposed neighborhoods affected by the proposed road improvements at the West Range Site was performed in accordance with the FHWA, Mn/DOT, and MPCA guidelines.

Specifically, the augmented FHWA noise prediction software MINNOISE was used to predict noise levels and identify potential noise impacts at 20 virtual receptor sites along the study corridor. Ten of the virtual receptors were placed in and around Big Diamond and Dunning Lakes to represent residences in close proximity to the proposed roadway. The MINNOISE model was used in conjunction with on-site measurement of traffic noise during peak hours. Additionally, MINNOISE calculates the amount of potential noise directly related to traffic speeds, traffic mix (percent of cars, trucks, heavy trucks), and peak hour percentages of predicted future traffic. On-site ambient measurement at the receptor locations discussed in Section 3.18 were used as a basis for modeled results and included into the virtual receptor sites. The measurement sites include areas of existing residential housing and common use areas regarded by the Federal standards as Federal Activity Category B, which includes residential, recreational, and church land uses. The FHWA NAC for Category B land uses is an hourly A-weighted sound level of L_{10} = 70 dBA.

In accordance with FHWA requirements, Mn/DOT has adopted a statewide noise policy that clarifies the FHWA terminologies of noise impacts. "Mn/DOT Noise Policy for Type I and Type II Federal-aid Projects as per 23 CFR 772" includes the following descriptions:

- *Noise Level Approaching the NAC* – Mn/DOT defines a level as "approaching" the criterion level when it is 1dB, or less, below the criterion level. For example, 69 dBA is considered "approaching" the FHWA NAC category B level of 70 dBA.
- *Substantial Increase in Noise* – Mn/DOT defines a substantial increase in noise as those future predicted noise levels that exceed the FHWA NAC category B level of 70 by 5dB or greater, or 75dBA.
- *Substantial Noise Reduction* – Mn/DOT identifies feasibility requirements for the use of abatement procedures such as noise walls and their associated costs. These requirements dictate that every reasonable effort be made to obtain a substantial noise reduction. Mn/DOT defines a substantial noise reduction as 5dBA or more from a noise impact.

Finally, all modeled results were judged using the L_{10} metric as both Federal and state guidelines specify only one metric used when determining impacts; L_{10} is common among both the Federal and state guidelines.

Receptor Locations

As discussed in Sections 3.18.2.1 and 3.18.2.2, receptor locations were chosen for ambient noise monitoring to provide baseline noise conditions and to use as base data for various noise analyses described above. In addition to these ambient noise receptor locations, some of the analyses required additional receptor locations to further supplement the noise impact analysis. The full set of receptor locations at the West Range and East Range Sites and the type of noise analysis performed at each receptor are identified in Tables 4.18-5 and 4.18-6, respectively **(see Figures 3.18-1 and 3.18-2 for graphical depiction of receptor locations listed in these tables; tables updated for the Final EIS)**.

Table 4.18-5. Receptor Locations for Noise Analyses at the West Range Site

Receptor Location	Approximate Distance from the nearest edge of West Range Site	Used for Analyses Type(s)
R1. County Landfill, south of proposed Plant	**1,870** ft south	Ambient Monitoring; Plant Operations Modeling; Construction Impacts; FHWA traffic modeling; Rail Operations Impacts
R2. Residence, North Big Diamond Lake	**4,025** ft southeast	Ambient Monitoring; Plant Operations Modeling; Construction Impacts; FHWA traffic modeling; Rail Operations Impacts
R3. Residence, along CR 7	**4,110** ft west	Ambient Monitoring; Plant Operations Modeling; Construction Impacts; FHWA traffic modeling; Rail Operations Impacts
R4. 32423 CR 7	**4,650** ft west	Ambient Monitoring; Plant Operations Modeling; Construction Impacts; FHWA traffic modeling; Rail Operations Impacts
R5. Dunning Lake Site	**4,300** ft southeast	Ambient Monitoring; Plant Operations Modeling; Construction Impacts; FHWA traffic modeling; Rail Operations Impacts
R6. Lutheran Church	**18,060** ft southeast	Plant Operations Modeling
R7. Catholic Church	**9,940** ft northwest	Plant Operations Modeling
AAC-6. Near Beasley Ave., City of Taconite	**9,100** ft southwest	Construction Impacts; Rail Operations Impacts
AAC-7. North side of Twin Lakes; near City of Marble	**15,000** ft southeast	Construction Impacts; Rail Operations Impacts
AAC-8. Between O'Reilly Lake & Island Lake (off Reilly Beach Rd.)	**11,050** ft northwest	Construction Impacts; Rail Operations Impacts

Table reflects changes due to readjustment of plant footprint (bold typeface denotes updated values for the Final EIS). See Figure 3.18-1 for graphical depiction of the receptor locations. Source: SEH et al, 2005; AAC, 2009

Table 4.18-6. Receptor Locations for Noise Analyses at the East Range Site

Location	Approximate Distance from the nearest edge of East Range Site	Used for Analyses Type(s)
R1. Access Road Southeast of Plant	800 ft northwest	Ambient Monitoring; Plant Operations Modeling; Construction Impacts; Rail Operations Impacts
R2. Boat Landing and Park	9,200 ft southwest	Ambient Monitoring; Plant Operations Modeling; Construction Impacts; Rail Operations Impacts
R3. Colby Ridge Development	8,300 ft southwest	Ambient Monitoring; Plant Operations Modeling; Construction Impacts; Rail Operations Impacts
R4. 321 Kent St, Hoyt Lakes	11,500 ft south	Ambient Monitoring; Plant Operations Modeling; Construction Impacts; Rail Operations Impacts
R5. Faith Lutheran Church	**8,400 ft south**	Plant Operations Modeling; Construction Impacts; Rail Operations Impacts
R6. Queen of Peace Catholic Church	**8,800 ft south**	Plant Operations Modeling; Construction Impacts; Rail Operations Impacts
R7. Trinity Methodist Church	**8,800 ft south**	Plant Operations Modeling; Construction Impacts; Rail Operations Impacts

See Figure 3.18-2 for graphical depiction of receptor locations (bold typeface indicates updated values for the Final EIS). Source: SEH et al, 2005; AAC, 2009

Note that the FHWA noise analysis was only required for the West Range Site because of the proposed realignment of CR 7. The virtual receptor locations for this analysis are discussed in the subsequent traffic noise impacts discussion for the West Range Site. **Following publication of the Draft EIS, Itasca County deferred its planned realignment of CR 7 due to changes in funding priorities at the state level. The proposed realignment of CR 7, as it was presented in the Draft EIS, is no longer anticipated to be available for the Mesaba Energy Project. Access Road 3, now Excelsior's preferred alternative, would directly connect the existing alignment of CR 7 to the southwestern corner of the property boundary as shown in Figure 2.3-2. A new traffic-related noise analysis was conducted for the new Access Road 3 at the West Range Site and is discussed in Section 4.18.2.2.**

4.18.2 Impacts of the Proposed Action

4.18.2.1 Impacts of Construction

The construction process for the Mesaba Generating Station and associated facilities would be expected to generate noise during the following construction phases:

- Site Preparation
- Excavation
- Foundation Placement
- Plant and Building Construction
- Exterior Finish and Cleanup

Equipment used during the construction process would differ from phase to phase. In general, heavy equipment (e.g., bulldozers, scrapers, dump trucks, and concrete mixers) would be used during excavation and concrete pouring activities. Most other phases would involve the delivery and erection of the building and equipment components. It is assumed that there would be no driven piles during the construction process; however, the necessity for such construction activity and applicable requirements would be fully determined after detailed engineering and design is completed.

Noise associated with the construction would be attenuated in a variety of ways. The most significant is the divergence of the sound waves with distance (attenuation by divergence). In general, this mechanism results in a 6-dBA decrease in the sound level with every doubling of distance from the source. For example, the 84-dBA average sound level at 50 feet associated with clearing and grading would be attenuated to 78 dBA at 100 feet, 72 dBA at 200 feet, and to 66 dBA at 400 feet. For a conservative worst-case analysis, noise attenuation from dampening due to ground effects was not included in the construction noise modeling.

During final construction, a method used for testing and cleaning steam piping called “steam blows” would create substantial noise, which would occur on a short-term, temporary basis. A steam blow results when high-pressure steam is allowed to escape into the atmosphere when cleaning the steam piping. A series of short steam blows, lasting 2 or 3 minutes each, would be performed several times daily over a period of 2 or 3 weeks during the final weeks of construction. Steam blows are necessary after erection and assembly of the feed water and steam systems because the piping and tubing that comprise the steam path accumulate dirt, rust, scale, and construction debris. The steam blows prevent debris from entering the steam turbine. Steam blows can produce noise as loud as 130 dBA at a distance of 100 feet. Subsequently, the resultant sound level at the nearby receptors would range from 86 to 103 dBA. To minimize the short-term temporary noise impacts from the steam blows, the steam piping would be equipped with silencers that would reduce noise levels by 20 dBA to 30 dBA at each receptor location.

Due to the nature of construction noise and common fluctuations in the background noise level, construction activity would be occasionally discernable at the nearest receptors. Given ideal atmospheric conditions with cold temperatures, winds, and variable humidity, construction noise could be discernable at the receptors located furthest from the project site because of inversion effects. Under certain circumstances, the construction noise could be a source of annoyance to noise sensitive individuals. In addition to implementing silencers on steam piping, Excelsior would develop a notification plan to alert nearby residents of impending activities that would result in abnormally loud noises. Furthermore, after the final site has been determined, Excelsior would notify nearby residences of the construction schedule and operating plan.

In general, short-term noise levels during construction would not be significant for the following reasons:

- The distance separating the residential areas from the site would result in substantial attenuation of construction noise.
- The construction equipment would not normally be operating simultaneously.
- During construction there would be periods of time when no equipment would be operating, and when noise would be at or near ambient levels.
- Construction activities are scheduled to occur during daytime hours, when many people are at work and away from home.
- To reduce construction noise to the greatest extent possible and practical, functional mufflers would be maintained on construction equipment.

Impacts During Construction at West Range Site

After publication of the Draft EIS, the footprint for the proposed Mesaba Generating Station was shifted approximately 280 feet to the northwest on the property along the same axis as the originally proposed footprint. Based on the new noise analysis, estimated construction-related noise levels at the receptors remained the same or decreased from values as stated in the Draft EIS. This section was revised to reflect the latest noise analysis based on the footprint adjustment. The modeled receptor locations for the West Range site are listed in Table 4.18-5. Note that R6 and R7 represent church receptors and were not used in the construction noise analysis. The predicted aggregate noise levels at the West Range Site during construction are shown in Table 4.18-7 **(revised in Final EIS)**.

The results shown in Table 4.18-7 indicate that noise from construction activities is not expected to exceed the MPCA residential daytime noise limits of 60 dBA (L_{50}) at any of the nearby receptor locations.

For the most part, rail line construction would be located further away from noise sensitive receptors, when compared to the construction of the power plant. However, rail line construction would encroach within 500 feet of receptors R2 and R5. Construction noise would be expected to range from 57 to 69 dBA during the short period that the railroad construction operation is nearest to the homes represented by each of these receptors. Due to the short-term nature of the linear construction operation, rail construction noise could potentially result in a short-term, temporary noise impact, which would be diminished as the construction operation moves away from receptors R2 and R5.

Table 4.18-7. Aggregate Estimated Noise Levels Generated by Construction Activities at the West Range Site

Construction Activity	Estimated Construction Operation Noise Level at Each Receptor Location, dBA							
	R1	**R2**	**R3**	**R4**	**R5**	**Receptor AAC-6**	**Receptor AAC-7**	**Receptor AAC-8**
Site Clearing	51	**44**	**45**	44	**43**	38	34	36
Excavation	56	**49**	**50**	49	**48**	43	39	41
Foundation	44	**37**	**38**	37	**36**	31	27	29
Building Construction	51	**44**	**45**	44	**43**	38	34	36
Finishing	56	**49**	**50**	49	**48**	43	39	41

This table reflects latest noise analysis based on plant footprint readjustment (bold typeface denotes updated values for the Final EIS). (Source: SEH et al., 2005**; AAC, 2009**)

Table 4.18-8 **(revised in Final EIS)** summarizes the estimated noise levels at the receptor locations resulting from steam blow at the West Range Site.

Table 4.18-8. Estimated Steam Blow Noise Levels at West Range Site

Receptor	Estimated Distance to Nearest Future Plant Steam Blow	Steam Blow Noise Level, dBA
R1	**2,990**	**100**
R2	**5,590**	**95**
R3	**5,375**	**95**
R4	**5,910**	**95**
R5	**6,130**	**94**
AAC-6	**10,250**	90
AAC-7	**16,480**	86
AAC-8	**12,525**	88

This table reflects latest noise analysis based on plant footprint readjustment. (Source: SEH et al., 2005**; AAC, 2009**)

To minimize the short-term temporary noise impacts from the steam blows, the steam piping would be equipped with silencers that would reduce noise levels by 20 dBA to 30 dBA at each receptor location.

The FHWA noise analysis that is required at the West Range site because of the proposed realignment of CR 7 also includes construction-related traffic noise and is discussed in Section 4.18.4.3. **Following publication of the Draft EIS, Itasca County deferred its planned realignment of CR 7 due to changes in funding priorities at the state level. A new traffic-related noise analysis was conducted for the new Access Road 3 at the West Range Site and is discussed in Section 4.18.2.2.**

As described in Sections 2.2.4.1 and 2.3.1.1, Excelsior would establish off-site construction staging and laydown areas on 85 acres of land selected from among four potential sites for Phase II construction. Figures 2.3-1 and 2.3-3 show the candidate locations for the West Range Site. All of the sites are located on lands that have been disturbed or cleared during prior uses by mineral extraction companies and all have access to local roadways. Additional traffic volumes (up to eight vehicle trips for each peak a.m. and p.m. hour) from construction truck deliveries would result in intermittent, increased noise levels on routes between the potential laydown areas and the construction site. However, these impacts are expected to be minor as this traffic increase would be short-term and intermittent and the routes between the laydown areas and the construction site do not traverse large towns. The 30-acre laydown area adjacent to CR 7 would present the least amount of noise impacts as the area is located in a fairly remote area near the project site and the route to the proposed site includes one residential property. A few residential areas located on US 169 in the community of Holman would experience minor noise impacts from the other three potential laydown areas as trucks travel between these areas and the project site. Residential properties located in the southwest corner of Taconite would experience minor noise impacts from the 30-acre laydown area located west of Taconite.

Impacts During Construction at East Range Site

The modeled receptor locations for the East Range Site are listed in Table 4.18-6. The predicted aggregate noise levels at the East Range site during construction are shown in Table 4.18-9.

The results shown in Table 4.18-9 indicate that noise from construction operations would not be expected to exceed the MPCA residential daytime noise limits of 60 dBA (L_{50}) at any of the nearby receptor locations.

Table 4.18-9. Aggregate Estimated Noise Levels during Construction at East Range Site

Construction Activity	Estimated Construction Operation Noise Level at Each Receptor Location, dBA						
	R1[1]	R2	R3	R4	R5[2]	R6[2]	R7[2]
Site Clearing	60	41	42	38	40	40	40
Excavation	65	46	47	43	45	45	45
Foundation	53	34	35	31	33	33	33
Building Construction	60	41	42	38	40	40	40
Finishing	65	46	47	43	45	45	45

[1] Receptor 1 is located at the boundary of the Buffer Land and is isolated from residential receptors.
[2] These 3 Receptors represent churches within the Hoyt Lakes Area
Source: SEH, 2005b

Table 4.18-10 **(revised for Final EIS)** summarizes the estimated noise levels at the receptor locations resulting from steam blow at the East Range Site.

Table 4.18-10. Estimated Steam Blow Noise Levels at East Range Site

Receptor	Estimated Distance to Nearest Steam Blow	Steam Blow Noise Level
R1*	1,900 ft	**104** dBA
R2	10,000 ft	**90** dBA
R3	9,200 ft	91 dBA
R4	12,800 ft	88 dBA
R5	10,700 ft	**89** dBA
R6	11,000 ft	**89** dBA
R7	11,000 ft	**89** dBA

* Receptor 1 is located at the boundary of the Buffer Land and is isolated from residential receptors.
Bold typeface denotes updated values for the Final EIS.
Source: SEH, 2005b

To minimize the short-term temporary noise impacts from the steam blows, the steam piping would be equipped with silencers that would reduce noise levels by 20 dBA to 30 dBA at each receptor location.

As described in Sections 2.2.4.1 and 2.3.2.1, Excelsior would establish off-site construction staging and laydown areas on 85 acres of land from two potential sites for Phase II construction. Figure 2.3-5 shows the candidate locations for the East Range Site. Both the sites are located on lands that have been disturbed during prior uses by mineral extraction companies and are accessible by mining roads or abandoned rail grades. The laydown areas are located about 2 to 3 miles from the project site and outside of any residential areas. Additional traffic volumes (up to eight vehicle trips for each peak a.m. and p.m. hour) from construction truck deliveries would result in intermittent noise level increases on routes between the potential laydown areas and the construction site. However, these impacts are expected to be minor as potential routes between the laydown areas and the construction site are located in fairly remote mining areas and no known sensitive receptors are located in the region.

4.18.2.2 Impacts of Facility Operation

Plant Noise

The dominant noise sources for the base plant configuration included the HRSG and ASU stack exits, large buildings with major process equipment inside (including the CTGs and STG) buildings, the ASU

buildings, Rod Mill buildings, and Slurry Feed buildings), Acid and Tail Gas burners, the Power Block and ASU cooling towers, and several large water-handling pumps.

Once Phase I begins commercial operations, Excelsior would perform a noise survey to ensure that such operations are in compliance with applicable noise standards. The mechanism for conducting such measurements would depend upon the construction schedule for Phase II. Presuming that construction of Phase II would be concomitant with operation of Phase I, testing would be conducted in a manner to confirm that the combination of activities (i.e., simultaneous Phase I operation and Phase II construction) comply with state requirements. The measurements would be taken during evening and daytime hours to include routine and special operating circumstances, including facility start-ups and shut downs, full load operation, maintenance and testing activities (e.g., steam blows), and rail deliveries and associated unloading activities.

During the start-up process, either the initial commissioning start-up phase or during on-going operations, controlled venting of steam directly to the atmosphere during steam-cycle start-up can occur from vent valves. Also during start-ups, steam can be vented to blowdown tanks. These start-up steam venting/discharging operations are generally not referred to as 'steam blows' and typically generate lower noise emissions than steam blows that occur during construction (discussed in Section 4.18.2.1). Beyond the start-up process and during regular operations, the only potential ventings or discharges of steam would be associated with an unusual or emergency event wherein one or more plant systems would 'trip' off-line and necessitate a steam discharge to protect personnel and plant equipment; however, these 'tripping' discharges are expected to occur infrequently because of the sophisticated control systems at the proposed facility.

Plant Noise at the West Range Site

After publication of the Draft EIS, the footprint for the proposed Mesaba Generating Station was shifted approximately 280 feet to the northwest on the property along the same axis as the originally proposed footprint. In general, new noise analysis findings show that levels of impact at the receptors were reduced compared to the analysis presented in the Draft EIS. None of the receptor locations exhibited changes in noise levels that would be perceptible (all decibel increases were less than ±3 dB). This section was revised to reflect the latest noise analysis for plant-related noise at the West Range Site.

The noise modeling results **for combined Phases I and II** (without any assumed noise control treatments) at the seven nearest receptors are shown below in Table 4.18-11. **Predicted noise levels are well within the daytime limits for all locations.** For the community receptors **R3 and R4**, the predicted aggregate noise emissions from the proposed complete power plant project (Phases I and II) were above the indicated Minnesota L_{10} /L_{50} community limits during the nighttime. At R3 and R4, these noise levels exceeded the L_{10} threshold by 3.**2** and 1.**2** dBA, respectively. The nighttime noise levels exceedances above the L_{50} threshold **were predicted as 3.5** dBA (R**3**) **and** 3.**4** dBA (R4). Note**, however,** that although R3 and R4 are above the **nighttime** noise limits, existing ambient conditions at both residences already exceed the Minnesota regulations, because of their proximity to CR7**. Additionally**, these locations are expected to incrementally receive less than 1 dB from the combined plant **noise levels**, which is well below the commonly held threshold of a perceptible change in community noise levels (which is ±3 dB).

Table 4.18-11. Estimated Plant Noise Levels (without mitigation) at Receptors for West Range Site for Phases I and II

Receptor	Existing L_{10} /L_{50} Day (dBA)	Existing L_{10} /L_{50} Night (dBA)	Projected Plant Noise L_{10} /L_{50} (dBA)	Decibel Increase L_{10} /L_{50} Day (dBA)	Decibel Increase L_{10} /L_{50} Night (dBA)	Resultant L_{10} /L_{50} Day (dBA)	Resultant L_{10} /L_{50} Night (dBA)
R1	53/52	51/49	**45/45**	**0.6/0.8**	**1.0/1.5**	**53.6/52.8**	**52.0/50.5**
R2	54/53	50/49	**42/45**	**0.3/0.3**	**0.6/0.8**	**54.3/53.3**	**50.6/49.8**
R3	59/55	***58/53***	**44/44**	**0.1/0.3**	**0.2/0.5**	**59.1/55.3**	***58.2/53.5***
R4	59/52	***56/53***	**43/43**	**0.1/0.5**	**0.2/0.4**	**59.1/52.5**	***56.2/53.4***
R5	51/**50**	50/49*	**42/42**	**0.5/0.6**	**0.6/0.8**	**51.5/50.6**	**50.6/49.8**
R6	52/50*	50/49*	**27/27**	0/0	0/0	**52.0/50.0**	**50.0/49.0**
R7	52/50*	50/49*	**35/35**	**0.1/0.1**	**0.1/0.2**	**52.1/50.1**	**50.1/49.2**

Note: **Table reflects new noise analysis based on adjusted footprint of proposed plant (bold typeface denotes updated values for the Final EIS).** Additionally, italicized and underlined typeface indicate levels exceeding state standards: 65/60 dBA (L_{10} /L_{50}) for daytime and 55/50 for nighttime at residential and church land uses (Source: SEH et al., 2005**; AAC, 2009**);
***Existing ambient conditions and levels were estimated based on information at locations with similar characteristics.**

The following techniques were evaluated to further reduce noise from plant operations, if needed:

- Using a mix of low-noise designs for some equipment items;
- Using available noise control technologies (such as stack silencers); and
- Applying external treatments such as enclosures or noise control panels on selected building walls.

The specific mitigation methods needed to reduce the noise levels of equipment to the desirable design criteria would depend on final design and selection of specific equipment. During the final design review process, Excelsior would evaluate noise reduction features and determine the best suite of mitigation measures that would be incorporated into the final plant design. A host of conceptual plant noise mitigation alternatives and the expected noise reduction potential associated with each feature is identified later in this section in Table 4.18-16.

Even without mitigation, it is expected that the facility would meet state noise standards (both L_{50} and L_{10}) at all sites, with the exception of the nighttime L_{10} noise standard for R3 and R4. Currently, the L_{10} noise levels at R3 and R4 are already above the MPCA nighttime limits due to roadway traffic on CR 7; however, the increased noise levels resulting from plant operations would not be detectable at these sites (less than 1 dBA for both sites). **Noise levels at receptors during the Phase I-only operation are not included in Table 4.18-11. Although, noise levels would not be halved during Phase I-only operation (in comparison to levels during the combined Phases I and II), the amount of decibel increase would be less than what is predicted in Table 4.18-11 and would be below perceptible changes.**

Plant Noise at East Range Site

The modeling results at the seven nearest receptors are shown below in Table 4.18-12. **Changes shown in this table are corrections based on Excelsior's latest supplemental filing (January 2008) for the project's Joint Application to the State of Minnesota (Excelsior, 2008).**

Table 4.18-12. Estimated Operational Noise Levels (without mitigation) at Receptors at East Range Site for Phases I and II

Receptor	Existing L_{10} /L_{50} Day (dBA)	Existing L_{10} /L_{50} Night (dBA)	Projected Plant Noise L_{10} /L_{50} (dBA)	Decibel Increase L_{10} /L_{50} Day (dBA)	Decibel Increase L_{10} /L_{50} Night (dBA)	Resultant L_{10} /L_{50} Day (dBA)	Resultant L_{10} /L_{50} Night (dBA)
R1[1]	50/50	49/49	58/58	**8.6/8.6**	**0.8/0.8**	**58.6/58.6**	**58.5/58.5**
R2	52/**51**	50/49	40/40	**0.3/0.3**	0.4/0.5	**52.3/52.3**	50.4/49.5
R3	53/**51**	50/49	**40/40**	**0.2/0.3**	**0.4/0.5**	**53.2/53.3**	**50.4/49.5**
R4	52/50	49/48	35/35	**0.1/0.1**	0.**2**/0.2	52.**1**/50.**1**	49.**2**/48.2
R5	53/50*	50/49*	**38/38**	0.**1**/0.3	0.3/**0.3**	53.**1**/50.3	50.3/**49.3**
R6	53/50*	50/49*	**38/38**	0.**1**/0. 3	0.3/**0.3**	53.**1**/50.3	50.3/**49.3**
R7	53/50*	50/49*	**38/38**	0.**1**/0. 3	0.3/**0.3**	53.**1**/50.3	50.3/**49.3**

Note: No receptor levels are predicted to exceed state standards: 65/60 dBA (L_{10} /L_{50}) for daytime and 55/50 for nighttime at residential and church land uses;
[1]State threshold for R1, is 80/75 dBA (L_{10} /L_{50}) for daytime and nighttime at industrial land uses.
***Existing ambient conditions and levels were estimated based on information at locations with similar characteristics.**
(Source: SEH, 2005b**; Excelsior, 2008; AAC, 2009**);
Bold typeface denotes updated values for the Final EIS - corrections in this table are based on Excelsior's latest supplemental filing (January 2008) for the project's Joint Application to the State of Minnesota (Excelsior, 2008)

During operation of the plant **during the combined Phases I and II** at the East Range Site, it is not anticipated that any of the receptors would receive levels above MPCA guidelines during either daytime or nighttime operation, as predicted in Table 4.18-12. This is attributable to the distances involved between the East Range Site and the nearest sensitive receptors. R1 exhibited the greatest predicted decibel increase for the daytime (**8.6** dBA for both L_{10} and L_{50}) **and for the** nighttime (0.8 for **both L_{10} and** L_{50}**). The 8.6-dBA increase at R1 exceeds ±3 dB, and thus, signifies a detectable change**; however, **R1 is located in a remote area at the boundary of the undeveloped East Range buffer land and isolated from any residential receptor. Also, R1 remains below the state threshold of 80/75 dBA (L_{10} /L_{50}) for daytime and nighttime at industrial land uses. All other** increases are well below the commonly-held threshold of a perceptible change in community noise levels (which is ±3 dB). **Noise levels at receptors during the Phase I-only operation are not included in Table 4.18-12. Although, noise levels would not be halved during Phase I-only operation (in comparison to levels during the combined Phases I and II), the amount of decibel increase would be less than what is predicted in Table 4.18-11, remain below perceptible changes with respect to any residential area, and remain within state thresholds.**

Rail Noise and Vibration

The Mesaba Energy Project would transport coal and related materials to and from the proposed project sites by way of a new rail line. Noise and vibration generated by the rail operations have the potential to impact nearby sensitive receptors. The rail noise analysis assumes the rail operating parameters as shown in Table 4.18-4.

The use of train horns is governed by the FRA per Federal requirements as found in 49 USC 20153 and 49 CFR, Parts 222 and 229 "Use of Locomotive Horns at Highway-Rail Grade Crossings, Final Rule (August 17, 2206). Train horns are must be sounded at public at-grade rail crossings. Further, these documents establish that locomotive horns should produce a minimum sound level of 96 dBA and a maximum sound level of 110 dBA, both measured at 100 feet forward of the locomotive in its direction of travel. Cumulative impacts as a result of train horns are discussed in Section 5.2.7.3.

Both rail yard noise levels and rail line noise levels were calculated for the Mesaba noise impact analysis using the methodologies, calculation procedures, and emissions ratings found in the industry-standard document "Transit Noise and Vibration Impact Assessment" (FTA, 1995). The methodologies of this assessment take into account the number of locomotives, the number of rail cars, the train speed, the type of tracks and wheels, and the number of trains per hour or day and use is made of standardized reference emissions factors for the various sources.

Rail Noise and Vibration at West Range Site

In response to concerns raised by USACE and other agencies about the need to avoid and minimize wetland impacts identified in the Draft EIS, Excelsior identified a new preferred rail alignment, Alternative 3B. The alignment would follow the same route as Alternative 1A from the point of interconnection with the CN and BNSF main line to the Mesaba plant site. However, Alternative 3B would begin its rail loop approximately at a point in between the footprints for Phases I and II (see Figure 2.3-2). The rail car unloading station was adjusted about 2,000 feet to the southeast and unit trains would extend beyond the West Range Site boundary at the start of unloading. Thus, under Alternative 3B, the train would be within about 1,000 feet of residential properties on the north end of Big Diamond Lake for approximately 1 hour longer than for Alternative 1A. However, because the train would not be under power during unloading and would be passively pulled through the unloading process, nearby residents would not be subject to additional rail noise during unloading under Alternative 3B. This section was revised to reflect the latest noise analysis for rail-related noise impacts at the West Range Site.

Table 4.18-13 lists the estimated future noise and vibration levels generated by train operations associated with the project in the West Range Site. Freight train noise levels would range from **36 to 56** dBA at the receptor locations during a train pass-by. Typical daytime background noise levels were measured to be in the low 50's dBA (L_{50}). Based on these levels, noise from freight train operations could be noticeable to residences represented by receptors R2, R5, and **AAC-**7 and may be considered an impact based on the FRA noise criteria (see Section 4.18.2.1). However, given the relatively small amount of future train operations **(up to two daily rail trips during Phase I and up to four daily rail trips during Phase II)** and the fact that very few train operations would occur on a daily basis, the incremental L_{dn} increase generated by freight train operations would not be considered significant when compared to background noise levels. Some instances of train pass-bys would be noticeable at receptors with quieter background noise levels, but the noise levels would not be expected to contribute appreciably to the ambient background on an hourly or 24-hour basis. The maximum noise levels generated by freight train operations would be below the ATPA guideline of 70 dBA at each residential receptor location.

Table 4.18-13. Estimated Freight Train and Yard Activity Noise Levels at West Range Site

Receptor	Estimated Distance to Nearest Track Segment (ft)	Estimated Train Noise (dBA)	Estimated RMS Vibration Velocity (dBV)	Estimated Distance to Rail Yard (Loading & Unloading) (ft)	Estimated Yard Noise (dBA)
R1	4,110	44	56	**3,835**	**25**
R2	**1,125**	**52**	**67**	**4,585**	**23**
R3	**6,895**	**40**	**51**	**7,490**	**19**
R4	**7,300**	**40**	**51**	**8,070**	**18**
R5	**630**	**56**	**72**	**4,800**	**23**
AAC-6	**2,130**	**48**	**61**	**10,950**	**15**
AAC-7	**1,480**	**51**	**65**	**15,575**	**12**
R8	**13,020**	**36**	**46**	**14,565**	**12**

Table reflects new noise analysis based on new rail alignment Alternative 3B (bold typeface denotes updated values for the Final EIS). (Source: SEH et al., 2005**; AAC, 2009**)

Noise generated by rail yard operations have also been estimated and summarized in Table 4.18-13. The noise from yard activities, involving loading and unloading of freight trains, would be greatly attenuated due to the distance between the nearby receptors and the yard. Rail yard noise is estimated to be between **12 to 25** dBA at the nearby residences. Noise generated by yard operations would not exceed the FRA and ATPA noise guidelines, and therefore, is not expected to be significant.

Horn soundings would be expected to be clearly audible to the nearest residential receptors. Because train horns are a requirement of the FRA, the noise impact would be considered an unavoidable adverse noise impact.

Since vibration effects from rail operations would be classified as "infrequent events" (per Table 4.18-4), the FRA guideline for vibration impacts would be 80 VdB. As all the receptors at the West Range Site are predicted to have train-related vibration levels of at least 8 VdB below this guideline level, it is expected that rail vibration impacts would not be significant at the West Range Site.

Rail Noise and Vibration at East Range Site

Table 4.18-14 lists the estimated future noise levels generated by train operations associated with the project at the East Range Site. **Changes shown in this table are corrections based on Excelsior's latest supplemental filing (January 2008) for the project's Joint Application to the State of Minnesota (Excelsior, 2008).**

Freight train noise levels would range from **39 to 50** dB at the receptor locations during a train pass-by. Typical daytime background noise levels were measured to be in the low 50s. Based on these levels, noise from freight train operations could be noticeable to R1. However, given the relatively small amount of future train operations and the fact that very few train operations would occur on a daily basis, the L_{dn} generated by freight train operations would not be considered significant when compared to background noise levels. Some instances of train pass-bys would be noticeable at receptors with quieter background noise levels, but the noise would not be expected to contribute appreciably to the ambient background on an hourly or 24-hour basis. Furthermore, the maximum noise levels generated by freight train operations

would be below the ATPA guideline of 70 dBA at each receptor location and would not be considered significant.

Table 4.18-14. Estimated Freight Train and Yard Activity Noise Levels at East Range Site

Receptor	Estimated Distance to Nearest Track Segment (ft)	Estimated Train Noise (dBA)	Estimated RMS Vibration Velocity (dBV)	Estimated Distance to Rail Yard (Loading & Unloading) (ft)	Estimated Yard Noise (dBA)
R1	1,700	**50**	**63**	1,700	**32**
R2	5,800	**42**	**53**	9,500	**17**
R3	5,200	**43**	**53**	8,700	**18**
R4	9,300	**39**	**49**	12,000	15
R5	7,300	**40**	**51**	10,000	**17**
R6	8,000	**40**	**50**	10,200	**16**
R7	8,100	**40**	**50**	10,200	**16**

* Receptor 1 is located at the boundary of the Buffer Land and is isolated from residential receptors. (Source: SEH, 2005b; AAC, 2009); **Corrections in this table are based on Excelsior's latest supplemental filing (January 2008) for the project's Joint Application to the State of Minnesota (Excelsior, 2008)**

Noise generated by rail yard operations have also been estimated and summarized in Table 4.18-14. The noise from yard activities, involving loading and unloading of freight trains, would be greatly attenuated due to the distance between the nearby receptors and the yard. Rail yard noise is estimated to be between 15 to **32** dB at the **receptors**. When compared to the FRA and ATPA noise guidelines, noise generated by yard operations would not expected to be significant.

Horn soundings would be expected to be clearly audible to the nearest residential receptors. Because train horns are a requirement of the FRA, such noise impacts are an unavoidable adverse impact.

Since vibration effects from rail operations would be classified as "infrequent events" (per Table 4.18-4), the FRA guideline for vibration impacts would be 80 VdB. As all the receptors at the East Range Site are predicted to have train-related vibration levels of at least 17 VdB below this guideline level, it is expected that rail vibration impacts would not be significant at the East Range Site.

Federal Highway Administration Noise Analysis (West Range)

As previously mentioned, an FHWA noise analysis was conducted (using the augmented FHWA noise prediction software MINNOISE) for the West Range Site because this site initially consisted of a proposed roadway that would have included substantial realignment and additional lanes (realignment of CR7). Following publication of the Draft EIS, Itasca County deferred its planned realignment of CR 7 due to changes in funding priorities at the state level. The proposed realignment of CR 7 as it was presented in the Draft EIS is no longer anticipated to be available for the Mesaba Energy Project. Access Road 3, now Excelsior's preferred alternative, would directly connect the existing alignment of CR 7 to the southwestern corner of the property boundary as shown in Figure 2.3-2. An additional noise assessment was completed for Access Road 3. This section was revised to reflect the latest traffic-related noise levels at the West Range Site.

The noise levels at the virtual receptors at the West Range Site during the construction and operational phase are shown in Table 4.18-15 **(revised for Final EIS)**. **For the new analysis, two**

receptor points, MR 19 and MR 20, were removed due to their greater distance from Access Road 3. New receptors, MR 21 and MR 22, were added: MR 21 is a new location which was not affected by the original alignment and MR 22 has been identified as a new residential receptor. See Figure 4.18-1 (added in Final EIS) for location of receptors used for the traffic-related noise analysis. [Text regarding exceedances predicted for Draft EIS was deleted.]

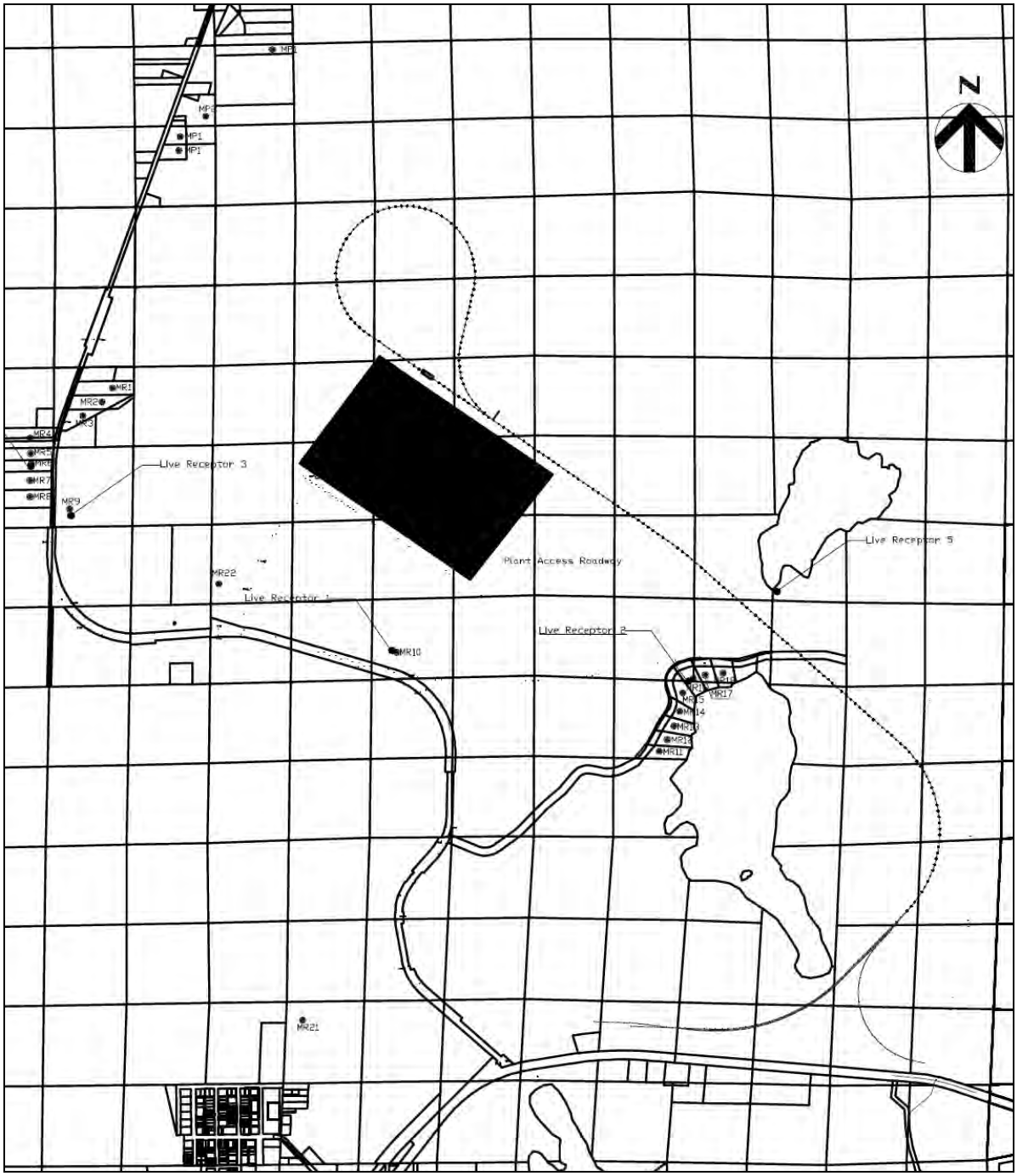


Figure 4.18-1. MINNOISE L_{10} Virtual Receptor Locations for West Range Site (HDR, 2009)

Table 4.18-15. MINNOISE L_{10} Noise Levels at Virtual Receptor Locations for West Range Site

Receptors/Distance to Roadway	"Nightime"[1] Construction L_{10}	"Daytime"[1] Construction L_{10}	"Nightime"[1] 2028 Plant Service L_{10}	"Daytime"[1] 2028 Plant Service L_{10}
MR1/5500'	**45** dBA	**48.8** dBA	**40.4** dBA	**40.4** dBA
MR2/5400'	**46.3** dBA	**50.2** dBA	**41.7** dBA	**41.7** dBA
MR3/5500'	**49.7** dBA	**53.9** dBA	**45.2** dBA	**45.2** dBA
MR4/5800'	**49.8** dBA	**52.9** dBA	**44.3** dBA	**45.6** dBA
MR5/5600'	**50.8** dBA	**53.8** dBA	**45.2** dBA	**45.7** dBA
MR6/5600' **(near R4)**	**51.3** dBA	**54.2** dBA	**45.6** dBA	**45.8** dBA
MR7/5450'	**51.3** dBA	**54.2** dBA	**45.6** dBA	**48.4** dBA
MR8/5300'	**51.5** dBA	**54.4** dBA	**45.8** dBA	**53.9** dBA
MR9/4600' **(near R3)**	**55.1** dBA	**57.2** dBA	**48.4** dBA	**35.8** dBA
MR10/320' **(near R1)**	**62.3** dBA	**60.8** dBA	**55.1** dBA	**35.3** dBA
MR11/1400'*	**41.9** dBA	**41.8** dBA	**36** dBA	**34.9** dBA
MR12/1250'*	**41.5** dBA	**41.3** dBA	**35.5** dBA	**34.6** dBA
MR13/1050'*	**41.1** dBA	**40.9** dBA	**35.1** dBA	**34.3** dBA
MR14/850'*	**40.7** dBA	**40.5** dBA	**34.7** dBA	**33.7** dBA
MR15/550'*	**40.4** dBA	**40.2** dBA	**34.4** dBA	**33.1** dBA
MR16/350'*	**39.8** dBA	**39.6** dBA	**33.8** dBA	**32.4** dBA
MR17/300'* **(near R2)**	**39.2** dBA	**39.1** dBA	**33.3** dBA	**40.9** dBA
MR18/300'*	**38.5** dBA	**38.4** dBA	**32.6** dBA	**32.4** dBA
MR21/1,880'	**46.8** dBA	**47,** dBA	**40.7** dBA	**40.9** dBA
MR22/520'	**58.4** dBA	**58.8** dBA	**51.8** dBA	**52.1** dBA

Notes: Shaded values represent L_{10} values above state standards **65/60 dBA (L_{10} /L_{50}) for daytime and 55/50 for nighttime at residential and church land uses**. * Represents residences at Big Diamond Lake. **[Note, MR 19 and 20 were deleted for the Final EIS.];**

[1] "Daytime" is defined by the MPCA as between 7:00 am – 10:00 pm; "nighttime" is defined as between 10:00 pm – 7:00 am

Source: SEH et al., 2005**; HDR, 2009**

The new analysis indicates that MPCA noise thresholds are potentially exceeded at three receptor points – MR 9, MR 10, and MR 22 – for the nighttime construction condition. However, these exceedances are only for construction-related traffic and only between the nighttime hours. Since no nighttime construction activities are currently planned, the nighttime noise standards would not be exceeded and, therefore, noise mitigation for increased traffic-related noise would not be required. In defining the impacted receptors, the FHWA, Mn/DOT, and MPCA regulations were examined and the following conclusions were made: **[Text regarding exceedances predicted for the Draft EIS was deleted.]**

- No receptors met the criteria for *Noise Level Approaching the NAC*. As stated, FHWA and Mn/DOT apply this classification when the predicted level is 1 dB below the criterion level.
- No receptors met the FHWA definition of *Substantial Increase in Noise* as defined by a 5-dB increase over the Federal NAC category B criteria of 70 dB, or a 75 dB prediction.

- "Nighttime" construction times (10:00 pm – 7:00 am) yielded **three** impacted receptors per MPCA definition. **However, construction is unlikely to occur during nighttime hours and these three receptors would not experience these projected noise levels.**
- "Nighttime" 20-year project plant service traffic levels revealed **no** impacted receptors **per FHWA or MPCA and Mn/DOT guidelines**.
- "Daytime" 20-year projected plant service traffic levels reveal no impacted receptors per FHWA or MPCA and Mn/DOT guidelines.

In general, results of the new noise study show that Access Road 3 would not generate any new noise impacts above MPCA guidance and, in fact, traffic-related noise impacts as discussed in the Draft EIS, primarily for receptors near Big Diamond Lake, are reduced. Based on the level of reduced impacts, a noise wall analysis is not required.

4.18.3 Impacts of 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. Since this alternative would most likely not involve introducing new noise sources, the No Action Alternative is projected to have no impact on the nearby noise sensitive receptors. Therefore, the noise levels would be substantially similar to existing conditions.

4.18.4 Summary of Impacts

Basis for Impact	No Action	West Range	East Range
Conflicts with a jurisdictional noise ordinance or Minnesota regulations (i.e., Minnesota Pollution Control Agency [MPCA]) or results in a permanent perceptible increase in ambient noise levels at residential areas during construction.	There would be no additional noise emissions and therefore, there would be no new conflicts with noise standards; however R3 and R4 at the West Range are currently above the MPCA noise thresholds.	Short-term adverse noise impacts would result from construction activities, including steam blows. Noise levels at nearby receptors from steam blows would range from **86 to 100** dBA; however, steam piping would be equipped with silencers that would reduce noise levels by 20 dBA to 30 dBA at each receptor location. **Predicted aggregate noise levels from construction activities range from 27 to 56 dBA -** MPCA residential daytime noise limits of 60 dBA (L_{50}) would not be exceeded at any of the residential receptors during construction. **Increased noise levels would occur at potential off-site staging areas, especially along construction vehicle routes; however, minor impacts are expected as increases would be short-term, intermittent, and transportation routes would not traverse large towns.** FHWA noise analysis: Nighttime L_{10} threshold would be exceeded at **three receptors locations (MR9, MR10, and MR22)** during construction**; however, construction not expected to take place during nighttime hours and, thus, no impacts would occur**.	Short-term adverse noise impacts would result from construction activities, including steam blows. Noise levels at nearby receptors from steam blows would range from 88 to **104** dBA; however, steam piping would be equipped with silencers that would reduce noise levels by 20 dBA to 30 dBA at each receptor location. **Predicted aggregate noise levels from construction activities range from 31 to 65 dBA -** MPCA residential daytime noise limits of 60 dBA (L_{50}) would not be exceeded at any of the residential receptors during construction **(65 dBA is predicted to occur at R1, which is located at the boundary of the Buffer Land and is isolated from residential areas)**. **Increased noise levels would occur at potential off-site staging areas, especially along construction vehicle routes; however, minor impacts are expected as increases would be short-term, intermittent, and staging areas and transportation routes are located in remote areas.**

Basis for Impact	No Action	West Range	East Range
Conflicts with a jurisdictional noise ordinance or Minnesota regulations (i.e., Minnesota Pollution Control Agency [MPCA]) during operations or results in a permanent perceptible increase in ambient noise levels at residential areas.	There would be no additional noise emissions and therefore, there would be no new conflicts with noise standards and no change in ambient noise conditions; note, however, that R3 and R4 at the West Range are currently above the MPCA noise thresholds.	Unmitigated plant noise (daytime): Without mitigation, MPCA noise thresholds would not be exceeded. Unmitigated plant noise (nighttime): Without mitigation, the nighttime noise levels would exceed the L_{50} threshold at R3 and R4 by **3.5** and **3.4** dBA, respectively. Note, however, that existing noise levels at R3 and R4 currently exceed state limits because of proximity to CR 7. **Additionally, note that no perceptible noise increases would occur at any receptor locations for the single and combined plant phases under an unmitigated scenario (i.e., predicted change in existing ambient noise levels would be less than 3 dB)**.	Unmitigated plant noise (daytime and nighttime): MPCA noise thresholds would not be exceeded. Predicted daytime and nighttime noise level increases were **greatest at R1 (8.6-dBA increase); however, R1 is an isolated area (not a residential area); no other perceptible changes in noise levels would occur at the other receptor locations**.
Conflicts with transportation-related noise guidelines (Federal Highway Administration, Federal Railroad Administration, and American Public Transportation Association).		Rail Noise: Freight train noise levels would range from **36 to 56** dBA at the modeled receptor locations during a train pass-by - noise from freight train operations could be noticeable to residences represented by receptors R2, R5, **and AAC-7** and may be considered an impact based on the FRA noise criteria, but would be short-term and relatively infrequent. Maximum noise levels generated by freight train operations would be below the ATPA guideline of 70 dBA at each receptor location and would not be considered significant. **All receptors are predicted to have train-related vibration levels of at least 8 VdB below the FRA guideline level of 80 VdB.** Train horns, as required under FRA regulations would be adverse unavoidable impacts for receptors near at-grade crossings. FHWA noise analysis: **All receptor locations were below state thresholds during plant operations (no receptors met the FHWA definition of *Substantial Increase in Noise*)**.	Rail Noise: Freight train noise levels would range from **39 to 50** dBA at the modeled receptor locations during a train pass-by - noise from freight train operations could be noticeable to residences represented by receptor R1. Maximum noise levels generated by freight train operations would be below the ATPA guideline of 70 dBA at each receptor location and would not be considered significant. **All receptors are predicted to have train-related vibration levels of at least 17 VdB below the FRA guideline level of 80 VdB.** Train horns, as required under FRA regulations would be adverse unavoidable impacts for receptors near at-grade crossings.

4.18.5 Plant Noise and Mitigation Issues

To ensure that appropriate noise attenuation features are included in the final facility design and layout, acceptable ambient noise levels for the proposed land use could be specified in contractor bid specifications. An acoustical analysis of the final design could be completed to ensure it is consistent with the MPCA guidelines.

Noise mitigation design features were identified in the noise evaluation reports. The reports recommended a prudent plant layout configuration, appropriate building acoustical features, low-noise specifications for selected item vendors, and silencing equipment on certain systems. With these proposed noise control designs, it is believed that compliance with the MPCA standards would be achieved at all nearby receptor locations and beyond in the adjacent land uses; both during full-load operations at any time of the day and night.

To ensure noise compliance, the amounts of equipment noise controls could be refined during the course of the project engineering, such that the as-built installation maintains the expected noise emissions and achieves the desired noise compliance. Following commissioning, the plant could be tested using a formalized acoustical survey procedure to demonstrate noise acceptability with the project requirements.

Table 4.18-16 lists the conceptual noise mitigation measures, identified in the noise evaluation studies included in Appendix 5 of the Mesaba Energy Project – Environmental Supplement (SEH et al., 2005), that could be incorporated into the final design of the power plant.

Table 4.18-16. Summary of Noise Mitigation Project Design Features

Noise Source (Original Noise Emissions Rating)	Conceptual Noise Mitigation Feature(s)
Power Block Cooling Tower (60 dBA at 400' from tower edge)	Reduced 6 dB to 54 dBA at 400' from tower edge. Tower vendors can use a combination of slower-speed fans with special blade design, low-noise drive systems, splash control features, and/or tower baffling materials.
Combustion Turbine, Steam Turbine, & HRSG 2-on-1 Power Island (70 dBA at 400' from island envelope)	(a) Include acoustical panel specifications for CTG and STG buildings walls in the detailed design such that interior space noise levels are adequately absorbed and encased within these building shells. (b) Specify CTG components that are outside buildings to be less than 90 dBA at 3 feet from the equipment surface envelope, as an aggregate.
HRSG Stack Exit (alone)(60 dBA at 400')	Reduced 10 dB to 50 dBA at 400' from stack base. Power Island vendor should use a stack silencer (either before or after the up-turn bend) to reduce HRSG stack noise.
Power Block Cooling Tower Pumps(94 dBA at 1')	Reduced 6 dB to ≤88 dBA at 1'. Can be accomplished via noise limit specification to equipment vendor (for a quiet design). As an alternative, install an acoustical enclosure around the pump and drive mechanics.
ASU System(varies)	(a) Include acoustical panel specifications for ASU building walls in the detailed design such that interior space noise levels are adequately absorbed and encased within the building shell. (b) Specify ASU components that are outside buildings to be less than 90 dBA at 3 feet from the equipment surface envelope, as an aggregate.
ASU Stack Exit (alone) (50 dBA at 400')	Reduced 10 dB to 40 dBA at 400' from stack base. ASU System vendor should use a stack silencer to reduce stack noise.
Rail Dumping Building(73 dBA at 50')	Assumes acoustical panel specifications for building walls in the detailed design such that interior space noise levels are adequately absorbed and encased within the building shell to meet the assumed emissions levels.
Slurry Feed and Slurry Prep Building(60 dBA at 50')	Same as immediately above.
Slag Handling Building(65 dBA at 50')	Same as immediately above.
Rod Mill Building(75 dBA at 50')	Reduced 10 dB to 65 dBA at 50' from any building facade. Specify acoustical panel specifications for Rod Mill building walls in the detailed design such that interior space noise levels are adequately absorbed and encased within the building shell to meet the reduced emissions levels.

Table 4.18-16. Summary of Noise Mitigation Project Design Features

Noise Source (Original Noise Emissions Rating)	Conceptual Noise Mitigation Feature(s)
SynGas and TailGas Burners(96 dBA at 3')	Reduced 10 dB to 86 dBA at 3' from the burner box. Specify low-noise burners to equipment vendors or use noise control enclosures/ plenums around burner systems.
Raw Water Pump Sets(91 dBA at 3')	Reduced 10 dB to 81 dBA at 3' from the pump set envelope. Noise limit specification to equipment vendor to supply either quiet-design pump sets or to utilize equipment enclosure.
All other Mechanical Equipment not specified above (various)	Noise limit specification to equipment vendor; no more than 85 dBA at 3'.
All building HVAC units and fans (various)	Noise limit specification to equipment vendor; no more than 85 dBA at 3'.

Source: SEH et al., 2005**; AAC, 2009**

The available mitigation methods needed to reduce the noise levels from specific equipment to the desirable design criteria would depend on final design and selection of specific equipment. Therefore, no commitment to specific noise mitigation methods has been made at this phase of the project. However, to ensure that noise levels would be below state-required thresholds, Excelsior would evaluate and select the best suite of noise reduction alternatives to be incorporated as part of the design basis.

With respect to noise resulting from activities other than plant equipment, additional noise reduction activities could include restricting the number and timing of coal train deliveries across a specific time period and restricting certain construction/maintenance activities to daytime hours.

5. SUMMARY OF ENVIRONMENTAL CONSEQUENCES

5.1 COMPARATIVE IMPACTS OF ALTERNATIVES

5.1.1 Summary Comparison of Alternatives and Impacts

Table 2.4-1 (Chapter 2) compares the potential impacts for the No Action Alternative with the Proposed Action as located at the West and East Range Sites. The impacts for each environmental resource are based on the analyses found in Chapter 4.

5.1.2 Impacts of Commercial Operation

The demonstration of the Mesaba Energy Project for the CCPI Program would be considered successful if the results indicate that the continued operation of the gasifier would fully meet the fuel needs of the combined-cycle unit and would be economically and environmentally feasible (i.e., the project would achieve commercially competitive performance in terms of availability, thermal efficiency, emissions, and cost of electricity). However, if the fuel needs of the combined-cycle unit would need to be met or supplemented by using natural gas for continued commercial operation, then the demonstration of synthesis gas (syngas) production by coal gasification would be considered unsuccessful.

Following completion of the one-year demonstration in late **2015**, three scenarios would be reasonably foreseeable: (1) a successful demonstration of the Mesaba Energy Project followed immediately by commercial operation of the facilities at approximately the same production level; (2) an unsuccessful demonstration followed by continued commercial operation of the combined cycle power-generating unit using the gasifier to the extent possible, while using natural gas to serve the balance of the combined-cycle unit's requirements not met by the gasifier; and (3) an unsuccessful demonstration followed by continued commercial operation of the combined-cycle unit using natural gas exclusively.

Under all three scenarios, the expected operating life of the facilities would be at least 20 years, including the one-year demonstration period. An extension beyond 20 years would be based on the continued economic feasibility of the facility. Under the first scenario (successful demonstration followed by commercial operation), the level of short-term impacts for environmental resource areas during commercial operation would not differ from those described in Section 4 because the proposed facilities would continue operating 24 hours per day with the same operating characteristics.

For long-term effects, the impacts would be identical to those discussed in Chapter 4, except for impacts that accumulate with time (i.e., solid waste disposal and CO_2 emissions). As described in Sections 2.2.3.3 and 2.2.3.4, solid wastes would be minimized through the removal of elemental sulfur from the IGCC syngas in relatively concentrated form resulting in a marketable product. The other principal solid waste from the syngas process would be an inert, glass-like slag that may be marketable for asphalt aggregate, landfill cover, or other applications depending on carbon content and gasification fuel source. Unmarketable sulfur and/or slag would be disposed of at an appropriate commercial landfill. Disposal of these wastes would increase the waste volume in the landfill, but would not change other potential impacts associated with the landfill. Solid wastes from the ZLD system in the form of a crystallized filter cake would be disposed of at a licensed hazardous waste landfill. The impacts of solid waste management are described in Section 4.16.

Maximum CO_2 emissions over the 20-year commercial life of the generating station would be approximately 214 million tons without mitigation. However, as described in Section 2.2.1.3, the plant would be designed to be adaptable for retrofit of carbon capture technology. Excelsior has presented a plan to remove up to 85 percent of the CO_2 in the syngas fuel, which would result in an overall CO_2 capture rate of 30 percent for the plant (Appendix A1). Furthermore, Excelsior is working in coordination with the Energy and Environmental Research Center, as part of the Plains CO_2 Reduction Partnership, to

develop CO_2 management options for the Mesaba Energy Project based on evaluations of sequestration opportunities associated with regional geologic formations and nearby terrestrial features.

Under the second scenario (an unsuccessful demonstration followed by commercial operation of the combined-cycle unit using the gasifier to the extent possible), the types of impacts resulting from the proposed facilities would be similar to those in the first scenario. However, the level of impacts would be reduced because less coal would be used and less elemental sulfur, slag, and carbon dioxide would be produced. Fewer trains would be needed to deliver coal to the Mesaba Generating Station than for the first scenario operating at full load. Disposal requirements and/or transportation off the site for commercial sale of elemental sulfur and slag would be reduced correspondingly. During periods when the gasifier would not be operating, cooling water demand for project facilities also would be reduced in comparison to the first scenario.

Under the third scenario (an unsuccessful demonstration followed by commercial operation of the combined-cycle unit using natural gas exclusively), the gasifier and associated equipment would no longer be required and most likely would be dismantled and removed from the site for reuse or salvage. Potential short-term impacts would result from fugitive dust and emissions by engines during dismantlement and off-site transport of unneeded equipment, from additional traffic associated with hauling the equipment off site, and from temporary socioeconomic impacts related to the additional workers needed to dismantle and remove the equipment. Also, the likely operational downtime that would occur for the generating station during the dismantling of the gasifer would result in reduced operational impacts.

5.1.2.1 Carbon Dioxide Capture and Geologic Storage

The Carbon Capture and Sequestration plan presented in Appendix A1 was prepared by Excelsior and submitted to the PUC to provide a starting point from which the State of Minnesota could consider meeting its obligations under future CO_2 regulations. Although this option is not feasible during the period of the project demonstration phase, Excelsior may install CO_2 capture technology and sequester the power plant's CO_2 in a deep underground geologic formation at some point during the commercial life of the project. The analysis presented here describes the potential environmental impacts associated with the scenarios and possible pipeline routes presented in Appendix A1, based on the best available information.

Excelsior has not established a specific, detailed design for carbon capture, transport, or sequestration. Hence, this analysis is based primarily on publicly available information compiled by DOE that is considered most representative of the potential future design of these features appropriately scaled for the Mesaba Energy Project. It is expected that if CO_2 capture and storage were implemented at some time in the future, a more detailed analysis would be conducted, including detailed design and engineering, environmental and geotechnical studies, and permitting necessary to comply with appropriate laws and regulations.

For conceptual purposes, two possible CO_2 capture scenarios are examined in this section: Scenario 1, in which approximately 20-30 percent of the CO_2 is captured (depending on the feedstock used), and Scenario 2, in which approximately 85-90 percent of the CO_2 is captured. The captured CO_2 would be stored in an oil-bearing formation for enhanced oil recovery (EOR) or in a deep saline formation. These scenarios help present a valid range of impacts that could occur if CO_2 capture and sequestration were implemented during the power plant's commercial operation phase.

Geologic sequestration (or storage) is the injection and storage of CO_2 in a suitable subsurface formation with the capability to contain it permanently. The injection of gases underground is not a new concept and has been performed successfully for decades, including natural gas storage projects around the world and acid gas injection at EOR projects.

Geologic storage of anthropogenic (man-made) CO_2 as a greenhouse gas mitigation option was first proposed in the 1970s, but little research was done until the early 1990s. In a little over a decade, geologic storage of CO_2 has grown from a concept of limited interest to one that is quite widely regarded as a potentially important mitigation option. Technologies that have been developed for and applied by the oil and gas industry can be used for the injection of CO_2 in deep geologic formations. Well-drilling technology, injection technology, computer simulation of reservoir dynamics, and monitoring methods can potentially be adapted from existing applications to meet the needs of geologic storage (IPCC, 2005).

Types of geologic formations capable of storing CO_2 include oil and gas bearing formations, saline formations, basalts, deep coal seams, and oil- or gas-rich shales. Not all geologic formations are suitable for CO_2 storage; some are too shallow and others have low permeability (the ability of rock to transmit fluids through pore spaces) or poor confining characteristics. Formations suitable for CO_2 storage have specific characteristics such as thick accumulations of sediments or rock layers, extensive covers of low permeability sediments or rocks acting as seals (caprock), permeable layers saturated with saline water (saline formations), structural simplicity, and lack of transmissive faults (IPCC, 2005).

Impacts of CO_2 Capture

Table 5.1-1 lists the potential CO_2 capture rates and expected material requirements, wastes, and water use associated with Scenarios 1 and 2. These estimates are based on information for representative carbon capture and storage systems that would most likely be included in the detailed design for the Mesaba Energy Project.

Under Scenario 1, approximately 20-30 percent of the CO_2 would be captured using amine scrubbing, in which a solution of amine and water contacts the syngas. Higher capture rates would be possible with Powder River Basin coal as a feedstock, while other feedstock blends would result in a lower capture rate. Under Scenario 2, a gas reheater and water-gas shift reactors would be placed upstream of the CO_2 amine scrubber, enabling approximately 85-90 percent of the CO_2 to be captured. Current turbine designs cannot accommodate the higher percentages of hydrogen in syngas produced by this process; however, the advancement of **turbine** technology is **an objective of the CCPI Program**.

The amine and CO_2 in the syngas undergo a chemical reaction forming a CO_2-rich amine that is soluble in water. This solution would then be pumped to a desorber where it is heated or de-pressured, which reverses the reaction and releases pure CO_2 gas. A portion of the recovered amine would be sent to a reclaimer where it would be heated to a higher temperature to distill and reclaim usable solvent that is recycled to the process. There would be some degradation of the amine solvent through irreversible side reactions with SO_2 and other syngas components, resulting in solvent loss.

Amine solutions, such as N-Methyldiethanolamine (MDEA), are stable and not particularly hazardous but require safe chemical handling (such as skin, eye, and respiratory protection) and proper hazardous material storage procedures (DOW, 2004). Soda ash could be added to aid in the precipitation of higher boiling point waste material, which includes heat stable amine salts and other degradation products. The waste would be transferred to the plant's wastewater tank for off-site disposal.

In addition to the reclaimer waste and spent carbon, the process would generate used filter elements from the solvent filters at the carbon bed (Chapel, Ernest, and Mariz, 1999). While waste quantities are estimated in Table 5.1-1 based on the best available information, the actual amount of waste generated would be function of the syngas composition and power plant operating conditions. Because Scenario 2 would result in nearly 3 times greater CO_2 capture than Scenario 1, it would require nearly 3 times the amount of solvent, soda ash, water, and energy. It would also generate nearly 3 times the amount of reclaimer waste and spent carbon filter material. The reclaimer waste would be disposed of by incineration and the spent carbon filter material would most likely be regenerated (recycled) by the vendor (Chapel, Ernest, and Mariz, 1999).

Table 5.1-1. Expected Characteristics of CO2 Capture Scenarios

Parameter	Scenario 1	Scenario 2
Power Plant Rating (MW gross)	1,200	1,200
Total CO_2 generated (tons/year) without capture and sequestration	10,600,000	10,600,000
Capture rate (nominal)	30 percent	90 percent
CO_2 captured (pounds/hour)	726,000	2,178,000
CO_2 captured (tons/year)	3,180,000	9,540,000
CO_2 emitted (million tons/year) after capture and sequestration	7,420,000	1,060,000
Solvent, MEA		
Solvent recirculation rate (gallons per minute) [based on 2.18 gallons MEA/pound of CO_2 removed] [1]	26,400	79,100
Solvent make-up rate (gallons per minute) [based on 0.05 percent loss] [2]	13.2	39.6
Solvent delivery (gals/day) [based on losses]	19,000	57,000
Rail car deliveries of solvent (cars/week) [based on 30,000-gallon capacity tank cars] [3]	4	13
Soda Ash		
Soda ash consumed (pounds/hour) [based on 370 lbs/hr for 4,800 gpm solvent recirculation rate] [2]	2,000	6,000
Soda Ash requirement (tons/year)	8,900	27,000
Spent Carbon Filter		
Spent carbon (pounds/day) [based on 0.165 pounds per metric ton of CO_2] [4]	1,300	3,900
Spent carbon disposal/regeneration (tons/year)	240	720
Energy Use		
Energy penalty (% decrease in efficiency) [5, 6]	1-3	8
Reduction in Capacity (MW)	33-100	267
Reclaimer Waste		
Reclaimer waste (cubic meters/day) [based on 0.003 cubic meters per metric ton of CO_2 captured] [4]	24	70
Reclaimer waste, cubic meters/year	8,700	26,000
Water Use		
Water (gallons per minute) [based on 180 gpm required for 2,800 MT per day CO_2 recovery]	<500	1,500
Process water (gallons/day)	731,600	2,195,000

Note: Quantities of materials, waste, water and energy are estimated based on the best available data; however, the actual amounts would be a function of the flue gas composition and power plant operating characteristics. Many of the estimates for the 30% capture scenario are conservative as they represent a third of the 90% case and do not account for the fact that the proposed 30% capture case would not require the water gas shift reactor.

[1] EPRI, 2000
[2] Chinn, et al., 2004.
[3] ARI, 2005
[4] Chapel, Ernest, and Mariz, 1999
[5] Ciferno, et al., 2007 (Energy penalty shown is based on Selexol. Use of amine would have a higher energy penalty)
[6] Southern California Edison, 2006

Impacts of CO_2 Compression and Transport

Background on CO_2 Compression and Pipelines

To deliver the captured CO_2 to the injection site, the gas would be compressed into a supercritical state (i.e., exhibiting properties of both a liquid and a gas) to make it more efficient to transport. CO_2 compression uses the same equipment as natural gas compression, with some modifications to suit the properties of CO_2. Once compressed, the CO_2 would be conveyed by pipeline to the sequestration site.

Approximately 3,000 miles (4,800 kilometers) of CO_2 pipelines exist in the United States. CO_2 pipelines are regulated as hazardous liquids pipelines. The U.S. Department of Transportation's CO_2 Pipeline and Hazardous Materials Safety Administration has responsibility for safe and secure movement of hazardous materials to industry and consumers by all transportation modes, including the Nation's pipelines. Ordinarily, Federal approval is not required for development of a new hazardous liquids pipeline unless it would cross Federal lands. Generally, state and local laws regulate construction of new hazardous liquids pipelines. However, under Federal and state regulations, pipeline operators are responsible for ensuring the safe operation of their pipelines. Operators must use qualified materials and sound construction practices; thoroughly inspect, test, maintain, and repair their pipelines; ensure their workers are trained and qualified; implement best management practices (BMPs) to prevent damage to pipelines; and develop adequate risk management and emergency response plans. A Computational Pipeline Monitoring System is required by Federal regulation (49 CFR Section 195.444) for leak detection in CO_2 pipelines. This type of leak detection system automatically alerts the operator when a leak occurs so that appropriate actions can be taken to minimize the release. The proposed routes to EOR sites cross international boundaries and would require bilateral coordination between the U.S. Department of Transportation and the Canadian National Energy Board.

> **Supercritical CO_2** - CO_2 usually behaves as a gas in air or as a solid in dry ice. If the temperature and pressure are both increased (above its supercritical temperature of 88ºF [31.1ºC] and 73 atmospheres [1,073 psi]), it can adopt properties midway between a gas and a liquid, such that it expands to fill its container like a gas, but has a density like that of a liquid.

Most pipelines for hazardous liquids are located or buried within existing rights-of-way (ROWs). A ROW consists of consecutive property easements acquired by, or granted to, the pipeline company. The ROW provides sufficient space to perform pipeline maintenance and inspections, as well as a clear zone where encroachments can be monitored and prevented. If an existing utility ROW is not available or suitable for the proposed CO_2 pipeline, new ROW would be obtained where necessary.

The diameter of the pipeline would depend on many factors, particularly the length of the pipeline and transport pressure. It is likely that the pipeline would be buried at least 3 feet (0.9 meter) below the surface except where it is necessary to come to the surface for valves and metering. A typical distance between metering stations is 5 miles (8 kilometers). These features may be aboveground or could be located below ground in concrete vaults. The pipeline would require protection from above ground loading at road crossings, either by increased wall thickness or by casing the pipe. In cold climates, transporting warm CO_2 could increase the ground temperature, which may affect ground frost and freeze in the winter. To avoid problems with icing at road crossings, the pipeline depth or pipe insulation thickness may be increased.

The use of existing ROWs is preferable, because developing ROWs for new CO_2 pipelines could cause changes in land use and ownership, including land clearing and soil disturbances, utility and road crossings, wetland and habitat disturbances, and potential surface leaks of CO_2.

Storage Option 1- Transport to Oil Fields for Enhanced Oil Recovery

As explained in Appendix A1, CO_2 has been proven very effective for oil recovery by both displacing and decreasing the viscosity of otherwise unrecoverable oil. This process provides an economic benefit

that can offset all or some of the costs of CO_2 capture, transport, and sequestration. For Option 1, pipelines could be constructed between the Mesaba Energy Project and a cluster of oil fields in north central North Dakota, the southwestern corner of Manitoba and the southeastern corner of Saskatchewan. For the main trunk pipeline connecting the power plant and the oil field, two route options were examined. These routes would follow existing ROWs to minimize potential impacts to environmental resources and land uses. While these routes are good candidates for such a pipeline, other potential corridors may exist and could be selected if CO_2 capture and storage were pursued. Both of the examined routes could service either the West Range or East Range sites (with slight differences). Routes 1 and 2 are presented in Figure 5-1.2-1. If CO_2 regulations are instated, a comprehensive network of CO_2 pipelines may develop to meet regional sequestration needs and link sources with potential sinks; The Mesaba Energy Project may be able to efficiently connect to that pipeline network.

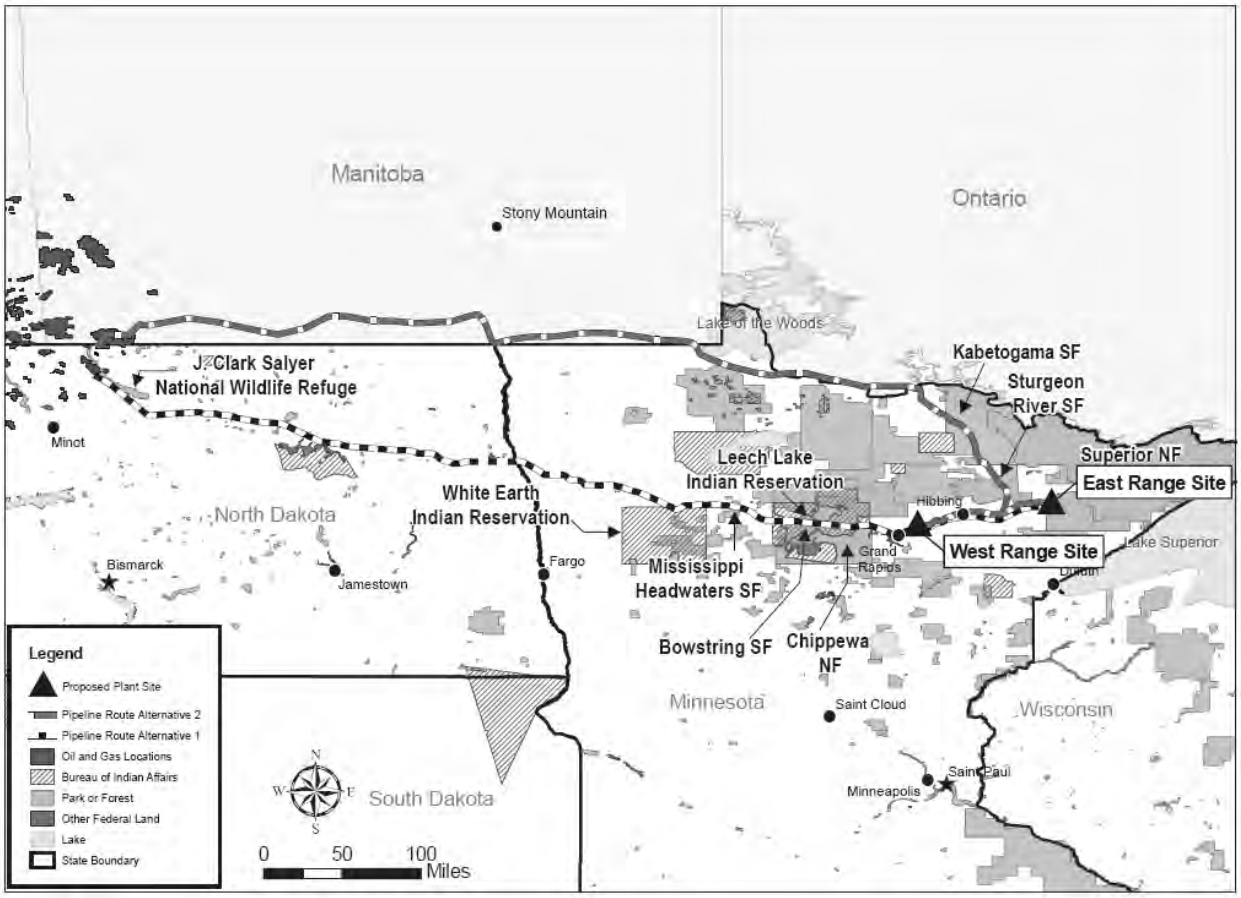


Figure 5-1.2-1. Potential Pipeline Routes from the Mesaba Energy Project to EOR Fields

Route 1

Route 1 would originate at either the East Range Site or West Range site, following an existing ROW to the west. From the West Range site, the route would be about 400 miles long and from the East Range site, the route would be about 450 miles; depending on which capture scenario is employed, the pipeline may be expanded to reach additional oil fields.

For either site, pipeline route 1 would travel through the Chippewa National Forest near Grand Rapids, as well as the Mississippi Headwaters and Bowstring State Forests within existing railroad ROW. For the East Range Site, route 1 between Hibbing and the East Range Site would also pass through a portion of Superior National Forest within existing railroad ROW.

Route 1 for either power plant site would pass through two Indian reservations in Minnesota, including 3 areas that are part of the Leech Lake Indian Reservation and the northern portion of the White Earth Indian Reservation. If this route were chosen, the railroad ROW agreement would need to be examined for each reservation to determine if utility lines (like CO_2 pipelines) would be allowed under the current agreement. If not, Excelsior would seek to obtain a separate right-of-way agreement across each reservation in accordance with 25 CFR 169 (Bureau of Indian Affairs, Department of Interior, Part 169, Right of Way Over Indian Lands). If written consent is obtained from the tribe, a written application for a right-of-way would then be filed with the Secretary of Interior.

Route 1 would travel through 41 towns and communities, ranging from populations of less than 100 to 49,000. The largest towns along the route would be Hibbing (East Range only), Grand Rapids, Bemidji, Crookson, Grand Forks, and Devils Lake.

Route 2

Pipeline Route 2 would originate at either the East Range Site or West Range site, following existing railroad ROW ultimately to the north towards Canada, where it would then turn west toward the oil fields. From the West Range site, the route would be about 525 miles long and from the East Range site, the route would be about 500 miles; depending on which capture scenario is employed, the pipeline may be expanded to reach additional oil fields.

For either site, route 2 would also travel through the Superior National Forest north of Hibbing and the Sturgeon River and Kabetogama State Forests within existing railroad ROW. For the East Range site, route 2 between Hibbing and the East Range Site would also pass through a portion of Superior National Forest within existing railroad ROW. Route 2 would not pass through any Native American tribal lands.

Route 2 would travel through 18 towns and communities, ranging from populations of less than 100 to 17,000. The largest towns along the route would be Hibbing (East Range only), International Falls, Virginia, Eveleth, and Mountain Iron.

Storage Option 2 – Transport to Saline Formation

Deep saline formations are also good candidates for CO_2 storage if they have adequate seals or caprock above them to prevent upward migration. While there is currently no economic benefit of sequestration in saline formation when compared to EOR, saline formation generally have much greater capacities to store CO_2 than oil-bearing formations. If future CO_2 regulations generate value for reducing emissions, an economic benefit for saline storage could emerge.

Under this option, the pipeline route would most likely follow route 1 described above for the EOR option. However, the route would be approximately 200 miles shorter for each power plant site alternative, terminating somewhere between Grand Forks Air Force Base and the Town of Devils Lake in eastern North Dakota. There is also the potential for saline storage in the Mid-continent Rift formation in Minnesota, which could be reached with a <100 mile pipeline. **However its potential for CO_2 sequestration is still theoretical.**

Impacts of Geologic Sequestration

Background

Injection of CO_2 in its supercritical state into a deep geologic formation would be achieved by pumping the CO_2 down an injection well. To increase the storage potential, CO_2 would be injected into very deep formations where it could maintain its dense supercritical state. The fate and transport of CO_2 in the formation would be influenced by the injection pressure, dissolution in the formation water, and upward migration due to CO_2's buoyancy.

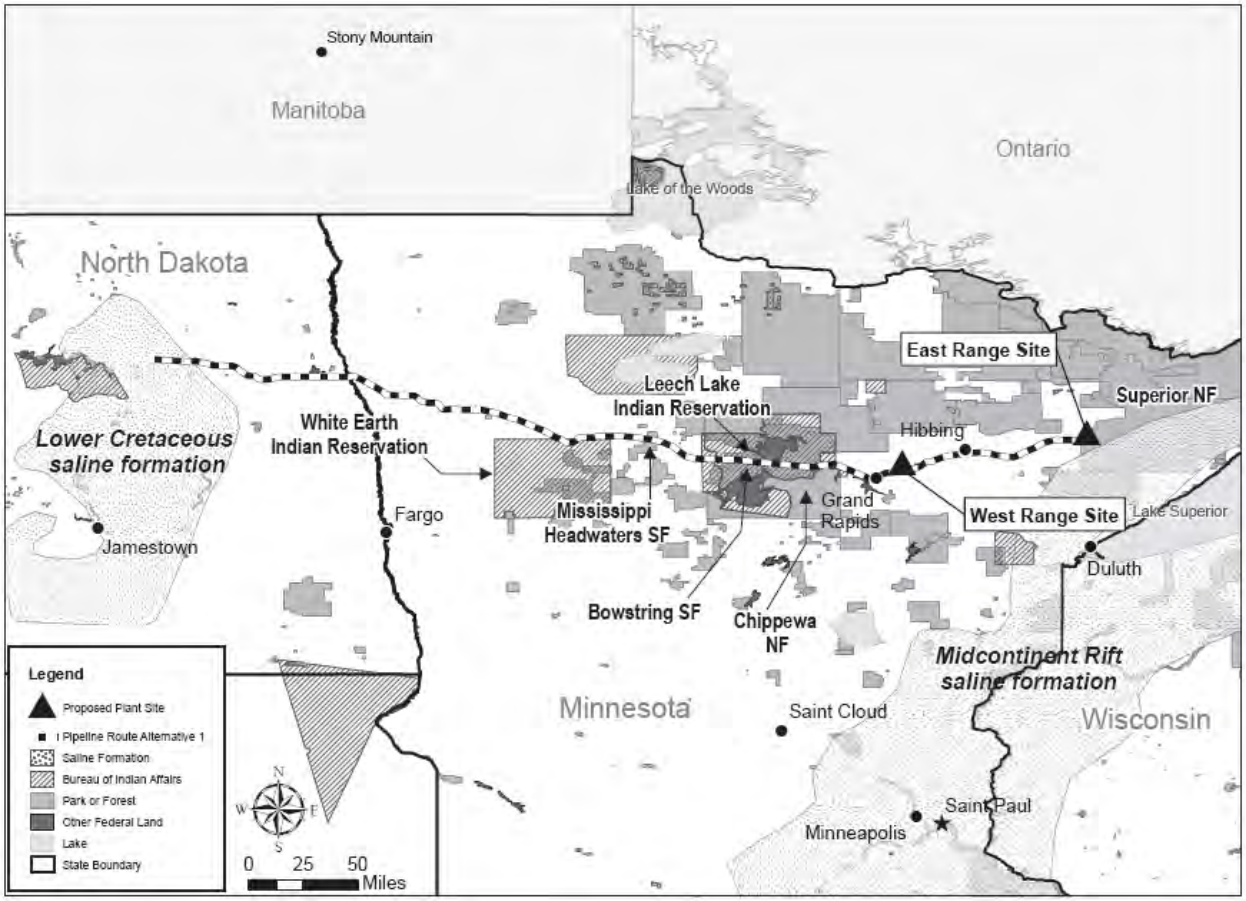


Figure 5-1.2-2. Potential Pipeline Route to the Lower Cretaceous Saline Formation

When CO_2 is injected for EOR, it mixes with the oil and decreases the viscosity, enabling recovery of oil that was previously considered unrecoverable. During standard EOR practices, a small fraction of the CO_2 injected remains in underground storage, but most is recycled as the oil is produced. The CO_2 that remains in the structure is stored over the long term by the same trapping mechanisms observed in saline formations and described below. **For example, the Weyburn CO_2 Monitoring and Storage Project in Saskatchewan, Canada, yielded a 93 percent storage rate for CO_2 supplied by the Dakota Gasification Company plant. Although 100 percent of the CO_2 supplied by the Dakota Gasification Company was determined to remain in geologic storage, the CO_2 emissions resulting from the electricity consumption by the compressors needed to re-inject CO_2 removed with the extracted oil would be equivalent to 7 percent of the stored CO_2. Conservatively, assuming a net 90 percent storage rate and use of 100 percent subbituminous coal, the Mesaba scenarios could achieve sequestration rates of 2,862,000 to 8,586,000 tons per year of CO_2, respectively, for the 30 percent and 90 percent capture rates**.

When CO_2 is injected into a deep saline formation in a liquid or liquid-like supercritical dense phase, it is only somewhat miscible in water. Because supercritical CO_2 is much less viscous than water (by an order of magnitude or more), it would be more mobile and could migrate at a faster rate than the saline groundwater. In saline formations, the comparatively large density difference (30 to 50 percent) creates strong buoyancy forces that could drive CO_2 upwards.

To provide secure storage (e.g., structural trapping), a low permeability layer (caprock) would act as a barrier and cause the buoyant CO_2 to spread laterally, filling any stratigraphic or structural trap it

encounters. As CO_2 migrates through the formation, it would slowly dissolve in the formation water. In systems with slowly flowing water, reservoir-scale numerical simulations show that, over tens of years, up to 30 percent of the injected CO_2 would dissolve in formation water. Larger basin-scale simulations suggest that, over centuries, the entire CO_2 plume would dissolve in formation water. Once CO_2 is dissolved in the formation water, it would no longer exist as a separate phase (thereby eliminating the buoyant forces that drive it upwards), and it would be expected to migrate along with the regional groundwater flow.

As migration through a formation occurs, some of the CO_2 would likely be retained in the pore space, commonly referred to as "residual CO_2 trapping." Residual trapping could immobilize large amounts of the CO_2. While this effect is formation-specific, researchers estimate that 15 to 25 percent of injected CO_2 could be trapped in pore spaces, although over time much of the trapped CO_2 dissolves in the formation water (referred to as "dissolution trapping"). The dissolved CO_2 would make the formation water more acidic, with pH dropping as low as 3.5, which would be expected to dissolve some mineral grains and mineral cements in the rock, accompanied by a rise in the pH of the formation water. At that point, some fraction of the CO_2 may be converted to stable carbonate minerals (mineral trapping), which is the most permanent form of geologic storage. Mineral trapping is believed to be comparatively slow, taking hundreds or thousands of years to occur (IPCC, 2005).

To ensure the safe storage of sequestered CO_2, a monitoring, mitigation and verification strategy would be implemented. The purposes of monitoring include assessing the integrity of plugged or abandoned wells in the region; calibrating and confirming performance assessment models; establishing baseline parameters for the storage site to ensure that CO_2-induced changes are recognized; detecting microseismicity associated with the storage project; measuring surface fluxes of CO_2; and designing and monitoring remediation activities.

Regulations Governing Underground Injection of CO_2

The underground injection of CO_2 is regulated under the U.S. Environmental Protection Agency's (EPA's) Underground Injection Control (UIC) Program. The UIC Program works with state and local governments to oversee underground injection of waste in an effort to prevent contamination of drinking water resources. All injection wells require authorization under general rules or specific permits.

The EPA groups underground injection into five classes for regulatory control purposes. Each class includes wells with similar functions, and construction and operating features so that technical requirements can be applied consistently to the class. Although the classification of UIC wells would be determined at the time of permitting, there is an overall standard of protection under the UIC Program that prohibits the movement of fluids into underground sources of drinking water. The citation below (from 40 CFR Part 144) provides the standard that all injection wells must be measured, including Class V (shallow and other) wells. This standard is currently in effect:

§ 144.12 Prohibition of movement of fluid into underground sources of drinking water.

(a) No owner or operator shall construct, operate, maintain, convert, plug, abandon, or conduct any other injection activity in a manner that allows the movement of fluid containing any contaminant into underground sources of drinking water, if the presence of that contaminant may cause a violation of any primary drinking water regulation under 40 CFR Part 142 or may otherwise adversely affect the health of persons. The applicant for a permit shall have the burden of showing that the requirements of this paragraph are met.

Furthermore, if any water quality monitoring of underground sources of drinking water indicates the movement of any contaminant into the water source, the state or EPA would require corrective action, operation, monitoring, or reporting as necessary to prevent such movement. The injection permit would be modified to reflect these additional requirements or the permit may be terminated. Appropriate enforcement action can be taken if a permit is violated.

In July 2008, EPA released a new rule that would create a new category for CO_2 injection wells under the UIC Program. The rule would govern the siting, operation, monitoring and closure procedures for the injection wells. EPA solicited comments from the public through December, 2008, and has hosted several stakeholder workshops in an effort to get public input in the process. In 2008, EPA promulgated UIC guidance allowing the use of Class V wells for CO_2 sequestration research initiatives. However, until the CO_2 injection rule has been finalized by EPA, standard primacy and UIC well categories still apply to CO_2 injection wells. In North Dakota, Class II UIC wells cover the injection of brines and other fluids associated with oil and gas production and are regulated by the North Dakota Industrial Commission, Department of Mineral Resources, Oil and Gas Division (North Dakota Department of Health, 2007). **For EOR,** Class II is the most likely class of UIC well that would be used**.**

In Canada, underground injection and groundwater protection are regulated at the provincial level, except where provincial or international boundaries are crossed. In this case, because the CO_2 would be piped from Minnesota, the Canadian Federal government would have jurisdiction. Both Saskatchewan and Manitoba have a provincial Environmental Assessment Act, under which CO_2 injection would be classified as a development requiring ministerial approval (PCOR, 2005).

Impacts of EOR Storage

The target formation for injection for EOR storage would be various hydrocarbon formations within the Williston Basin in eastern North Dakota, southeastern Saskatchewan, and southwestern Manitoba. Possible fields for CO_2 EOR development with CO_2 from the Mesaba Energy Project include the Nesson anticline, Saskatchewan, and Northwestern Flank. Oil production in the Williston basin is from Paleozoic-age rocks where oil is contained in stratigraphic traps.

The economic benefits and incentives for CO_2 EOR are described in Appendix A1. Preliminary estimates indicate that under either capture scenario, there are fields suitable to accept the CO_2 from the Mesaba Energy Plant for the planned 22-year operations cycle. The use of CO_2 from the Mesaba Energy Project at existing oil fields could extend the operating life of those fields, allowing for greater volumes of oil to be extracted. A small fraction of the CO_2 would mix with the recovered oil that would be removed in the processing stage. However, because of the economic value of the CO_2, it would probably be recovered and re-injected at the EOR site. Extending the life of nearly-depleted oil fields could create or prolong existing jobs at these fields and provide additional oil and gasoline for consumers. Impacts associated with using the CO_2 for EOR could potentially include, but would not be limited to:

- Constructing new CO_2 injection sites that require the permitting and drilling of new UIC wells
- land clearing and soil disturbance for installing wells, pumps, distribution piping, access roads, and utility lines
- sealing or mitigation of abandoned wells
- potential surface leaks of sequestered CO_2
- potential vertical or lateral migration of CO_2 in the subsurface that could cause changes in soil gas concentrations, cause chemical changes or mineralization, impact groundwater supplies, or mobilize heavy metals
- prolong oil recovery operations at the site
- providing the economic benefits of additional oil recovery

The amount of oil recovered would vary based on site-specific conditions. However, a nominal estimate would be three barrels of incremental oil produced per metric ton of CO_2 injected (EU DG JRC, 2005). Under the 30 percent capture scenario, up to 3.2 million tons (2.9 million metric tons) per year of CO_2 could be used for EOR. This could result in the additional recovery of up to 8.7 million barrels of oil per year. For the 90 percent capture scenario, up to 9.5 million tons (8.6 million metric tons) per year of CO_2 could aid the recovery of an additional 25.3 million barrels of oil per year.

Impacts of Saline Formation Sequestration

The target formations for storage in saline formations would be the Lower Cretaceous saline formation within the Williston Basin in eastern North Dakota or the Mid-continent Rift formation in Minnesota. The formations that make up the Lower Cretaceous portion of the northern Great Plains aquifer system are, in descending order, the Newcastle, Skull Creek, and Inyan Kara in North Dakota (Bluemle et al., 1986). Overlying the Lower Cretaceous aquifer system in North Dakota are impermeable rocks of the TK4 aquitard system. Marine shale is the primary lithology of the TK4. Other lithologies include sandstone, siltstone, and chalk; there are also numerous beds of bentonite throughout parts of the section. With respect to CO_2 sequestration, the thick shales and occasional bentonite formations of the TK4 would serve as competent seals in areas where it is present (PCOR, 2005). The Mid-continent Rift formation has not been characterized at this point, but preliminary studies indicate it warrants further study as a potential CO_2 storage reservoir.

Potential impacts of injection into a saline formation include induced seismic responses if proper injection pressures are maintained. State and Federal agencies regulate the injection pressures that can be utilized during the sequestration process, and monitoring of the formation pressure would help detect potential over-pressurization. Some saline formations are located in geologic traps that also serve as petroleum reservoirs. Therefore, prior to the sequestration of CO_2 in a saline formation, the surrounding area would be studied to determine if the sequestration would affect any oil and gas resources. As with the other geologic sequestration technologies, surface and underground mining in the area of the injected CO_2 could affect the integrity of the hydrogeologic features that cap and isolate the reservoir, thus may allow undesirable migration of the CO_2.

It is essential to protect the water supply aquifers that are stratigraphically above the injection zone. The addition of CO_2 to the saline water-bearing formation can decrease the water pH and alter the pH of the water causing the mobilization of trace elements (e.g., arsenic, selenium, lead). However, selecting sites with competent, extremely tight caprock above the injection zone and other favorable geologic features that restrict both vertical and lateral flow would isolate the sequestered CO_2 from any aquifer that could be used as a potable water supply source. Utilizing BMPs for design, construction, operation, and monitoring can control the subsurface leakage of formation fluids. Injection pressures would be carefully monitored and controlled to avoid hydrofracturing of the formation or caprock that could allow formation fluids to migrate to shallower aquifers. Impacts associated with the construction of the pipeline and injection wells would be the same as for storage via EOR.

Summary of Impacts of CO_2 Capture and Sequestration

Potential impacts of CO_2 capture and storage are provided in Table 5.1-2. Because the addition of CO_2capture and storage technologies at the Mesaba Energy Plant is not part of the Proposed Action, impacts are described in general terms. Additional site-specific analysis would be needed should the commercial operations include CO_2 capture and storage.

Table 5.1-2. Summary of Impacts and Mitigation Measures for CO_2 Capture and Storage

Resource Area	Summary of Impacts	Possible Mitigation Measures
Aesthetics	Capture: • No additional impact on aesthetics would be anticipated with the addition of capture technologies. Storage: • If existing ROWs are not used, land clearing would result in potential moderate adverse impacts (long-term and localized) on aesthetic and scenic resources. Such impacts may range from negligible to moderate depending upon the characteristics of the proposed corridor. Pipeline route 1 would pass through 2 national forests, 1 wildlife refuge, and 2 state forests. Pipeline route 2 would pass through 1 national forest and 2 state forests.	Capture: • No mitigation measures warranted. Storage: • Final pipeline routes should use existing ROWs to the extent possible and avoid scenic resources.
Air Quality	Capture: • Beneficial impact from reduced CO_2 emissions would occur. • Criteria emission rates would increase proportionately to the reduced heat rate of the plant. Storage: • Equipment used to compress, transport and inject the CO_2 (which could be fossil-fueled) may emit additional air pollutants; overall impact would be negligible. • Possibility exists for leakage of CO_2 from storage site to the atmosphere. Risk of leakage is greatest during injection. Once injection ceases, wells would be properly sealed and abandoned to minimize this leakage pathway. Once within the formation, mineralization reactions would slowly decrease the risk of leakage. Impact is expected to be negligible, provided monitoring, mitigation and verification measures are followed.	Capture: • No mitigation measures warranted. Storage: • Determine the air impacts associated with operation of CO_2 compression and injection equipment as applicable. Consult state air permitting officials to determine if the project would meet emission standards as designed. • Mitigate possibility for leakage of CO_2 to the atmosphere through careful site selection, acquiring applicable permits, review of all wells or other surface conduits in the area, and employing appropriate monitoring, mitigation and verification technologies to measure releases of CO_2 from the surface above geologic formations. • Locate pipelines and injection areas away from populated areas.
Climate	Capture: • Beneficial impact from reduced CO_2 emissions would occur. Storage: • EOR or saline storage would not cause any unavoidable adverse impacts relevant to climate and meteorology.	• No mitigation measures warranted.

Table 5.1-2. Summary of Impacts and Mitigation Measures for CO_2 Capture and Storage

Resource Area	Summary of Impacts	Possible Mitigation Measures
Geology	Capture: • Capture technologies would have no impact on geological resources. Storage: • No unavoidable adverse impacts would occur to geological resources, provided mitigation measures are followed. Reservoir space would be used to store the injected CO_2.	Capture: • No mitigation measures warranted. Storage: • Following appropriate regulatory requirements and maintaining appropriate injection pressures is critical to preserving the integrity of the storage reservoir. • Impacts to sub-surface microbial communities may be unavoidable.
Soils	Capture: • Capture technologies would have no impact on soils Storage: • Temporary disturbances to soil would occur along proposed pipeline corridors. BMPs would minimize adverse impacts. Overall, impacts would be moderate but temporary.	Capture: • No mitigation measures warranted. Storage: • BMPs for pipeline corridors should be implemented to decrease soil erosion.
Groundwater	Capture: • Increased need for water for CO_2 capture represents a minor impact to regional groundwater resources. Storage: • No unavoidable adverse impacts would occur to groundwater resources. BMPs would be used to minimize impacts.	Capture: • No mitigation measures warranted. Storage: • Careful site selection and risk assessment prior to injection as well as following appropriate regulatory requirements would ensure protection of groundwater resources. The monitoring, mitigation and verification plan may include groundwater monitoring.
Surface Water	Capture: • Compression of CO_2 would result in condensate water with trace chemicals and increased salinity; no impacts are expected, provided appropriate permits are received and BMPs followed. Storage: • Water may be produced, or withdrawn, from the underground formation prior to injection at both EOR and saline storage sites; appropriate permits for disposal would be needed to avoid adverse impacts. Disposal to surface waters may not be possible and the wastewater may be reinjected through a UIC-permitted saltwater disposal well. • Direct impacts of CO_2 on surface water are extremely unlikely.	Capture: • Appropriate permits for any pollutant discharge should be obtained (NPDES). Storage: • UIC or National Pollution Discharge Elimination System (NPDES) permits may be required for disposal of produced water.

Table 5.1-2. Summary of Impacts and Mitigation Measures for CO_2 Capture and Storage

Resource Area	Summary of Impacts	Possible Mitigation Measures
Wetlands and Floodplains	Capture: • Capture technologies would have no impact on wetland and floodplain resources. Storage: • Construction of pipeline infrastructure could result in unavoidable temporary impacts to wetlands along the pipeline corridors. BMPs would minimize adverse impacts, and no long-term operational impacts are anticipated.	Capture: • No mitigation measures warranted. Storage: • Pipeline corridors could be located to avoid wetlands where possible. • Section 404 permits would be obtained for jurisdictional water-body and wetland alternations needed for pipeline construction. As a permit condition, mitigation of wetland impacts would be in the form of direct replacement or other approved U.S. Army Corps of Engineers (USACE) and state mitigation requirements.
Biological Resources	Capture: • Capture technologies would have no impact on biological resources. Storage: • Temporary disturbances to additional aquatic and terrestrial habitats would occur along proposed pipeline corridors. • Surveys for endangered and threatened species before pipeline construction and injection would determine if they occur in the area. BMPs and coordination with state and Federal agencies would minimize adverse impacts. • Seismic imaging (a key monitoring, mitigation and verification technique) has potential temporary adverse impacts on wildlife and potential localized destruction or harm to plant populations.	Capture: • No mitigation measures warranted Storage: • Mitigation for Federal endangered species, if necessary, would be defined during consultation with the U.S. Fish and Wildlife Service and could include passive measures such as construction timing outside of critical breeding periods, or more aggressive measures such as complete avoidance of impacts. • Seismic survey plans should undergo environmental review before testing is authorized and conducted
Cultural Resources	Capture: • No additional cultural resource impact is anticipated beyond what is described elsewhere in this document. Storage: • Consultation with Native American tribes would be needed along either proposed pipeline route. Any potential of unavoidable adverse impacts would be resolved once consultation is complete. • Although there are no known areas of cultural significance, the potential exists for an adverse impact to cultural resources along the pipeline corridor and at proposed injection sites. Archaeological surveys would determine location of any cultural resources and the possible extent of impact.	Capture: • No mitigation measures warranted. Storage: • Required management and mitigation measures regarding traditional cultural properties are unknown until consultation with Native American tribes is complete. • Consultation with the State Historic Preservation Officer (SHPO) for any new unforeseen areas of construction or ground disturbance not included within the EIS would be completed before construction to determine the need for cultural resource investigations and any appropriate mitigation measures.

Table 5.1-2. Summary of Impacts and Mitigation Measures for CO_2 Capture and Storage

Resource Area	Summary of Impacts	Possible Mitigation Measures
Land Use	Capture: • No additional impact, although the Mesaba Energy Project with capture may have a slightly larger construction footprint within the existing plant site. Storage: • Potential impact due to displacement of oil and gas wells, if saline storage option is chosen in an area with oil and gas resources. • Possible new ROW for pipeline construction.	Capture: • No mitigation measures warranted. Storage: • Displaced oil and gas wells could be relocated. • Existing ROWs would be used for pipeline placement to the extent possible.
Socio-economics and Environmental Justice	Capture: • Addition of capture technologies could increase electricity rates and have a long-term adverse impact. Storage: • Construction and operation of storage facilities generally would have negligible to minor adverse impacts on demographic and socioeconomic conditions; additional revenue from EOR would have potential beneficial impact on the local economy.	Capture: • Consider distributing potential increases in utility costs to support the proposed project to mitigate the potential for adverse and disproportionate impacts on low-income populations. Storage: • Mitigation measures would be implemented as required according to specific demographic conditions.
Community Services	Capture/Storage: • No unavoidable adverse impacts would occur to community services. BMPs would be used to minimize impacts.	Capture/Storage: • No mitigation measures warranted.
Utility Systems	Capture: • Capture technologies would result in increased electricity needs, referred to as an energy penalty as described in Table 5.1-1; overall impact for capture and compression is estimated to be 2.6-8% of the power plant's output, depending on the capture scenario chosen. Storage: • Transport and re-compression of the CO_2 would result in increased electricity usage. Amount is minor compared to CO_2 separation and compression described under capture. Capture/Storage: • Impacts on water and wastewater infrastructure would be related to the size and distribution of potential facilities and/or region-specific issues affecting the ability to obtain a sustained supply of water or dispose of treated wastewater. Because volumes would be relatively small, the impacts are expected to be negligible or minor.	Capture: • No mitigation measures warranted. Storage: • No mitigation measures are warranted
Transportation and Traffic	Capture: • No additional impact on transportation and traffic would be anticipated. Storage: • Slightly increased traffic volumes near construction sites for compression facilities may be anticipated, but impact would be negligible.	Capture/Storage • Traffic controls would be implemented as required during construction across roadways.

Table 5.1-2. Summary of Impacts and Mitigation Measures for CO_2 Capture and Storage

Resource Area	Summary of Impacts	Possible Mitigation Measures
Materials and Waste Management	Capture: • Some waste materials, including amine reclaimer sludge and spent carbon from the filter would be generated; with proper disposal impacts are negligible. Storage: • Anhydrous ammonia is needed for some compressors; following BMPs will mitigate any impacts. • Injection practices would generate waste from cutting and drilling, use of tracers, as well as fuel for equipment. Best management practices would mitigate any impacts.	Capture/Storage • All hazardous, solid, or industrial wastes should be disposed of according to Federal, state and local regulations. • Require implementation of a system to respond to spills of hazardous materials or waste including reporting the spill to the correct authority, providing appropriate means of cleaning up spills, and properly disposing of the resulting waste.
Human Health, Safety, and Accidents	Capture: • Operation and maintenance of capture equipment is similar to other environmental control technologies; negligible impact is expected provided OSHA workplace standards are followed. Storage: • Remote potential exists for release of large quantities of CO_2; impact would be unlikely provided BMPs for site selection, risk assessment, and monitoring, mitigation and verification are followed. Some industry knowledge of CO_2-specific BMPs exist, and experience can be drawn from the natural gas industry as well as the EPA's UIC Program. Should a large-scale release occur, impact could be severe.	Capture/Storage: • Prepare a comprehensive safety program that addresses the construction and operations phases of the project. Ideally that plan would include a training plan, regular safety meetings, and an employee safety-awareness program. • Confer with the local emergency planning committee early in the planning process to establish a dialogue, explain the proposed facility, and learn how the emergency plan can be amended to address the new facilities. • Since the sudden release of a large quantity of CO_2 can have ground-level impacts on nearby flora, fauna, and humans, monitoring for leaks in and around pipelines and around injection points is an important consideration of any system design. Transmission piping and wells should be located to allow for adequate dispersion of CO_2 (away from populated areas) in the event of an accidental release. • Design an effective monitoring and alarm system to detect CO_2 leaks from pipelines, valves, and other equipment. • Prepare a Risk Management Plan if any of the facilities would use chemicals in quantities sufficient for the facility to become subject to the risk management provisions of Section 112r of the CAA amendments.

Table 5.1-2. Summary of Impacts and Mitigation Measures for CO_2 Capture and Storage

Resource Area	Summary of Impacts	Possible Mitigation Measures
Noise and Vibration	Capture: • Construction of the capture facility may result in unavoidable temporary elevated noise levels. BMPs would reduce impacts. Storage: • Construction of the pipeline and associated facilities would result in unavoidable temporary elevated noise impacts BMPs would reduce impacts.	Capture and storage: • Require the implementation of noise suppression equipment and BMPs to reduce noise to acceptable levels at property boundaries of adjacent communities**.**

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5.2 POTENTIAL CUMULATIVE IMPACTS

This section presents the results of the joint DOE and MDOC analysis of potential cumulative impacts of the Mesaba Energy Project combined with the potential impacts of other relevant on-going actions and reasonably foreseeable future activities in the vicinities of the West Range and East Range Sites. The CEQ regulations implementing NEPA require the consideration of cumulative impacts (40 CFR 1508.7) as part of the EIS process. Although the Mesaba Energy Project is subject to the Minnesota Power Plant Siting Act (Minnesota Rules Chapter 4400), which does not require the consideration of cumulative impacts comparable to those of the Minnesota Environmental Policy Act (MEPA) in Minnesota Rules Chapter 4410, MDOC has agreed to the consideration of cumulative impacts in this joint Federal/state EIS document based on public comments received.

5.2.1 Approach and Analytical Perspective

As described in Appendix D, DOE used the following approach and analytical perspective to perform this cumulative impacts analysis:

- DOE required the use of quantitative modeling specifically for this cumulative impacts analysis.
- Projects included in the cumulative impacts analysis are those that have the highest potential for causing identifiable cumulative impacts and considered potential Federal, state, and private activities.
- DOE considered a reasonably foreseeable action to be a future action for which there is a reasonable expectation that the action could occur, such as a proposed action under analysis by a regulatory agency, a project that has already started, or a future action that has obligated funding.

As outlined in the approach to cumulative impacts analysis (Appendix D), based on a consideration of the regions of influence for impacts on environmental resources from respective foreseeable actions, not all of the resource areas addressed in Chapter 3 and 4 of this EIS would be subject to cumulative impacts. For example, potential impacts on vegetation and archaeological resources generally would be limited to the locations of anticipated land disturbance, which are specific to the individual projects. Therefore, the needs for cumulative impacts analyses were specifically identified for air quality conditions (Section 5.2.2), air inhalation health risk (Section 5.2.3), water resources (Section 5.2.4), wetlands (Section 5.2.5), wildlife habitat (Section 5.2.6), and rail traffic (Section 5.2.7). The cumulative impacts analyses for these resources were developed based on specific methodologies and assumptions as described for each.

5.2.2 Air Quality

Air quality analyses were conducted to assess the cumulative impacts on Class I areas related to the Mesaba Energy Project (Phases I and II) in combination with existing and reasonably foreseeable future emission sources. The analyses addressed the BWCAW, VNP, RLW**, and IRNP**. **The air impact analysis for the Final EIS was updated to reflect Excelsior's revised air modeling protocol (TRC, 2009) and is described in Section 4.3. As discussed in the sub-section *Class I Area (Far-Field) Modeling Results* under Section 4.3.2.5, it was determined that a cumulative impact analysis for SO_2 and PM_{10} was required because of the 3-hour and 24-hour SO_2 and 24-hour PM_{10} projected impacts. Since publication of the Draft EIS, a more comprehensive cumulative air analysis has been conducted and is described in greater detail in Appendix D1. This section has been updated to reflect the results from the approved modeling protocol and summarizes the revised cumulative analysis documented in Appendix D1.**

The cumulative air analysis reflects a comprehensive, updated inventory of regional SO_2 and PM_{10} increment sources, reasonably foreseeable sources, and Mesaba Phases I and II. The recently updated SO_2 and PM_{10} multi-source inventories were developed and used to evaluate PSD increment consumption. The multi-source modeling results for the same pollutants were also used

in combination with historical monitoring data obtained in or nearby each Class I area to provide an indication of cumulative source impacts on ambient air quality therein. Cumulative Class I area impacts on the deposition of sulfur and nitrogen compounds were estimated using historical monitoring data collected in or nearby each Class I area and adding to this data the modeled impacts of the Mesaba Generating Station and other reasonably foreseeable future sources for which Class I area impacts had been modeled and were publicly available.

As recommended by the Forest Service, cumulative impacts on visibility in Class I areas have been evaluated in conjunction with the revised Draft Regional Haze State Implementation Plan (SIP) published by the MPCA in July 2009 for public comment, discussed later in Section 5.2.2.2. (The impacts of the Mesaba Generating Station on visibility in Class I areas are presented in the sub-section *Class I Visibility/Regional Haze Analysis* under Section 4.3.2.6 and mitigation of such impacts are discussed in Section 5.3.2.2.)

Maximum predicted mercury emissions from the Mesaba Generating Station were modeled to predict average concentrations of mercury in air at receptors in each Class I area. The mercury concentration results were compared to global background levels to provide a basis for estimating the relative impact of the project's emissions on the potential ambient concentrations of mercury in or nearby each Class I area.

5.2.2.1 Methodology and Multi-Sources Inventory

All cumulative air impacts modeling in Class I areas utilized the CALPUFF modeling system, EPA's guideline methodology for simulation of long-range transport and dispersion. As noted in Section 4.3 and Appendix B, modeling of the Mesaba Generating Station impacts on PSD increment consumption at Class I area receptors within 50 km of the source (hereafter referred to as near-field receptors [NFRs]) was also conducted using AERMOD (i.e., for a small number of receptors in the BWCAW that fell within 50 km of the East Range Site). Such use of AERMOD was originally specified and approved by the FLMs as part of Excelsior's revised modeling protocol (TRC et al., 2008 and 2009). However, relative to CALPUFF, the impacts on PSD increment consumption predicted by AERMOD at NFRs were found to be systematically lower for all short- and long-term concentrations of SO_2 and PM_{10} (observed for both the single and multi-source runs conducted) (the comparison of AERMOD and CALPUFF predictions are summarized in Section 4.3 and detailed in Appendix B). Therefore, for purposes of conservatism, all cumulative impacts presented in this analysis reflect the predictions modeled using the CALPUFF modeling system (see Appendix D1 for more details).

Emissions data and source parameters for increment consuming/expanding sources of SO_2 and PM_{10} within a 300 km radius of each Class I area were compiled for the cumulative Class I modeling analyses. Data was provided by the FLMs, MPCA, the Wisconsin Department of Natural Resources, and the Michigan Department of Environmental Quality. Additionally, information was acquired from permit applications, publicly available regulatory submittals, the respective State regulatory agency websites, and the construction and operating permits issued for each facility. Appendix D1 provides a list of the sources of data used to assemble the Class I multi-source inventory (Table 1 in Appendix D1) and a list of the PSD increment consuming/expanding emission sources for SO_2 and PM_{10} (Table 2 in Appendix D1).

The modeling analysis conducted using the emission sources identified in Appendix D1 is conservative because it uses: 1) maximum actual SO_2 emission rates for the existing inventoried power plant sources required to monitor and report such emissions (i.e., those sources having their hourly emissions presented in the EPA Clean Air Markets database), 2) estimated maximum actual PM_{10}, emission rates for those same sources, and 3) maximum allowable SO_2 and PM_{10} emission rates for all other inventoried sources (i.e., no attempt was made to confirm the actual rates of these sources, some operations of which may have permanently ceased or have otherwise reduced

emission rates since the applicable baseline date). Furthermore, since nearly all of the sources in the inventory presently exist and were in operation during the 2006-2007 time period, their actual emissions already contribute to the air pollutant concentrations, deposition rates and other AQRV impacts observed in Class I areas. Therefore, the summation of the maximum modeled impacts of the emission rates of the inventoried sources more than double counts their actual impacts on the Class I areas as those actual impacts are already included in the monitoring data that have been recorded there. It is expected that the planned addition of new sources, including the Mesaba Generating Station, would contribute only a small quantity of SO_2, PM_{10}, and AQRV impacts relative to the existing sources whose impacts are already accounted for in the monitoring data recorded in the Class I areas.

Historical monitoring data for SO_2 and PM_{10} concentrations and sulfur and nitrogen deposition were collected from various monitoring programs in some of the Class I areas. With respect to elemental mercury concentration in ambient air, it is assumed that, based on studies from the EPA, the global background of elemental mercury in ambient air is between 1-2 nanograms per cubic meter (USEPA, 1997b, c). Thus, the relative significance of the Mesaba Generation Station's impact on the deposition of elemental mercury can be estimated from its impact on ambient air concentrations of elemental mercury since the deposition of elemental mercury from the atmosphere would be independent of whether it is from the global background concentration or from the proposed facility.

5.2.2.2 Impacts from Operations-Related Emissions

Pollutant Concentrations in Class I Areas Solely Due to Operation of the Mesaba Generating Station

Class I impacts associated with operation of Mesaba Phases I and II are discussed in sub-section *Class I Area (Far-Field) Modeling Results* under Section 4.3.2.6 and Appendix B (Section B.2.1.3). As noted in those sections, worst-case emissions from Phases I and II differ between the West Range and East Range Sites due to the East Range Site's closer proximity to BWCAW. Therefore, in order to minimize modeled impacts from the combined Phases I and II from the East Range Site on AQRVs in BWCAW, "enhanced" controls are assumed to be required on Phase II relative to those placed on Phase I. These two scenarios represent the worst-case operating conditions creating maximum impacts from each site and are described as follows:

- **"proposed" controls (referred to by Excelsior as BACT controls) – "proposed" emission rates reflect control of sulfur in product syngas via an amine-based solvent – methyldiethanolamine (MDEA) – and control of nitrogen oxides via nitrogen dilution (for West Range Site, Phase I and Phase II were modeled using "proposed" controls); and**
- **"enhanced" controls (referred to by Excelsior as "Beyond BACT" controls) – "enhanced" emission rates reflect control of sulfur in syngas via Selexol™ (a physical solvent and control of nitrogen oxides via selective catalytic reduction (for East Range Site, Phase I was modeled using "proposed" controls and Phase II was modeled using "enhanced" controls).**

Tables 4.3-12 and 4.3-13 present CALPUFF model-predicted impacts of the Phase I and II operating at the West Range and East Range Sites, respectively (also discussed in Appendix D1, Tables 3 and 4). The estimates shown in these tables represent the highest predicted concentrations of pollutants (for which ambient air increments have been established) modeled for each Class I area, year, pollutant, and averaging time. Note that no analyses of Phases I and II impacts on IRNP are required for the West Range Site as the distance between these locations exceeds 300 km.

Despite the added controls placed on Phase II at the East Range Site, impacts in the BWCAW would be higher than those attending operation of Phases I and II at the West Range Site where both facilities would operate with "proposed" controls. This observation would generally be true

for RLW also, except for NO_2 – the predicted annual average concentration of NO_2 at RLW would be the only pollutant/averaging period where operation of Phases I and II at the West Range Site exceed the impacts at the East Range Site. For the VNP, impacts caused by operations of Phases I and II at the West Range Site exceed those modeled for the East Range Site for every pollutant/averaging period.

Emissions from the Mesaba Generating Station would be considered "significant" under the PSD regulations for short-term SO_2 and PM_{10} emissions at the BWCAW and VNP (see sub-section *Class I Impacts and Increment Consumption* under Section 4.3.2.5 for an explanation as to why a cumulative analysis was not conducted for the RLW and IRNP). However, Phases I and II impacts would still be below the allowable PSD increment in these cases. All annual average impacts (SO_2, PM_{10} and NO_2) at these Class I areas, including the RLW and IRNP, were determined to be below significant levels.

Cumulative Pollutant Concentrations in Class I Areas Based on Operation of PSD Increment Consuming/Expanding Sources and the Mesaba Generating Station

Multi-source PSD increment modeling results are shown in Table 5.2.2-1. Results from this table indicate that the projected future regional emission scenario, including the Mesaba Generating Station at either the West Range Site or East Range Site, would not pose a threat to the Class I PSD increments or ambient air quality standards in the applicable Class I areas.

Based on historical monitoring data, the highest ambient SO_2 concentrations have been identified in order to evaluate cumulative SO_2 impacts. Similarly, ambient 24-hour and annual average concentrations of PM_{10} have been identified. Table 5.2.2-2 includes the highest monitored ambient concentrations of SO_2 and PM_{10} in their respective multi-year datasets for each averaging period in each applicable Class I area (fourth column of Table 5.2.2-2). This table also provides, where appropriate, an estimate of the 3-hour average SO_2 concentrations as derived from an EPA-endorsed algorithm (see Section 5.2 of Appendix D1). These highest monitored concentrations were added to the highest predicted concentrations derived from the multi-source modeling studies described previously (the highest modeled results for the West Range Site and East Range Site are shown in the fifth and sixth columns of Table 5.2.2-2, respectively) to produce conservative estimates of cumulative impacts in the relevant Class I areas (the resulting sums for the West Range Site and East Range Site are shown in the seventh and eighth columns of Table 5.2.2-2, respectively). In comparing the estimated total cumulative ambient air impacts to applicable state and federal ambient air quality standards, it is expected that there would be no threat to such standards in any Class I area in which the Mesaba Generating Station would result in levels above the applicable SILs. Additionally, the cumulative impacts analyses demonstrate that there would be minor differences in cumulative impacts between the West Range Site versus East Range Site.

Table 5.2.2-1. Estimated Impacts of Mesaba Phases I and II and All Other Existing/Planned Increment Consuming/Expanding Sources on PSD Increments[(1)] at Relevant Class I Area Receptors (all tabulated concentrations expressed in μg/m^3)

Class I Area	Pollutant	Averaging Time	Mesaba I & II[(2)] Plus All Other Sources – West Range	Mesaba I & II[(3)] Plus All Other Sources – East Range	Allowable Increment	Minn/NAAQS
Boundary Waters Canoe Area	SO_2	3-hour	8.63	8.06	25.0	915
		24-hour	2.68	2.45	5.0	365
		annual	NAR	NAR	2.0	60
	PM_{10}	24-hour	1.21	1.18	8.0	150
		annual	NAR	NAR	4.0	50
Voyageurs National Park	SO_2	3-hour	8.13	7.33	25.0	915
		24-hour	1.90	1.82	5.0	365
		annual	NAR	NAR	2.0	60
	PM_{10}	24-hour	1.03	0.98	8.0	150
		annual	NAR	NAR	4.0	50
Rainbow Lakes Wilderness Area	SO_2	3-hour	No SILs exceeded by operation of Mesaba Phases I and II for any pollutant and its averaging period at either site			
		24-hour				
		annual				
	PM_{10}	24-hour				
		annual				
Isle Royale National Park	SO_2	3-hour	Park is located outside of 300 km radius from stacks on West Range site.	No SILs exceeded by operation of Mesaba Phases I and II for any pollutant and its averaging period.		
		24-hour				
		annual				
	PM_{10}	24-hour				
		annual				

(1) Impacts are shown for those pollutants and averaging periods for which Mesaba Phases I and II operating under 100% capacity factor and normal operating conditions (i.e., both Mesaba Phases I and II operating at full load for all hours of the year) create impacts above the SILs over the time period 2002-2004. The values shown for 3-hour and 24-hour average concentrations are "highest second-high" values modeled at receptors; annual concentrations are highest values modeled at those receptors.
(2) The "worst case" ambient impact scenario presented for the West Range site is "proposed" emission controls on both Mesaba Phases I and II.
(3) The "worst case" ambient impact scenario presented for the East Range site is "proposed" emission controls on Mesaba Phase I and "enhanced" controls on Phase II.
NAR = No Analysis Required

Table 5.2.2-2. Estimated Cumulative Impacts of Mesaba Phases I and II[(1)], All Existing Sources, and Reasonably Foreseeable Future Sources[(2)] on Ambient Air Quality at Relevant Class I Area Receptors (all tabulated concentrations expressed in µg/m^3)

Class I Area	Pollutant	Averaging Time	Maximum Historical Background Data	Increment Consuming & Expanding Source Impacts – West Range	Increment Consuming & Expanding Source Impacts – East Range	Cumulative West Range Impacts	Cumulative East Range Impacts	Most Constraining State or National AAQS
Boundary Waters Canoe Area	SO_2	3-hour	See SO_2 Results for VNP Below	9.8	8.4	29	28	915
		24-hour		4.1	3.7	13	12	365
		annual	30.4	NAR	NAR	NAR	NAR	60
	PM_{10}	24-hour	7.4	2.4	2.3	33	33	150
		annual		NAR	NAR	NAR	NAR	50
Voyageurs National Park	SO_2	3-hour	19	12	11	31	30	915
		24-hour/7-day	8.6/3.8	2.4	2.1	11	11	365
		annual	0.97	NAR	NAR	NAR	NAR	60
	PM_{10}	24-hour	34	1.5	1.4	36	35	150
		annual	7.6	NAR	NAR	NAR	NAR	50
Rainbow Lakes Wilderness Area	SO_2	3-hour	NA	No SILs exceeded for any pollutant and its averaging period.		NAR for any normal operating scenario		
		24-hour/7-day	NA/7.9					
		annual	1.8					
	PM_{10}	24-hour	NA					
		annual	<10					
Isle Royale National Park	SO_2	3-hour	NA	Park is located outside of 300 km radius from stacks on West Range site.	No SILs exceeded for any pollutant and its averaging period.	NAR for any normal operating scenario		
		24-hour	4.0					
		annual	0.60					
	PM_{10}	24-hour	36.7					
		annual	8.2					

(1) Impacts are shown for those pollutants for which Mesaba One and Mesaba Two operating under 100% capacity factor and normal operating conditions (i.e., both Mesaba One and Mesaba Two operating at full load for all hours of the year) create impacts above the SILs (see Tables 3 and 4 in Appendix D1).

(2) The values shown for all modeled values are the highest concentrations modeled over the time period 2002-2004. For the West Range site, cumulative impacts are based on Mesaba One and Mesaba Two operating at "proposed" emission rates; cumulative impacts for the East Range site are based on operation of Mesaba One and Mesaba Two at "proposed" and "enhanced" emission rates, respectively.

NA = Not Available; VNP = Voyageurs National Park; RLWA = Rainbow Lakes Wilderness Area; SIL = Significant Impact Level; NAR = No Analysis Required; IRNP = Isle Royale National Park; AAQS = Ambient Air Quality Standard

Class I Visibility/Regional Haze Analysis

In comments on the Draft EIS, the Forest Service stated "the assessment of cumulative visibility impacts [in the Boundary Waters Canoe Area and Voyageurs National Park] are probably best dealt with through the regional haze program and plan being developed by the State of Minnesota." (See Comment 49-12 in the Comment Response Document, Volume 3 of the Final EIS.)

The state's program and plan to address regional haze are in support of its responsibilities under the federal Regional Haze Regulation promulgated by EPA on July 1, 1999 and codified at 40 CFR Part 51, §§ 51.300 through 51.309. The requirements call for states to establish reasonable progress goals for each Class I area within its boundaries. Also, states are required to submit a long-term strategy that includes measures to achieve such goals. The regulations specify emission limitations representing Best Available Retrofit Technology (BART).

In 2005, EPA promulgated final guidelines for BART determinations. The guidelines specify five steps of determining BART on a case by case basis, the first step of which addresses how to identify all available retrofit emission control techniques, which involves identifying potentially applicable retrofit control technologies that represent the full range of demonstrated alternatives. Examples are given of general information sources to consider, one of which includes technical reports issued as part of DOE's Clean Coal Program.

EPA released final guidance on June 1, 2007 to use in setting "reasonable progress goals" (RPGs). Section 1.2 of the EPA guidance states:

> ***"RPGs are interim goals that represent incremental visibility improvement over time toward the goal of natural background conditions and are developed in consultation with other affected States and Federal Land Managers (FLMs). In determining what would constitute reasonable progress, section 169A(g) of the CAA requires States to consider the following four factors:***
>
> - ***The costs of compliance;***
> - ***The time necessary for compliance;***
> - ***The energy and non-air quality environmental impacts of compliance; and***
> - ***The remaining useful life of existing sources that contribute to visibility impairment.***
>
> ***States must demonstrate in their SIPs how these factors are taken into consideration in selecting the RPG for each Class I area in the State... the Regional Haze Rule establishes an additional analytical requirement for States in the process of establishing the RPG. This analytical requirement requires States to determine the rate of improvement in visibility needed to reach natural conditions by 2064, and to set each RPG taking this 'glidepath' into account…EPA adopted this approach, in part, to ensure that States use a common analytical framework that accounts for the regional difference affecting visibility and, in part, to ensure an informed and equitable decision making process. The glidepath is not a presumptive target, and States may establish a RPG that provides for greater, lesser, or equivalent visibility improvement as that described by the glidepath."***

In Chapter 10 of Minnesota's Draft Regional Haze SIP, MPCA lays out its long-term strategy for achieving its reasonable progress goals and includes its "Concept Plan for Addressing Major Point Sources in Northeastern Minnesota." The concept plan establishes five principles under which it proposes to attain its vision and goals. One of the goals states, "*The MPCA commits to develop a Regional Haze State Implementation Plan (SIP) that spurs development of innovative emission control strategies in source sectors that currently are uncontrolled or under-controlled.*" Additionally, the Mesaba Energy Project would not affect the goals of the concept plan as exemplified by the first of the Project's two statements of Purpose provided in Appendix F1:

"Confirm the commercial viability of generating electrical power by means of a fuel-flexible integrated gasification combined cycle ("IGCC") technology in a utility-scale application."

The Mesaba Energy Project is designed to achieve SO_2 and NO_X emission rates that are comparable or better than those of other advanced coal-fired steam electric generating technologies. However, IGCC technology is not currently considered a BART alternative for relevant facilities or as BACT for new sources or for those undergoing major modification, presumably because it has not been commercially demonstrated in a large utility-scale application across a broad spectrum of feedstocks. Once the Mesaba Energy Project demonstrates the commercial readiness of fuel flexible IGCC using ConocoPhillips' E-Gas™ technology the capital cost of constructing such facilities is expected to decrease. Such decreases could lower the cost of compliance, allowing IGCC to be considered a future BART and BACT alternative for sources using a variety of coal-based feedstocks.

Although projections of net effects of commercialization of IGCC technology alone are not currently available, DOE has made projections of the market penetration of various technologies under various scenarios of fuel prices and regulations to estimate the benefits of the implementation of the fossil energy research and development program (DOE, 2007). This analysis considers the potential market penetration of fossil energy technologies, as well as nuclear and renewable energy technologies. Depending on the scenario considered, the implementation of the fossil energy R&D program would result in IGCC capturing from three percent to nine percent of the total market by 2025. Since fossil energy would still provide a substantial portion of the nation's electricity supply under all scenarios, the analysis shows that implementation of the fossil energy R&D program, which includes IGCC, would result in emission reductions of NO_X, SO_2, and CO_2 by the year 2025, relative to a scenario that does not involve fossil energy R&D and the subsequent advancement of IGCC technology.

Additionally, on May 16, 2008, Excelsior submitted comments to the MPCA on the Draft Regional Haze SIP. In their comments, Excelsior recommended that the Mesaba Energy Project be included in the 2018 emission inventory of Minnesota sources to reflect the project's potential role in helping meet future increases in electrical demand, while minimizing SO_2 and NO_x emissions. Excelsior contended that, to meet increasing demand, existing electric generating units would be required to operate at higher capacity factors. These existing units comprised of BART-eligible units and others that are not considered eligible for BART. The SIP lists BART-eligible units with BART emission limits ranging from 0.07 to 0.41 lbs/MMBtu for NO_x and 0.09 to 2.3 lbs/MMBtu for SO_2 (see Table 9.4 in the revised Draft Regional Haze SIP; MPCA, 2009a). In comparison, the Mesaba Energy Project's prescribed emissions rates for NO_x and SO_2 are 0.058 lbs/MMBtu and 0.025 lbs/MMBtu, respectively. The following excerpt from the Technical Support Document for the Draft Regional Haze SIP (MPCA, 2009b) is in reference to the Northeast Minnesota Plan:

In this plan, the six counties in northeast Minnesota would maintain a 30 percent reduction in NO_x and SO_2 from 2002 emissions levels. About 21 percent of that reduction is already associated with the Minnesota Power—Boswell and –Taconite Harbor projects described above and included in the on-the-books controls. In order to model this plan in the uniform rate of progress analysis, the remaining approximately 10 percent was applied to taconite industry sources. The emission reductions were based on permit limits, furnace modifications in 2006 and 2007, fuel switching, a new scrubber, newer rate information, and some reductions due to BART.

The Mesaba Energy Project was not included in the state's emissions projections. However, MPCA indicates that the 20 percent reduction goal can be achieved by the reductions occurring at the Boswell and Taconite Harbor power plants. To the extent that power from the Mesaba Energy Project would replace power from existing coal-fired generating units, the Project would not affect the goals outlined in the Northeastern Minnesota Plan.

Terrestrial and Aquatic Impacts

Deposition of Nitrogen and Sulfur

Total annual sulfur and nitrogen depositions to the ground surface were determined by summing contributions from all S and N species (gaseous and particle-bound) at each Class I receptor **using the CALPUFF/CALPOST modeling programs**. Results of the analysis represent the highest annual deposition value for any receptor and any of the three years modeled, for each Class I area. **For foreseeable future projects that have submitted formal Class I modeling reports to a public agency, these projects' deposition values were used and represent the highest annual deposition value for any receptor, for any of the three years modeled, and for each relevant Class I area. Tables for the total (wet plus dry) sulfur and nitrogen deposition predictions for the Mesaba Generating Station, historical sulfur and nitrogen deposition data from existing monitoring sites; and the summation of sulfur and nitrogen deposition from these sources are presented in Appendix D1 (Tables 7 through 11 in Appendix D1).**

The Forest Service has defined screening criteria for terrestrial and aquatic impacts of deposition (see Section 4.3) in the Green Line criteria**, which define levels "at which it was reasonably certain that no significant change would be observed in ecosystems that contain large numbers of sensitive components."** Predicted cumulative deposition impacts compared to the Green Line criteria **for terrestrial and aquatic resources** are presented in Table 5.2.2-3 **for BWCAW and RWL**. **For NPS Class I areas (i.e., VNP), no acceptable deposition values for impacts on soils or waters have been established. A "deposition analysis threshold" (DAT) of 0.01 kg/ha-yr is given as a level below which no adverse impacts are expected.**

Table 5.2.2-3. Comparison of Annual Cumulative Sulfur and Nitrogen Deposition to Green Line Criteria or DAT Threshold for Impacts to Terrestrial and Aquatic Ecosystems

Class I Area	Parameter	Background (kg/ha-yr)	Reasonably Foreseeable Project Impacts (kg/ha-yr)	Mesaba Phases I and II (kg/ha-yr)		Cumulative Impacts (kg/ha-yr)		Green Line[1] Value or DAT[2] (kg/ha-yr)
				West Range	East Range	West Range	East Range	
BWCA	Terrestrial							
	Total S Depo	2.01	0.047	0.014	0.038	2.07	2.10	5-7
	Total N Depo	3.85	0.048	0.0082	0.025	3.91	3.92	5-8
	Aquatic							
	Total S Depo	2.01	0.047	0.014	0.038	2.07	2.10	7.5-8
	S + 20% N	2.78	0.057	0.016	0.043	2.85	2.88	9-10
RLWA	Terrestrial							
	Total S Depo	3.21	0.009	0.0065	0.0067	3.23	3.23	5-7
	Total N Depo	6.03	0.008	0.0042	0.0047	6.04	6.04	5-8
	Aquatic							
	Total S Depo	3.21	0.009	0.0065	0.0067	3.23	3.23	3.5-4.5
	S + 20% N	4.42	0.011	0.0073	0.0076	4.43	4.43	4.5-5.5
VNP	Terrestrial							
	Total S Depo	1.98	0.012	0.016	0.012	2.01	2.00	0.01
	Total N Depo	4.20	0.016	0.0099	0.0074	4.23	4.22	0.01
	Aquatic							
	Total S Depo	1.98	0.012	0.016	0.012	2.01	2.00	0.01
	S + 20% N	2.82	0.015	0.018	0.013	2.85	2.85	0.01
IRNP	Terrestrial							
	Total S Depo	2.61	0.010	Not	0.0049	Not	2.62	0.01
	Total N Depo	4.48	0.007	Applicable	0.0017	Applicable	4.49	0.01
	Aquatic							
	Total S Depo	2.61	0.010	Not	0.0048	Not	2.62	0.01
	S + 20% N	3.51	0.011	Applicable	0.0051	Applicable	3.52	0.01

[1] Green Line Values from "Screening Procedure to Evaluate Effects of Air Pollution on Eastern Region Wilderness Cited as Class I Air Quality Areas", USFS, 1991.
[2] For NPS Class I areas (i.e., VNP), no acceptable deposition values for impacts on soils or waters have been established. A "deposition analysis threshold" (DAT) of 0.01 kg/ha-yr is given as a level below which no adverse impacts are expected.

The highest Mesaba deposition relative to total cumulative deposition ranges from 1.8 percent for the East Range Site's sulfur impacts in the BWCAW to 0.6 percent for the East Range Site's nitrogen impacts in the BWCAW. Table 5.2.2-3 indicates that total sulfur and nitrogen deposition, including background, would be within the acceptable Green Line criteria for the BWCAW and RLW. For VNP and IRNP, total deposition levels exceed the DAT criteria. It should be noted, however, that the analysis is considered very conservative as it uses worst-case emissions and 100 percent operation. Furthermore, the background values presented likely include the current impacts of some of the modeled sources considered in this analysis. Therefore, the predicted future total deposition data in Table 5.2.2-3 is assumed to be conservative.

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 at the VNP and IRNP would below Green Line limits. Thus, for this reason and assuming conservative cumulative predictions in Table 5.2.2-3, it is not expected that cumulative levels of sulfur and nitrogen deposition would result in any impacts for which DOE would require mitigation to protect 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.

SO_2 Concentration

Table 5.2.2-4 presents the annual cumulative estimates of SO_2 and the applicable Forest Service Green Line limit for terrestrial and flora/fauna resources. The SO_2 concentration estimates in the table indicate that the cumulative impacts for the West Range Site and East Range Site would result in increments of SO_2 concentrations that would be approximately 9.8 and 8.4 percent, respectively, of the Green Line criteria at the BWCA and 12 and 11 percent, respectively, at the VNP; therefore, significant cumulative impacts from SO_2 concentration are not expected.

Table 5.2.2-4. Comparison of Cumulative[(1)] SO_2 Concentrations to Green Line Criteria for Impacts to Terrestrial Ecosystems, Flora and Fauna (All Tabulated Concentrations Expressed in µg/m^3)

Class I Area	Pollutant	Averaging Time	Maximum Historical Background Data	Increment Consuming & Expanding Source Impacts: West Range	Increment Consuming & Expanding Source Impacts: East Range	Cumulative Mesaba West Range Impacts	Cumulative Mesaba East Range Impacts	Green Line Criteria[(2)]
BWCA	SO_2	3-hour	19	9.8	8.4	29	27	100
		24-hour[(3)]	8.6					
		annual	0.97	No multi-source analysis required		0.097+0.018=0.12	0.097+0.053=0.15	5
VNP	SO_2	3-hour	19	12	11	31	30	100
		24-hour[(3)]	8.6					
		annual	0.97	No multi-source analysis required		0.097+0.024=0.12	0.097+0.012=0.11	5
RLWA	SO_2	3-hour	20	No multi-source analysis required		20+0.49=20	20+0.72=21	100
		24-hour[(3)]	NA					
		annual	1.8			1.8+0.01=1.8	1.8+0.010=1.8	5
IRNP	SO_2	3-hour	9.0	Site >300 km from West Range site	No multi-source analysis required	Site >300 km from West Range site	9.0+0.36=9.4	100
		24-hour[(3)]	4.0					
		annual	0.60				0.60+0.004=0.60	5

(1) Cumulative impacts from all sources – including Mesaba One and Mesaba Two – are shown for those pollutants for which Mesaba One and Mesaba Two operating under 100% capacity factor and normal operating conditions (i.e., both Mesaba One and Mesaba Two operating at full load for all hours of the year) create impacts above the SILs; the values shown for all modeled values in such instances are the highest concentrations modeled using the multi-source inventory over the time period 2002-2004. For the West Range site, cumulative impacts are based on Mesaba One and Mesaba Two operating at BACT emission rates; cumulative impacts for the East Range site are based on operation of Mesaba One and Mesaba Two at BACT and Beyond BACT emission rates, respectively.

(2) Green Line Values from "Screening Procedure to Evaluate Effects of Air Pollution on Eastern Region Wilderness Cited as Class I Air Quality Areas", USFS, 1991.

(3) There is no "green line" SO_2 concentration for the 24-hour averaging period. Monitored SO_2 concentrations for the 24-hour averaging period are shown because where they exist, they are used to estimate the concentrations for 3-hour averaging periods using an algorithm taken from "Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised", EPA Office of Air Quality and Standards, EPA454/R-92-019, October 1992, page 4-15. The estimate involves dividing the 24-hour SO_2 concentration by 0.4 and multiplying the resulting value by 0.9. Where no 24-hour average SO_2 concentration was available, the highest annual concentration was used to estimate a 3-hour concentration by dividing the annual concentration by 0.08 and multiplying the quotient by 0.9.

NA = Not Available; BWCA = Boundary Waters Canoe Area; VNP = Voyageurs National Park; RLWA = Rainbow Lakes Wilderness Area; RNP = Isle Royale National Park

Deposition of Mercury

Combined sources modeling results for mercury concentration**, including those resulting from Mesaba Phases I and II,** are presented in **Tables 5.2.2-5 and 5.2.2-6 for the West Range Site and East Range Site, respectively**. These concentrations represent the three-year average highest ambient mercury concentration at any point in each Class I area. There are no standards for ambient mercury levels in air to use as a basis for impact assessment; however, **the highest values in the tables can be compared to the commonly accepted background ambient air concentration of 1 to 2 ng/m^3 to obtain an indication of the overall impact of Phases I and II. Presuming the background ambient air concentration of elemental mercury in rural areas to be 1.5 ng/m^3, the estimates in Tables 5.2.2-5 and 5.2.2-6 provide a relative indication of the contribution the Mesaba Generating Station would have on background elemental mercury concentrations – less than 0.5 percent. Additionally,** these predicted values, which estimate maximum levels of combined mercury forms, were considered in the air inhalation health risk assessment (Section 5.2.3).

Table 5.2.2-5. Maximum Estimated West Range Mercury Concentration & Impacts on Background Mercury Concentration

Year	Boundary Waters Canoe Area (ng/m^3)	Voyaguers National Park (ng/m^3)	Rainbow Lake Wilderness Area (ng/m^3)
2002	1.34E-03	1.57E-03	7.96E-04
2003	1.23E-03	1.59E-03	6.82E-04
2004	1.19E-03	1.52E-03	5.27E-04
	Phases I and II Impacts on Ambient Mercury Concentration Presuming Background Ambient Air Concentration of Elemental Mercury Is 1.5 ng/m^3		
	0.09%	0.11%	0.05%

Table 5.2.2-6. Maximum Estimated East Range Mercury Concentration & Impacts on Background Mercury Concentration

Year	Boundary Waters Canoe Area (ng/m^3)	Voyaguers National Park (ng/m^3)	Rainbow Lake Wilderness Area (ng/m^3)	Isle Royale National Park (ng/m^3)
2002	3.55E-03	1.13E-03	8.58E-04	7.25E-04
2003	4.14E-03	1.10E-03	8.73E-04	6.42E-04
2004	3.46E-03	1.15E-03	9.87E-04	6.30E-04
	Phases I and II Impacts on Ambient Mercury Concentration Presuming Background Ambient Air Concentration of Elemental Mercury Is 1.5 ng/m^3			
	0.28%	0.08%	0.07%	0.05%

Minnesota is currently in the process of determining how to implement the statewide mercury TMDL, which set an annual air emission target of 789 lb 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 might implement would depend on the specifics of that program, which are not known at this time. 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 consider 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 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 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.

5.2.2.3 Conclusion

Modeling results from the cumulative impact analysis indicate that the combined criteria pollutant emissions of Mesaba Energy Project and the all existing and foreseeable future sources would not pose a threat to Class I PSD increments or ambient air quality standards. Additionally, **cumulative** deposition of sulfur and nitrogen from the combined sources would not cause adverse impacts to **terrestrial, aquatic,** and **vegetative resources** in Class I areas **for which DOE would require mitigation; however, DOE would consider any recommendation from the FLMS as a condition of the Record of Decision.**

Potential options for reducing the modeled impacts of Mesaba Phases I and II on visibility in the Class I areas where visibility is an AQRV are discussed in Section 5.3. 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.

The Project's cumulative visibility impacts would be addressed as part of updating Minnesota's State Implementation Plan in compliance with the Federal Regional Haze Rule. Demonstration of this IGCC technology and widespread commercialization would contribute to the State's goal of reducing regional haze impacts in nearby Class I areas over the long term.

5.2.3 Air Inhalation Health Risk

5.2.3.1 Analysis for the Draft EIS

The Draft EIS summarized the results of the cumulative impacts **analysis** of air toxics emissions from the Mesaba Energy Project, nearby existing facilities, and other potential future emission sources **in proximity to** the East Range and West Range **Sites**. Future emissions from the proposed Minnesota Steel Industries (MSI) plant, east of the West Range **Site**, were included in this evaluation. Emission sources considered at the East Range **Site** included the exiting Laskin Energy Center (southwest of the power plant footprint), the proposed Mesabi Nugget facility (northwest of the footprint) and the proposed PolyMet Mining (PolyMet) project (north of the footprint). Only the Laskin Energy Center (Laskin) **was** in operation **at the time of the Draft EIS**.

Two proposed wood-fired boilers at the existing coal-fired power Laurentian Energy Generation Plants located near Virginia and Hibbing are also potential future emission sources. The Laurentian facility at Hibbing would be approximately 35 kilometers from the proposed West Range Site, and the Laurentian facility at Virginia would be approximately 40 kilometers from the proposed East Range Site. Because of the relatively large distances from these sites, the incremental risk resulting from inhalation of air toxics that the Laurentian facilities would contribute would not be significant and was therefore not considered in the analysis **completed for the Draft EIS**.

[Text in the Draft EIS describing the approach for the cumulative health risk analysis was deleted.]

West Range Site

As described in the Draft EIS, the facilities considered for the West Range Site include the Mesaba Generating Station and **the** MSI **plant**. The combined acute hazard indices from both facilities resulted in a maximum acute cumulative hazard index of 1. A sub-chronic hazard index was not calculated for the MSI facility in the MSI Human Health Screening-Level Risk Assessment; therefore, a cumulative sub-chronic hazard index could not be evaluated.

The cumulative non-carcinogen and carcinogen results for the West Range Site **were** summarized in **Table 1 in Draft EIS** Appendix D2. The maximum sub-chronic contribution from the Mesaba Generating Station was 0.1, well below the threshold value of concern established by the MDH. The combined chronic hazard indices from both facilities resulted in a maximum cumulative hazard index of 0.2. The combined cancer risks from both facilities resulted in a maximum cumulative cancer risk of 9×10^{-7}. Likewise, the combined acute hazard indices resulted in a maximum cumulative acute hazard index of 1. Thus, the predicted cumulative total chronic and acute non-carcinogenic hazard indices did not exceed the acceptable MPCA hazard value. The combined cancer risks from both facilities resulted in a maximum cumulative cancer risk of 3×10^{-5}. The background individual lifetime cancer risk of 3×10^{-5} would exceed the MPCA acceptable limit for individual projects, but is within the upper bound U.S. EPA guideline for cumulative risks. The cumulative cancer risk for the Mesaba Energy facility would not exceed the U.S. EPA National Contingency Plan limit**.**

East Range Site

As described in the Draft EIS, four facilities are in relatively close proximity near the East Range Site. Three of those facilities, the Mesaba Generating Station, Mesabi Nugget, and PolyMet are close enough geographically to result in the overlap of all three buffer zones. To evaluate potential impact from these sources, **the analysis for the Draft EIS** assumed that emissions from all three facilities could potentially impact a receptor in the overlap area. Likewise, the buffer zones for the Mesaba Generating Station and Laskin facilities overlap. The Laskin buffer zone, however, does not overlap those of either Mesabi Nugget or PolyMet.

The Mesaba Energy Project and Laskin Energy Center

As summarized in the Draft EIS Appendix D2, the combined acute hazard indices from the proposed Mesaba Generating Station and Laskin facilities resulted in a maximum acute cumulative hazard index of 0.7. The combined sub-chronic hazard indices from the two facilities resulted in a maximum cumulative hazard index of 0.1. The combined chronic hazard indices from both facilities resulted in a maximum cumulative hazard index of 0.07. The combined cancer risks from both facilities resulted in a maximum cumulative cancer risk of 2×10^{-6}.

Based on the risk analyses performed for the Mesaba and Laskin facilities **for the Draft EIS**, maximum acute, sub-chronic and chronic hazard indices, and cancer risk would not exceed MDH threshold values, indicating that a cumulative air inhalation risk associated with these facilities would be within acceptable limits.

The Mesaba Energy Project, Mesabi Nugget, and PolyMet

Because the buffer zones of the Mesaba Generating Station, Mesabi Nugget, and PolyMet facilities overlap, a combined evaluation of all three facilities was conducted.

[Text in the Draft EIS describing the 3-step approach to the health risk analysis was deleted.]

As reported in the Draft EIS, the combined acute hazard indices from the Mesaba Generating Station and Mesabi Nugget facilities resulted in an acute cumulative hazard index of 1. The combined chronic hazard indices from both facilities resulted in a cumulative hazard index of 0.9. The combined cancer risks from both facilities resulted in a cumulative cancer risk of 7×10^{-6}. The projected

contribution of the Mesaba Generating Station to the acute inhalation risk in this case would be 20 percent and 1 percent for both chronic non-cancer and cancer risk.

The combined acute hazard indices from the Mesaba Generating Station and PolyMet facilities resulted in a cumulative hazard index of 0.9. The combined chronic hazard indices from both facilities resulted in a cumulative hazard index of 1. The combined cancer risks from both facilities resulted in a cumulative cancer risk of 1×10^{-5}. The projected contribution of the Mesaba Generating Station to the acute inhalation risk would be 22 percent and 1 percent for both chronic non-cancer and cancer risk.

Taking into account geographical location of risk for the Mesaba Generating Station only, **the analysis in the Draft EIS concluded that** acute, sub-chronic, and chronic hazard indices and cancer risk would not exceed MDH threshold values for the Mesaba Generating Station combined with either the Mesabi Nugget or PolyMet facilities.

[Text in the Draft EIS describing conclusions and data refinements was deleted.]

5.2.3.2 Analysis for the Final EIS

The step-wise approach that was used in the Draft EIS to evaluate the cumulative impacts to receptors from inhaled emissions generated by the Mesaba Energy Project in combination with other sources was modified based on revised MPCA guidance following publication of the Draft EIS. Specifically, the objectives of the revised MPCA guidance, based on the "20D Rule", are to determine which, if any, sources of air pollutants, including ambient air, are likely to have a significant impact inside the significant impact area of a proposed facility. Guidance on the "20D Rule" was supplied in an e-mail from MPCA to SEH (MPCA, 2008c). For the Mesaba Generating Station, 10 km is the maximum significant impact area. This approach was used to determine those sources within the significant impact area to be included in the evaluation of cumulative impacts to receptors from inhaled emissions. Based on the guidance provided by MPCA for use of the "20D Rule", facilities whose potential allowable emissions (in tons per year) are less than 20 times the distance (D, in kilometers) between the two facilities were excluded from further consideration. However, nearby facilities whose potential allowable emissions are greater than 20 times the distance between the two facilities were included in the evaluation. The revised cumulative health risk analysis is included in revised Appendix D2, which explains the "20D Rule" in more detail.

Ambient monitoring data representing the rural Iron Range in Minnesota were provided by the MPCA and used to calculate summed risks from measured air concentrations of volatile organic chemicals (VOCs), carbonyls, and metals. Rural VOC and carbonyl data were used because of the location and population density surrounding the alternative Mesaba Energy Project sites. Since Excelsior's alternative sites are located in the Iron Range of Minnesota, the most recent data as measured at Virginia, Minnesota was used in this evaluation.

Where modeling data were available, as is the case with the Mesaba Energy Project, Mesabi Nugget, and PolyMet, the subsistence farmer scenario was used to predict potential risk at the maximum air emissions impact location, because that scenario tends to result in higher risk impacts. However the location of maximum impact would not necessarily occur at a location where a subsistence farm could be located in the future. For example, the projected Mesaba East Range maximum impact receptor would be located on a small tract of land used by the City of Hoyt Lakes for biosolids disposal. A subsistence farm would be prohibited in this area.

Based on guidance and additional direction from MPCA the analysis was conducted such that, if chronic or acute hazard indices for any individual facility would be greater than one, the hazards for that facility should be further refined by separating the risks by health endpoint, pollutant family (i.e., metals, VOCs, carbonyls, etc.), or by risk drivers.

West Range Site

Based in part on the Scoping EAW for the proposed MSI Project near Nashwauk, MN, the proposed MSI facility is the closest "reasonably foreseeable future or ongoing action" in the vicinity of the Project located near Taconite, MN. As shown in revised Appendix D2 Figure 1 (MN Steel DRI Plant Cumulative Impact Buffers), the location of highest air emission impact for the proposed Mesaba Generating Station (Receptor 3) is outside of the MSI 10 km buffer. Since the closest additional facility that would contribute to increased air concentrations is greater than 10 km away, only risk associated with background ambient air data was considered along with the calculated Mesaba Generating Station health risk.

As reported in revised Appendix D2 analysis for the Final EIS, the predicted total cumulative cancer risk for the Mesaba Generating Station at the West Range Site is 3×10^{-5}, mostly contributed by background conditions. The cancer risk contribution from the proposed Mesaba facility is one order of magnitude lower (3×10^{-6} for the farmer at the highest impact location). The cumulative cancer risk for the Mesaba Generating Station does not exceed the U.S. EPA National Contingency Plan limit.

Furthermore, the predicted chronic inhalation non-cancer hazard index from background emissions at the West Range is 1, which is an indication that the risk of deleterious health impacts is very small. The hazard index predicted for the Mesaba Generating Station would be negligible in comparison (0.08). The total acute hazard indices contributed from background (0.5) as well as the proposed Mesaba Generating Station emissions (0.7) are comparable in magnitude. Due to the uncertainty in the summed inhalation hazard indices, the cumulative total hazard indices may be rounded as per U.S. EPA guidance to acute and chronic hazard indices of 1. Therefore, the predicted cumulative total chronic and acute non-carcinogenic hazard indices attributable to the Mesaba Generating Station at the West Range Site do not exceed the acceptable MPCA risk value of 1.

East Range Site

Four facilities located within a 10 km buffer surrounding the location of highest air emission impact for the proposed Mesaba Generating Station were evaluated in the revised analysis in Appendix D2 to determine the contributions of each to cumulative risk. These facilities include the Mesaba Generating Station, Mesabi Nugget, Laskin Energy Center, and PolyMet. Appendix D2 Figure 2 (Cumulative Impact Buffer – East Range) illustrates the general area potentially impacted by these four facilities.

Information regarding maximum cancer risks and hazard indices was obtained from the following sources:

- **Mesaba Energy Project AERA, dated January 2009.**
- **PolyMet Mining, Inc. AERA, dated March 2007.**
- **Mesabi Nugget, LLC, MPCA AERA Internal Form-03, dated April 7, 2005.**
- **MPCA Annual Emissions Inventory record for year 2005, Laskin Energy Center as supplied by MPCA on February 3, 2009.**

The background individual total lifetime cumulative cancer risk for the Iron Range is the same for the East Range and the West Range locations (discussed above) at 3×10^{-5}. Although the background cumulative lifetime cancer risk exceeds the MPCA acceptable limit for individual projects (1×10^{-5}), it is within the upper bound U.S. EPA guideline for cumulative risks (1×10^{-4}). The maximum total lifetime cumulative cancer risks estimated for the four individual facilities (4×10^{-7} to 5×10^{-6}) are all below the MPCA acceptable limit for individual projects. Lifetime inhalation cancer risks for each individual project range from 6×10^{-10} to 4×10^{-6} and are well below the MPCA acceptable limit.

The background total chronic non-cancer hazard index for the Iron Range is the same for the East Range and West Range locations (discussed above) at 1. The predicted total and inhalation maximum chronic non-carcinogenic hazard quotients for facilities evaluated at the East Range Mesaba Energy project location range from 0.08 to 0.3. Each facility evaluated is well below the MPCA acceptable limit.

The background total acute non-cancer hazard index for the Iron Range is the same for the East Range and West Range locations (discussed above) at 0.5. The predicted total maximum non-carcinogenic acute hazard quotients for facilities evaluated at the East Range Mesaba location range from 0.1 to 0.7. All facilities are below the MPCA acceptable limit for individual projects.

Conclusions

Total cumulative impacts of air toxics from reasonably foreseeable projects in the vicinity of the Mesaba project at the West Range and East Range Sites have been examined using conservative assumptions. As concluded by the revised analysis for the Final EIS in Appendix D2, nearly all chronic and acute non-cancer hazard indices are attributable to the inhalation endpoint. Total cumulative cancer risks as well as chronic and acute non-cancer risk at each individual facility evaluated were determined to be below the MPCA acceptable limits.

5.2.4 Water Resources

The following section provides a discussion on the impacts of the Mesaba Energy Project, together with reasonably foreseeable future actions, within the watersheds of the two proposed power plant locations and the cumulative impacts on surface water resources in terms of water quantity and quality. This cumulative impacts analysis is based on the information contained in this EIS (see Sections 3.5 and 4.5), the material contained in Appendix D3 and USGS monitoring data.

5.2.4.1 West Range

Water withdrawal from the LMP and Prairie River (if required) would occur during Phase II, which would reduce flows downstream; however, no other reasonably foreseeable projects are expected to adversely impact flow in the Prairie River and, therefore, no cumulative impacts are expected. The cumulative water analysis is focused on impacts to the Swan River watershed. The West Range Site lies within the Swan River watershed. The Swan River is designated as an impaired water by the MPCA. The causes of impairment are low oxygen and a fish consumption advisory due to mercury. In addition, the Trout Lake, Swan River, Upper Panasa Lake, and Lower Panasa Lake are also impaired due to fish consumption advisories for mercury. The primary source of the mercury in the water is atmospheric deposition. Roughly, 70 percent of the atmospheric deposition of mercury is from man-made sources (such as energy, mining, and product disposal) and the remainder is from natural sources, such as volcanoes (MPCA, 2004b).

The only reasonably foreseeable future action in the watershed, besides the Mesaba Energy Project, is the MSI project, located near Nashwauk. Also, the Nashwauk and Coleraine-Bovey-Taconite WWTFs would receive additional wastewater influent from the MSI and Mesaba projects, respectively. In addition, the water currently pumped from the HAMP would be diverted from the Upper Panasa Lake **to the CMP** for use at the Mesaba Generating Station.

Water Quantity

Limited water flow information exists for the Swan River. The USGS has operated two gauging stations on the Swan River; one just downstream of Swan Lake and the other just upstream of its confluence with the Mississippi River. The average flow of the Swan River downstream of Swan Lake is 64.8 cubic feet per second (29,000 gallons per minute) based on gauging data from 1965 to 1990. Prior to its confluence with the Mississippi River, the average reported flow is 188.6 cubic feet per second (85,000 gallons per minute) in the Swan River; however, there is only one year of record (1954).

CMP water levels would be maintained within a relatively narrow range (i.e., ± 2 feet) and impacts to Swan River from use of the CMP are not expected as the CMP currently generates limited outflow and does not directly discharge to any surrounding surface waters.

Currently the HAMP Complex dewaters into the Upper Panasa Lake**, which discharges into the Lower Panasa Lake and then the Swan River**. **MNDNR records indicate that annual average discharge of approximately 2,500 from the HAMP was needed in recent years to maintain the HAMP at the desired level (see Table 4.5-8), but the MNDNR's current NPDES permit allows for annual transfers of water from the HAMP at an average pumping rate of 6,500 gallons per minute. However, d**ue to financial reasons, **seasonal freeze-ups, and pump capacity, the HAMP Complex is generally dewatered for 6 months per year at a rate of 6,200 gallons per minute (maximum pump capacity)**. **Therefore, loss of such flow (6,200 gallons per minute) would represent the maximum possible cumulative loss of flow from the HAMP to the Swan River resulting from either the IGCC Power Station or from other industrial users.**

The MSI project, located upstream of Swan Lake **(see Figure 1 of Appendix D3)**, plans to use mine pit water as their primary source of process water for their operations. **Studies done for MSI's EIS concluded that the net reduction in water flows in the Swan River due to MSI would average 1,660 gallons per minute and would rise to 2,110 gallons per minute in dry years (MSI, 2008). While higher short-term reductions were predicted, these reductions would coincide with periods of high flow in the Swan River, and are therefore not considered problematic. MSI's Final EIS also states that approximately 1,200 gallons per minute of stream flow augmentation would be required during latter years of operation. The HAMP would be the preferred source, although no water appropriation permit application has yet been filed. As discussed above, the maximum withdrawal from the HAMP is assumed to be 6,200 gallons per minute.**

For annual average flows, the cumulative reduction would be approximately 4,800 gallons per minute (based on MSI's normal-year reduction and the elimination of MNDNR's pumping from the HAMP. The maximum short-term cumulative reduction in flow is approximately 8,300 based on MSI's dry-year net reductions and the elimination of pumping from the HAMP. These flows represent 17 and 29 percent of the Swan River's average during normal- and dry-year reductions, respectively.

Both MSI and the Mesaba Generating Station would discharge domestic wastewaters to their respective WWTFs and both have sufficient capacity to accept the additional flows. The additional flows into and out of these WWTFs would have little net affect on the total water flow in the Swan River.

Water Quality

The primary pollutants of concern in the Swan River Watershed and associated with the Mesaba Energy Project are mercury and phosphorus. As the MSI project would not discharge any process or industrial wastewater, it is not being considered further in this analysis. **Use of an enhanced ZLD system has eliminated wastewater discharges to nearby water bodies and, therefore, eliminates cumulative water quality impacts as no net increases of any water pollutants in the Swan River watershed would occur as a result of industrial wastewaters from the Mesaba Generating Station.**

There would be a very small net increase in domestic wastewater discharges into the Swan River watershed from the Mesaba Generating Station and MSI operations via their connections to local WWTFs. However, these increased flows would not cause either WWTF to exceed their permit requirements for either flow or phosphorus loadings.

5.2.4.2 East Range

The East Range Site lies within the Partridge River watershed. The Partridge River is not designated as an impaired water by the MPCA, however, two of the local water bodes (Colby Lake and Whitewater

Reservoir) are impaired due to fish consumption advisories for mercury. As with the West Range Site, the primary source of the mercury in the water is atmospheric deposition.

The foreseeable future actions in the watershed, besides the Mesaba Energy Project East Range Site, are the proposed PolyMet Mining project and the proposed Mesabi Nugget plant (both north of Hoyt Lakes). The only other existing facility that would be affected by the Mesaba Generating Station and the proposed PolyMet or Mesabi Nugget projects is the Hoyt Lakes WWTF. The Syl Laskin Energy Center is also located on Colby Lake.

Water Quantity

The USGS has operated several gauging stations on the Partridge River and two are used in this analysis: one just upstream of Colby Lake (Upper Partridge River) and the other several miles just downstream of Colby Lake (Lower Partridge River). The average flow at the Upper Partridge River station is 87.7 cubic feet per second (39,400 gallons per minute) based on data from 1979 to 1988. **Based on PolyMet's Environmental Activity Worksheet, average flow in the Upper Partridge River is approximately 17,500 gallons per minute (PolyMet, 2007).** Downstream of Colby Lake, the average flow of the Lower Partridge River is 111.2 cubic feet per second (49,900 gallons per minute) based on data from 1943 to 1967 **(USGS, 2009)**. **The Upper Partridge River is defined as the portion of the river upstream of Colby Lake and the Lower Partridge River is the stream reach downstream of the lake.**

Mesabi-Nugget has been issued a permit to withdraw water at a rate of **up to** 5,000 gallons per minute from Mine Pit 1, located north of the proposed East Range Site. If necessary, the permit also allows the appropriation of up to 5,000 gallons per minute from Mine Pit 2WX, as a standby source. **However, actual average required use would likely be much lower. Pit 2WX does not currently discharge to any surface waters. According to water flow records, Mine Pit 1 has a base discharge of approximately 3,300 gallons per minute to Second Creek, which subsequently flows to the Lower Partridge River (Johnson, 2009). This would be reduced or eliminated by Mesabi Nugget's use and by the Mesaba Energy Project's potential use of dewatering and wastewater flows from Mesabi Nugget.**

PolyMet would not appropriate water directly from the Partridge River, but it may appropriate water from Colby Lake. The PolyMet operation could appropriate process water from Colby Lake, at an estimated rate of **4,000 to 8,000** gallons per minute**. Since PolyMet would not directly appropriate water from the Partridge River, there would be no direct impacts on stream flow in the river. PolyMet may have some indirect impacts on the stream flow in the Partridge River by cutting off a portion of the runoff to the river and dewatering of the mine pit, which could cause a localized drop in the groundwater levels; however, this potential impact has not been quantified due to lack of available information.**

The Mesaba Generating Station is proposing to withdraw water (see Table 4.5-11) from a series of mine pits that would be interconnected with piping and pumps to provide a majority of water necessary for operation. **Several of these mine pits are currently discharging into the Upper and Lower Partridge Rivers – mine pits 3 and 5N currently contribute an estimated average flow to the Upper Partridge River of 1,100 gallons per minute; the Stephens and Knox mine pits contribute an estimated average flow of 435 gallons per minute to the Lower Partridge River. The flows from these mine pits would potentially be eliminated if used for the Mesaba Energy Project.** In addition, the Mesaba Generating Station would utilize 1,000 gallons per minute from the Mesabi-Nugget project's wastewater discharge and 2,900 gallons per minute from Colby Lake to provide high water demand supplies.

Regarding the Upper Partridge River, impacts would be attributed from the Mesaba Generating Station, which could remove up to 1,100 gallons per minute from the river. This

removal represents six percent of the Upper Partridge River's average flow (using PolyMet's data of 17,500 gallons per minute) (if based on available USGS data, this flow would represent three percent of average Prairie River flow). Regarding the Lower Partridge River, the total maximum flow that the Mesaba Generating Station and Mesabi Nugget could remove from the river could be as much as 3,735 gallons per minute ; however, this is not considered a cumulative impact with respect to removals from the Upper Partridge River as water levels in the lake (and hence outflows) are controlled according to existing permits. When Colby Lake reaches its established minimum allowable level, Minnesota Power is required to augment lake levels by pumping water from Whitewater Reservoir. When Colby Lake is at its minimum allowable level, flow out of the lake to Lower Partridge River is also at its minimum, which is approximately 5,835 gallons per minute. This means that flows on the Lower Partridge River would never fall below 5,835 gallons per minute.

There are a number of significant water appropriations in and near Colby Lake. The Syl Laskin Energy Center is permitted to pump 50,000 million gallons per year from Colby Lake for once-through cooling water. The average amount used, over the last 4 years, is 48,334 million gallons per year (92,000 gallons per minute). However, this water is returned to the lake with some evaporative losses. The City of Hoyt Lakes is also permitted to withdraw 160 million gallons per year (304 gallons per minute) for drinking water purposes, and has averaged about 125.4 million gallons per year (239 gallons per minute) over the past four years. A joint permit, issued to MP and Cliffs-Erie, LLC (CE), allows for withdrawing 6,307 million gallons per year (12,000 gallons per minute) to be used for mine processing, however, no water has been appropriated from Colby Lake under this permit since 2001. The City of Hoyt Lakes also is permitted to withdraw 4 million gallons per year (7.6 gallons per minute) from the Partridge River for watering a public golf course and has averaged 1.7 million gallons per year (3.2 gallons per minute) for the past four years.

In addition to the water appropriation permits for Colby Lake and the Partridge River, CE has a number of individual permits for dewatering mine pits (the same mine pits that are proposed for the source of process water for the Mesaba Generating Station East Range Site); however, no water has been withdrawn from these pits since 2001, as mining operations have ceased.

As discussed in the Section 4.5.4.1, the Mesaba Generating Station (Phases I and II) may use an average of 1,300 gallons per minute from Colby Lake, and peak use could reach 4,300 gallons per minute. Combined with PolyMet's potential use, Mesaba's potential appropriation from Upper Partridge River, and other Colby Lake users, total potential short-term withdrawal from the lake could reach approximately 13,600 gallons per minute, although this would represent a worst-case scenario – when mine pit storage is unable to reduce short-term appropriation rates. For comparison, this rate is lower than the historical short-term permit limit of 15,000 gallons per minute for the LTV mine.

The maximum total estimated amount of water that PolyMet and the Mesaba Generating Station could appropriate from Colby Lake would be determined by the MNDNR. Thus, determining precise appropriations and the net impact on water quantity for the Partridge River watershed is difficult at this time, due to the uncertainty of the status and design of each project. As discussed previously, it is expected that Minnesota Power would maintain Colby Lake water levels using water from the Whitewater Reservoir. Therefore, 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 cumulative appropriation is not expected to reach historical levels of appropriation. However, fluctuation would then occur in the Whitewater Reservoir.

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 period of time. Water losses through leaky dikes in Whitewater Reservoir are estimated to be about 9,000 gallons per minute 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 for 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. Further hydrologic modeling and investigations into limiting losses of water from Whitewater Reservoir would be conducted by Excelsior 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.

Water Quality

As the Mesaba Generating Station East Range Alternative would not discharge process or industrial wastewater, cumulative impacts from the project were not considered. There would be a small discharge of domestic (or sanitary) wastewater from the plant to the Hoyt Lakes WWTF, but this discharge is within the treatment capacity of the WWTF and should not result in significant pollutant loadings to the environment.

5.2.5 Wetlands

This section provides an analysis of cumulative wetland impacts within the defined Study Areas, as described below, for the West and East Range Site alternatives for the proposed Mesaba Energy Project in conjunction with other reasonably foreseeable future actions. This section represents a summary of a more detailed analysis by consultants to the project proponent, which is provided in its entirety in Appendix D4 **and was independently reviewed by DOE**.

The quantitative impact estimates from the analysis performed in this section are not completely consistent with results reported in Section 4.7 or Appendix D4 for two reasons: (1) This cumulative effects analysis was performed for defined study areas based on watersheds, as described below, therefore some of the associated project infrastructure, as described in Section 4.7, lies outside the study areas and is not included in this particular analysis. (2) This cumulative effects analysis includes potential impacts to wetlands that could occur in the interiors of potential rail line center loops; the analysis performed by the project proponent's consultants, which is included in Appendix D4, excluded these impacts. DOE determined that it would be most appropriate to include those potential impacts.

5.2.5.1 Study Areas

Because many of the primary functions performed by wetlands are closely related to the surrounding watershed, the study areas for the cumulative effects assessment was defined according to the limits of the affected subwatersheds for each alternative site.

West Range Site

The West Range Site is located within subwatersheds on the boundary between the Swan River and Prairie River watersheds. Therefore, the study area associated with the West Range site is defined as follows:

- That part of the Swan River watershed upstream of the point where Holman Lake discharges to the Swan River. The Holman Lake discharge point represents the point on the Swan River affected by discharge and drainage from the West Range Site; and
- That part of the Prairie River watershed upstream of Prairie Lake.

East Range Site

The East Range Site is located in a subwatershed of the Partridge River in St. Louis County, Minnesota. The study area of the East Range Site is defined as that portion of the Partridge River Watershed **approximately 5 miles downstream of the confluence with First Creek.**

5.2.5.2 Methodology

This analysis includes the evaluation of the incremental impact of the proposed project when added to other past, present, and reasonably foreseeable future actions. The proposed project was evaluated along with reasonably foreseeable future actions within the study area to determine the potential for cumulative effects on wetland resources for each alternative site. Determinations of past, present, and future conditions were performed as follows:

- **Past Conditions** – The past condition of wetland resources in the project area is defined as the condition that existed at the time of the NWI (1980s). The existing NWI data were used to represent the wetland area that existed at the time aerial photography was flown.
- **Existing Conditions** – Wetland areas estimated for the existing conditions were developed by compiling the following data:
    1) The NWI was used to identify wetlands in most areas, particularly where additional detailed information was unavailable. However, more accurate or more detailed data were used in place of NWI data, where available, as described in items 2 and 3 below.
    2) Wetlands shown to be disturbed by mining and other development and industry were identified through interpretation of aerial photography. Where wetlands were shown to be filled or otherwise obliterated, they were removed from the "existing wetlands" data.
    3) A "composite" wetlands layer was developed by deleting all of the NWI wetlands from the areas where additional data and/or photo interpretation show that wetlands have been impacted.
- **Future Conditions** – Wetland areas estimated for future conditions were developed by defining reasonably foreseeable future projects. Table 5.2.5-1 provides a summary of the projects considered reasonably foreseeable in each of the study areas. The potential effects of each project on existing wetland resources was estimated using the existing conditions wetland mapping described above and an assumed footprint of disturbance for each potential future project.

Table 5.2.5-1. Foreseeable Future Actions within the Defined Study Areas

West Range Site Study Area	East Range Site Study Area
Minnesota Steel Industries	PolyMet Mining NorthMet Project
Nashwauk Gas Pipeline	Mesabi Nugget **Phase II**
Itasca County Highway 7 Realignment	St. Louis County – new roadway from Hoyt Lakes to Babbitt
Itasca County Railroad	
Keetac Mine Expansion	

5.2.5.3 Cumulative Effects Analysis Results

Tables 5.2.5-2 and 5.2.5-3 provide the results of the analysis for the West Range Site and the East Range Site respectively. The impacts of the Mesaba Generating Station are limited to areas inside of the defined Study Areas that would be permanently impacted by being filled. Temporary impacts or changes in wetland type are not included in the analysis. In instances where infrastructure alternatives (e.g.,

alternative rail alignments) would produce differing impact acreages, the more conservative (larger) estimate was utilized.

Potential impacts to wetlands located within a proposed rail line center loop for **the East Range Site** were not included in the analysis in Appendix D4, because design specifications have not yet been finalized and permitting and mitigation specifics have not yet been made by applicable regulatory bodies. For the purposes of this section, the wetland acreages have been included for the rail loop based on the analysis in Section 4.7. These acreages are considered to represent the upper limits (worst case) of the wetland acreages that would be lost as a result of rail loop construction and operation.

Wetland impacts are considered losses of wetland areas primarily through the placement of construction fill. Impacts do not consider wetland mitigation scenarios, such as wetland restoration or creation, which would lessen impact totals. More detailed information on the study areas, past and existing conditions, foreseeable future actions, and impacts, including impacts by wetland type, is included in Appendix D4.

West Range Site

Table 5.2.5-2 describes the results of the cumulative wetland impacts analysis for the West Range Site within the defined study area that includes portions of the Swan River and Prairie River watersheds. Foreseeable future actions, including the Mesaba Generating Station, are anticipated to result in **1,845** acres of wetland impacts, which would represent a loss of 1**.5** percent of the total wetland acreage contained within the Study Area. The Mesaba Generating Station implemented at the West Range Site would affect approximately **37** acres of wetlands, which would represent a loss of approximately 0**.03** percent of the total wetlands currently within the Study Area. Therefore, the Mesaba Generating Station would account for **2** percent of the total wetland loss anticipated for all of the foreseeable future actions combined.

Table 5.2.5-2. West Range Site Cumulative Wetland Impacts Analysis Results

	Wetlands in Study Area (acres)	Wetland Impacts (acres)	Percent Loss of Wetlands	
			From Past	From Existing
Past – Circa 1980	128,917			
Existing – Circa 2006	125,322		2.8%	
Future Actions				
Mesaba Energy Project Impacts		**37**[4]		0**.03**%
Minnesota Steel Impacts[1]		1,163		0.93%
Nashwauk Gas Pipeline Impacts		26		0.02%
Highway 7 Realignment Impacts		2		0.001%
Itasca County Railroad Impacts		12		0.01%
Keetac Mine Expansion		**605**		**0.48%**
Total of Future Actions[2]		**1,845**		1.**47**%
Future – Circa 2026[3]	123,**477**			

[1] This impact acreage may be reduced to 945 depending upon the final site layout for the facility.
[2] This impact acreage may be reduced to **1,627** if the final site layout for the Minnesota Steel project affects 945 acres.
[3]This acreage may increase to **123,695** if only 945 acres of wetlands are impacted as a result of future actions.
[4]The 37 acres includes 31.36 acres for the Central IGCC plant footprint, 5.73 acres for Rail 3B, 0.19 acres for the access road and 0.01 acres for the HVTL Alt. 1
NOTE: See Section 5.2.5 for explanation of differences between this table and Appendix D4.

East Range Site

Table 5.2.5-3 describes the results of the cumulative wetland impacts analysis for the East Range Site within the defined study area that includes a portion of the Partridge River watershed. Foreseeable future actions, including the Mesaba Generating Station with worst-case rail loop impact, are anticipated to result in 1,**339** acres of wetland impacts, which would represent a loss of 4 percent of the total wetland

acreage contained within the Study Area. The Mesaba Generating Station implemented at the East Range Site would affect approximately **82** acres of wetlands, including potential impacts to 48 acres within the center loop of the proposed rail line, which would represent a loss of approximately 0.25 percent of the total wetlands currently within the Study Area. Therefore, the Mesaba Generating Station would account for about 6 percent of the total wetland loss anticipated for all of the foreseeable future actions combined.

Table 5.2.5-3. East Range Site Cumulative Wetland Impacts Analysis Results

	Wetlands in Study Area (acres)	Wetland Impacts (acres)	Percent Loss of Wetlands	
			From Past	From Existing
Past – Circa 1980	34,500			
Existing – Circa 2006	33,212		3.7%	
Future Actions				
Mesaba Energy Project Impacts[1]		**82**[4]		0.25%
PolyMet Mining Corp.		1,257		3.78%
Mesabi Nugget[2]		unknown		0%
Roadway from Hoyt Lakes to Babbitt[3]		unknown		0%
Total of Future Actions		1,**339**		4.03%
Future – Circa 2026	31,**873**			

[1] This impact acreage includes potential impacts to **51** acres of wetlands located inside of proposed rail line center loop.
[2] Approximately **1,667** acres of wetlands have been identified within the boundaries of the Mesabi Nugget project; however it is currently unknown how much will actually be impacted by the project.
[3] At this time no specific footprint has been decided upon with respect to this potential roadway. Therefore, no impact acreage can be determined, however, due to the general planned location it is expected that construction would cause some wetland impacts.
[4] The 82 acres includes 17.15 acres of the IGCC plant footprint, 13.38 for Rail 1, 0.44 for the access road, 0.09 for the HVTL, and 51 acres of indirect impacts to the center loop of the rail that would become isolated.

5.2.6 Wildlife Habitat

This section provides an analysis of cumulative wildlife habitat impacts within the defined Study Areas, as described in Section 5.2.6.1, for the West and East Range Site alternatives for the proposed Mesaba Energy Project in conjunction with other reasonably foreseeable future actions. The analysis consists of two parts:

- The total amount of habitat, by habitat type, that would be impacted by the Mesaba Energy Project and the other foreseeable future actions as compared to the total amount of existing habitat within the Study Areas.
- The potential effects of the Mesaba Energy Project and the other foreseeable future actions to wildlife travel corridors across the Iron Range minerals formation within the Study Areas. These habitat travel corridors have been identified in a study by the MNDNR and documented in a report titled *Cumulative Effects Analysis on Wildlife Habitat Loss/Fragmentation and Wildlife Travel Corridor Obstruction/Landscape Barriers in the Mesabi Iron Range and Arrowhead Regions of Minnesota*. The MNDNR study examined the Iron Range minerals formation because this location represents a linear feature approximately 100 miles long that, due to substantial historic mining activities, has become a barrier for wildlife travel from the northwestern to southeastern portions of the Arrowhead Region in northern Minnesota. The study identified 13 existing travel corridors, of which three are located within the Study Area for the West Range Site and four are located within the Study Area for the East Range Site.

This analysis provides a summary of a more thorough cumulative effects analysis performed by the project proponent. The project proponent's analysis is included in this EIS as Appendix D5.

5.2.6.1 Study Areas

Since many of the primary wildlife habitat functions performed by vegetation communities are closely related to a surrounding watershed, the study areas for the cumulative effects assessment were defined according to the limits of the affected subwatersheds for each alternative site.

West Range Site

The West Range Site is located within subwatersheds on the boundary between the Swan River and Prairie River watersheds. Therefore, the study area associated with the West Range site is defined as follows:

- That part of the Swan River watershed upstream of the point where Holman Lake discharges to the Swan River. The Holman Lake discharge point represents the point on the Swan River affected by discharge and drainage from the West Range Site; and
- That part of the Prairie River watershed upstream of Prairie Lake.

East Range Site

The East Range Site is located in a subwatershed of the Partridge River. The study area of the East Range Site is defined as that portion of the Partridge River Watershed upstream of its confluence with the St. Louis River.

5.2.6.2 Methodology

This analysis to assess potential cumulative impacts to wildlife habitat included the evaluation of the incremental impact of the proposed project when added to other past, present, and reasonably foreseeable future actions. Determinations of past, present, and reasonably foreseeable future conditions were performed as follows:

- **Past Conditions** – The past condition of wildlife habitat was determined by utilizing MNDNR Gap Analysis Program land cover data in GIS software to determine areas that are presently disturbed by mining and development. Those areas were then considered locations that were at some point in the past covered by natural features and provided habitat for wildlife. Those estimates were combined with the total amount of currently existing natural habitat to provide a total estimate of the amount of habitat that existed without human disturbance within each Study Area.

- **Existing Conditions** – The existing condition was defined as the areal extent of habitat types described in the MNDNR **Gap Analysis Program** land cover data, which were mapped with GIS, in each Study Area.

- **Future Conditions** – Wildlife habitat areas estimated for future conditions were developed by defining reasonably foreseeable projects that would be expected to be implemented in the future. Table 5.2.6-1 provides a summary of the projects considered reasonably foreseeable in each of the study areas.

Table 5.2.6-1. Reasonably Foreseeable Future Actions within the Defined Study Areas

West Range Site Study Area	East Range Site Study Area
Minnesota Steel Industries	PolyMet Mining NorthMet Project
Nashwauk Gas Pipeline	Mesabi Nugget
Itasca County Highway 7 Realignment	St. Louis County – new roadway from Hoyt Lakes to Babbitt
Itasca County Railroad	
Keetac Mine Expansion	

Using the "Existing Conditions" GIS mapping described above and an assumed footprint of disturbance for each potential future action, potential habitat loss estimates were calculated for existing habitats. This provided data on the total area of each habitat type that would be impacted by the implementation of each action, which were then compared to total amounts currently existing in the Study Areas. For consideration of potential impacts to wildlife travel corridors, GIS data was used to spatially orient the MNDNR-defined wildlife travel corridors with the assumed footprints of disturbance for the potential future actions. Based on the relative locations of these features, the potential for impacts to the travel corridors was characterized based on best professional judgment. The analysis is focused on impacts to larger mammals as they are considered the most mobile terrestrial species.

The analysis included in this FEIS differs from the DEIS in terms of impact values; however, the overall conclusions generally remain the same. New GIS analyses were performed in order to produce more accurate impact calculations as well as a slightly more detailed habitat classification scheme. For example, in the DEIS, there was a single class of deciduous forest and in the FEIS there are five classes of deciduous vegetation (lowland deciduous forest, lowland deciduous shrubland, upland conifer/deciduous forest mix, upland deciduous forest [aspen/birch], and upland deciduous forest [hardwoods]). In particular, the impacts of the Minnesota Steel Industries project have been increased substantially. Also, for the West Range Site analysis, the Keetac Mine Expansion project was added to the list of reasonably foreseeable future actions.

5.2.6.3 Cumulative Effects Analysis Results

The impacts of the Mesaba Energy Project would be limited to areas inside the defined Study Areas that would be permanently impacted (e.g., wetlands filled, habitat conversion). In instances where infrastructure alternatives (e.g., alternative rail alignments) would produce differing impact acreages, the more conservative (larger) estimate was utilized. Wetland mitigation scenarios, such as wetland restoration or creation, which would lessen impact totals, were not considered for the cumulative impact analysis. Impacts from reasonably foreseeable future actions, other than the Mesaba Energy Project, were based on assumed site boundaries; therefore, these impacts may be reduced as facilities layouts within the site boundaries are finalized. For purposes of this analysis, it was conservatively assumed that the entire area within the site boundaries would be impacted by the actions. **Overall, the term impact refers to instances in which habitat would be permanently lost through placement of fill, excavation, or the placement of structures.**

West Range Site

Habitat Loss

Overall, the impacts of the combined foreseeable future actions, including the Mesaba Energy Project, on the Study Area for the West Range Site would include a loss of **1.4** percent of the total wildlife habitat as compared to existing conditions (Table 5.2.6-2). The habitat type that would experience the greatest amount of **relative** disturbance would be **upland** deciduous forest **(hardwoods)** at **2.9** percent **of the existing habitat within the study area** (Table 5.2.6-3). It is estimated that the existing conditions represent a loss of **3.2** percent in overall wildlife habitat in the Study Area as compared to past conditions (pre-human settlement) (Table 5.2.6-2).

Table 5.2.6-2. West Range Site Cumulative Wildlife Habitat Impacts Analysis Results

	Total Habitat in Study Area (acres)	Total Habitat Impacts (acres)	Percent Loss of Total Habitat		Proportion of Cumulative Impact
			From Past	From Existing	
Past	**400,052**				
Existing	**387,754**		**3.2**%		
Future Actions					
Mesaba Energy Project		**523**		**0.13%**	**9.5**%
Minnesota Steel		**3,324**		**0.9%**	**60.3**%
Nashwauk Gas Pipeline		**157**		**0.04%**	**2.8**%
Highway 7 Realignment		**59**		**0.0002%**	**1.1**%
Itasca County Railroad		**122**		**0.0003%**	**2.2**%
Keetac Mine Expansion		**1,324**		**0.3%**	**24.0%**
Total of Future Actions		**5,509**		**1.4%**	100%
Future	**382,245**				

Table 5.2.6-3. Total Habitat Impacts for Existing Conditions and Proportion Lost Due to Reasonably Foreseeable Future Actions within West Range Site Study Area

Habitat Type	Existing Conditions (acres)	Impacts of Reasonably Foreseeable Future Actions (acres)	Percent Loss Resulting from Implementation of Reasonably Foreseeable Future Actions
Open Wetland	7,763	113	1.5%
Lowland Deciduous Forest	8,172	26	0.3%
Lowland Deciduous Shrubland	46,527	946	2.0%
Lowland Conifer Forest	31,731	31	.001%
Lowland Conifer Shrubland	212	0	0%
Upland Conifer Forest	22,878	28	0.1%
Upland Conifer/Deciduous Forest Mix	100	0	0%
Upland Deciduous Forest (Aspen/Birch)	139,407	1,885	1.4%
Upland Deciduous Forest (Hardwoods)	12,234	350	2.9%
Upland Shrub/Woodland	64,509	1,465	2.3%
Water	34,281	526	1.5%
Cropland	3,381	35	1.0%
Grassland	16,559	104	0.6%
Total	**387,754**	**5,509**	**1.4%**

Potential impacts of the Mesaba Energy Project are listed in Table 5.2.6-4. The Mesaba Energy Project at the West Range Site would potentially result in a loss of **523** acres of wildlife habitat, which represents a loss of **0.13** percent of the total habitat within the Study Area. The habitat type that would experience the greatest impacts would be **upland deciduous forest (hardwoods)**, which would experience **a loss of 0.6 percent** of the existing acreage in the Study Area. **The total impact acreage presented in this FEIS (523 acres) is considerably less than the acreage shown in the DEIS (759 acres), which is due to alterations to the design of the project (see Chapter 2 for detailed descriptions of project elements). The main project alteration having an effect is the development of the preferred Rail Line Alternative 3B, which reduces impacts considerably as compared to the Rail Line Alternative 1A, which was included in this section of the DEIS.**

Table 5.2.6-4. Mesaba Energy Project Wildlife Habitat Impacts

Habitat Type	Habitat Impact (acres)	Percent Loss as Compared to Total Habitat within Study Area for Existing Conditions	Proportion of Cumulative Impact
Open Wetland	1	0.01%	0.9%
Lowland Deciduous Forest	9	0.1%	35%
Lowland Deciduous Shrubland	16	0.03%	1.7%
Lowland Conifer Forest	11	0.03%	35%
Lowland Conifer Shrubland	0	0%	0%
Upland Conifer Forest	5	0.02%	17.9%
Upland Conifer/Deciduous Forest Mix	0	0%	0%
Upland Deciduous Forest (Aspen/Birch)	291	0.2%	15.4%
Upland Deciduous Forest (Hardwoods)	69	0.6%	19.7%
Upland Shrub/Woodland	114	0.2%	7.8%
Water	1	0.003%	0.2%
Cropland	0	0%	0%
Grassland	6	0.04%	5.7%
Total	**523**	**0.13%**	**9.5%**

Potential impacts of the Minnesota Steel Industries project are listed in Table 5.2.6-5. This project would potentially result in a loss of **3,324** acres of wildlife habitat, which represents a loss of **0.9** percent of the total habitat within the Study Area. The habitat type that would experience the greatest impact would be **upland deciduous forest (hardwood)**, which would experience **a** loss of **1.9** percent as compared to existing conditions within the Study Area.

Table 5.2.6-5. Minnesota Steel Industries Wildlife Habitat Impacts

Habitat Type	Habitat Impact (acres)	Percent Loss as Compared to Total Habitat within Study Area for Existing Conditions	Proportion of Cumulative Impact
Open Wetland	91	1.2%	80.5%
Lowland Deciduous Forest	14	0.2%	53.8%
Lowland Deciduous Shrubland	677	1.5%	71.6%
Lowland Conifer Forest	13	0.04%	41.9%
Lowland Conifer Shrubland	0	0%	0%
Upland Conifer Forest	13	0.1%	46.4%
Upland Conifer/Deciduous Forest Mix	0	0%	0%
Upland Deciduous Forest (Aspen/Birch)	860	0.6%	45.6%
Upland Deciduous Forest (Hardwoods)	233	1.9%	66.6%
Upland Shrub/Woodland	960	1.5%	65.5%
Water	360	1.1%	68.4%
Cropland	33	1.0%	94.3%
Grassland	70	0.4%	67.3%
Total	**3,324**	**0.9%**	**60.3%**

Potential impacts of the Nashwauk Gas Pipeline project are listed in Table 5.2.6-6. This project would potentially result in a loss of **157** acres of wildlife habitat, which represents a loss of **0.04** percent of the total habitat within the Study Area. **Upland shrub/woodland** would experience the greatest impact with a loss of **0.07** percent of the total amount represented by the existing conditions.

Table 5.2.6-6. Nashwauk Gas Pipeline Wildlife Habitat Impacts

Habitat Type	Habitat Impact (acres)	Percent Loss as Compared to Total Habitat within Study Area for Existing Conditions	Proportion of Cumulative Impact
Open Wetland	0	0%	0%
Lowland Deciduous Forest	3	0.04%	11.5%
Lowland Deciduous Shrubland	13	0.03%	1.4%
Lowland Conifer Forest	5	0.02%	16.1%
Lowland Conifer Shrubland	0	0%	0%
Upland Conifer Forest	6	0.03%	21.4%
Upland Conifer/Deciduous Forest Mix	0	0%	0%
Upland Deciduous Forest (Aspen/Birch)	67	0.05%	3.6%
Upland Deciduous Forest (Hardwoods)	17	0.1%	4.9%
Upland Shrub/Woodland	42	0.07%	2.9%
Water	1	0.003%	0.2%
Cropland	0	0%	0%
Grassland	3	0.02%	2.9%
Total	**157**	**0.04%**	**2.8%**

Potential impacts of the Itasca County Highway 7 Realignment are listed in Table 5.2.6-7. This project would result in a potential loss of **59** acres of wildlife habitat, which represents a loss of **0.02** percent of the total habitat within the Study Area. The habitat type that would experience the greatest impact would be **upland shrub/woodland**, which would experience a loss of **0.04** percent as compared to existing conditions within the Study Area.

Table 5.2.6-7. Itasca County Highway 7 Realignment Wildlife Habitat Impact s

Habitat Type	Habitat Impact (acres)	Percent Loss as Compared to Total Habitat within Study Area for Existing Conditions	Proportion of Cumulative Impact
Open Wetland	0	0%	0%
Lowland Deciduous Forest	0	0%	0%
Lowland Deciduous Shrubland	0	0%	0%
Lowland Conifer Forest	0	0%	0%
Lowland Conifer Shrubland	0	0%	0%
Upland Conifer Forest	1	0.004%	3.6%
Upland Conifer/Deciduous Forest Mix	0	0%	0%
Upland Deciduous Forest (Aspen/Birch)	30	0.02%	1.6%
Upland Deciduous Forest (Hardwoods)	2	0.02%	0.6%
Upland Shrub/Woodland	24	0.04%	1.6%
Water	<1	0%	0%
Cropland	0	0%	0%
Grassland	2	0.01%	1.9%
Total	**59**	**0.02%**	**1.1%**

Potential impacts of the Itasca County Railroad project are listed in Table 5.2.6-8. This project would potentially result in a loss of **122** acres of wildlife habitat, which represents a loss of **0.03** percent of the total habitat within the Study Area. **Upland shrub/woodland** would experience the greatest impact with a loss of **0.06** percent of the total amount represented by the existing conditions.

Table 5.2.6-8. Itasca County Railroad Wildlife Habitat Impacts

Habitat Type	Habitat Impact (acres)	Percent Loss as Compared to Total Habitat within Study Area for Existing Conditions	Proportion of Cumulative Impact
Open Wetland	0	0%	0%
Lowland Deciduous Forest	<1	0%	0%
Lowland Deciduous Shrubland	3	0.006%	0.3%
Lowland Conifer Forest	<1	0%	0%
Lowland Conifer Shrubland	0	0%	0%
Upland Conifer Forest	0	0%	0%
Upland Conifer/Deciduous Forest Mix	0	0%	0%
Upland Deciduous Forest (Aspen/Birch)	72	0.05%	3.8%
Upland Deciduous Forest (Hardwoods)	3	0.02%	0.9%
Upland Shrub/Woodland	39	0.06%	2.7%
Water	4	0.01%	0.8%
Cropland	<1	0%	0%
Grassland	1	0.006%	1.0%
Total	**122**	**0.03%**	**2.2%**

Potential Impacts of the Keetac Mine Expansion are listed in Table 5.2.6-9. This project would potentially result in a loss of 1,324 acres of wildlife habitat, which represents a loss of 0.3 percent of the total habitat within the Study Area. Lowland deciduous shrubland and water would experience the greatest impact with losses of 0.5 percent of the total amount represented by the existing conditions.

Table 5.2.6-9. Keetac Mine Expansion Wildlife Habitat Impacts

Habitat Type	Habitat Impact (acres)	Percent Loss as Compared to Total Habitat within Study Area for Existing Conditions	Proportion of Cumulative Impact
Open Wetland	21	0.3%	18.6%
Lowland Deciduous Forest	0	0%	0%
Lowland Deciduous Shrubland	237	0.5%	25.1%
Lowland Conifer Forest	2	0.006%	6.5%
Lowland Conifer Shrubland	0	0%	0%
Upland Conifer Forest	3	0.01%	10.7%
Upland Conifer/Deciduous Forest Mix	0	0%	0%
Upland Deciduous Forest (Aspen/Birch)	565	0.4%	30.0%
Upland Deciduous Forest (Hardwoods)	26	0.2%	7.4%
Upland Shrub/Woodland	286	0.4%	19.5%
Water	160	0.5%	30.4%
Cropland	2	0.06%	5.7%
Grassland	22	0.1%	21.2%
Total	**1,324**	**0.3%**	**24.0%**

Development of the Mesaba Energy Project as well as the other foreseeable future actions would likely cause localized habitat fragmentation around areas of development. This fragmentation may cause direct mortality to wildlife species by restricting access to necessary resources for survival, such as food and water. Over time, fragmented areas may experience a decline in the number of species present, affecting species diversity. However, due to the fact that the Mesaba Energy Project and the other foreseeable future actions would be located in regions of Minnesota with large amounts of similar habitat surrounding them, fragmentation impacts would be expected to individuals only and not to a population of a particular species.

Wildlife Travel Corridors

There are three MNDNR-defined wildlife travel corridors located within the Study Area for the West Range Site – wildlife travel corridors #2, #3, and #4 (refer to Appendix D5, Figure 3). Wildlife travel corridor #2 could potentially be severely disrupted by the Mesaba Energy Project, Itasca CR 7 Realignment, Itasca County Railroad, and Nashwauk Gas Pipeline. The footprint of the Mesaba Generating Station would be located just north of the western boundary of this wildlife travel corridor. Development of the plant site would place a relatively large barrier to wildlife utilizing the wildlife travel corridor when entering or exiting to or from the northwest. The Itasca CR 7 Realignment would run along the northern and eastern boundary of wildlife travel corridor #2. The roadway would fragment existing habitat in the area, however, this would not be an impenetrable barrier for larger mammals to cross. It would be expected that the roadway would cause some direct mortality to species crossing the roadway that would be struck by vehicles. The Itasca County Railroad would run across the southeastern corner and the southern boundary of wildlife travel corridor #2. Similar to the effects of the Itasca CR 7 realignment, the railroad would fragment existing habitat in the area without creating an impenetrable barrier for larger mammals to cross. Direct mortality to species could result from being struck by moving locomotives. The Nashwauk Gas Pipeline would run northeast to southwest to the north of the eastern half of wildlife travel corridor #2 and would then turn and run north to south through the center of the wildlife travel corridor. Maintenance during the operation of the pipeline would most likely involve clearing of trees and shrubs in the ROW, which would result in a permanent habitat conversion within the right-of-way where forested areas would be converted to grasslands. This would fragment existing habitat, but would not cause an impenetrable barrier for larger mammals to cross.

Wildlife travel corridor #3 is located approximately two miles east of corridor #2. This corridor could be disrupted by the Itasca County Rail Alignment. The Itasca County Rail Alignment would run along the northern boundary of the wildlife travel corridor and would fragment existing habitat in the area without creating an impenetrable barrier for larger mammals to cross. The Nashwauk Gas Pipeline would run in an east to west direction approximately 0.75 miles north of wildlife travel corridor #3. The pipeline is far enough away from the corridor that no impacts would be expected to result.

Wildlife travel corridor #4 is located approximately two miles east of the proposed Minnesota Steel Industries site. No impacts from the Mesaba Energy Project or any of the other foreseeable future actions would be anticipated to occur to this corridor.

East Range Site

Habitat Loss

Overall, the impacts of the combined reasonably foreseeable future actions, including the Mesaba Energy Project, on the Study Area for the East Range Site would include a loss of **5.2** percent of total wildlife habitat as compared to existing conditions (Table 5.2.6-**10**). The habitat type that would experience the greatest amount of **relative** disturbance would be **lowland conifer shrubland** at **46.6** percent **of the existing habitat within the study area** (Table 5.2.6-**11**). It is estimated that the existing conditions represent a loss of **11.6** percent in overall wildlife habitat in the Study Area as compared to past conditions (pre-human settlement) (Table 5.2.6-**10**).