4. ENVIRONMENTAL CONSEQUENCES

4.1 CHAPTER OVERVIEW

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

4.2 Aesthetics

4.3 Air Quality and Climate

4.4 Geology and Soils

4.5 Water Resources

4.6 Floodplains

4.7 Wetlands

4.8 Biological Resources

4.9 Cultural Resources

4.10 Land Use

4.11 Socioeconomics

4.12 Environmental Justice

4.13 Community Services

4.14 Utility Systems

4.15 Traffic and Transportation

4.16 Materials and Waste Management

4.17 Safety and Health

4.18 Noise

INTENTIONALLY LEFT BLANK

4.2 AESTHETICS

4.2.1 Approach to Impacts Analysis

4.2.1.1 Region of Influence

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

4.2.1.2 Method of Analysis

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

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

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

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

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

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

4.2.2 Common Impacts of the Proposed Action

4.2.2.1 Impacts of Construction

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

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

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

Table 4.2-1. IGCC Power Plant Structure Dimensions

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

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

The power plant footprint size is site-independent and basic construction activities would not differ greatly between the West Range Site and East Range Site. The power plant construction would be conducted in two phases, as outlined in Section 2.4. Preconstruction activities would include tree and brush clearing on the site, dewatering the facility footprint, grading activities, road building, and upgrading of existing utilities. The construction activities for the Mesaba Generating Station would occur within the West Range or East Range Sites. Land between the plant footprint and the site boundary would generally extend at least 1,500 feet from the plant footprint and could extend as much as 5,000 feet in areas north and east of the proposed power plant footprint. By reserving a buffer of existing forest between the local receptors and the construction site, the visual impacts from the missing vegetation would be minimized. After construction is complete, the disturbed area would be re-seeded and re-vegetated, minimizing the long-term visual impacts. During construction, a security fence would be built within the site boundary. The HVTL, pipeline, rail, and road construction activities would occur within variable-width corridors along the length of the alignments. The majority of corridor construction would occur during Phase I. Depending on which site and HVTL alternative is chosen, additional power line construction could also continue through Phase II.

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

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

4.2.2.2 Impacts of Operation

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

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

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

The Mesaba Generating Station would require security lighting, which would impact the closest residential receptors. In addition, warning lights may be required on tall structures near airports to meet Federal Aviation Administration (FAA) requirements. A lighting plan would be developed during the front-end engineering and design (FEED) and environmental review processes. The plan would receive input from the Taconite and Hoyt Lakes City councils and seek to minimize the night aesthetic impacts.

4.2.3 Impacts on West Range Site and Corridors

4.2.3.1 Impacts of Construction

Construction of Phase I would first require clearing the wooded and shrub vegetation from the project site, dewatering the area, and constructing the proposed power plant access roads. During Phase I, approximately 74 acres of forest would be removed. During Phase II, an additional 81 acres of forest would be removed. Potential impacts associated with the Mesaba Generating Station construction would include visible dust and exhaust, landscape scars, visible equipment, decreased forest from thinning, views of the security fences around the disturbed area, and additional truck and rail traffic. These activities would occur below the tree line and would be primarily visible to locations immediately surrounding the Mesaba Generating Station. Figures 3.2-6 and 3.2-7 show the locations of the residential receptors within the vicinity of the West Range Site, with the closest residences within 5,000 feet of the power plant footprint. Multiple residences are also located along CR 7, approximately 1 mile west of the proposed power plant footprint. The construction activities would be visible to residential receptors immediately surrounding the power plant site and would be visible to a lesser extent to the surrounding area. Impacts to the views by sensitive receptors would be mitigated by preserving a layer of forest along the boundary of the buffer zone and by constructing the power plant in two stages.

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

HVTL Corridors

New corridors would be required between the Greenway Substation to the Blackberry Substation for the WRA-1 and WRA-1A HVTL Alternative Alignments. The construction activities to generate the new corridors would include grading, clearing vegetation, excavation for the tower foundations, and stringing of the new line. These activities would occur within the 150-foot temporary ROW along the length of the corridor. In areas along the HVTL corridors where the transmission line towers are upgrades, there would be an increase in traffic and construction equipment to access these areas and construct the HVTLs. The greatest impacts to the local population would occur within the corridor region of influence, approximately 0.5 miles on either side of the ROW. There are approximately 66 residences within 0.5 miles of the WRA-1 Alternative Alignment; 62 residences within the region of influence of the WRA-1A Alternative Alignment; and, 214 residences within 0.5 miles of the WRB Alternative Alignments. The majority of the residences along all of these proposed corridors are within the 0.25- to 0.5-mile range.

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

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

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

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

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

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

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

Pipeline Corridors

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

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

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

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

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

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

Rail Alignments

The rail line alternatives would vary in their impacts to the surrounding area for line construction and train operation. Noise impacts associated with rail line construction and train operations are presented in Sections 4.18.2.1 and 4.18.3.1, respectively. Track visibility from area roads would be reduced, as the construction activities would be focused on the side of the track furthest from US 169 and at an elevation significantly above the grade at which CR 7 is located. However, the centerline of Rail Line Alternative 1A alignment would pass within 400 feet of the closest resident on Big Diamond Lake and within about 850 feet of the closest resident on Dunning Lake. At these locations, aesthetic impacts related to construction would be visible by residents and others living north of Big Diamond Lake.

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

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

4.2.3.2 Impacts of Operation

The Mesaba Generating Station emission points and its generator outlet (GO) HVTL structures would affect views in the vicinity of the West Range Site. The taller power plant buildings and stack emission points would be visible from nearby residential areas, high vantage points, CR 7, and other points where clear lines of sight between an observer and the power plant would occur. For example, the north-south segment of CR 336, located approximately two miles due north of the power plant footprint, would have views of all eight stacks.

During the growing seasons, the West Range Site Mesaba Generating Station, buildings, and emission points would be screened but still visible from some nearby homes, businesses, and CR 7. In the wintertime, the visibility of the structures associated with the power plant would increase. In addition to the loss of leaves, the cold weather condenses the water vapor present in combustion gases and the cooling tower exhaust. During the summer, humidity could cause the appearance of a haze at the plant site. Section 4.3.3.2, Air Quality, discusses the impacts related to haze in more detail.

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

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

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

Lighting

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

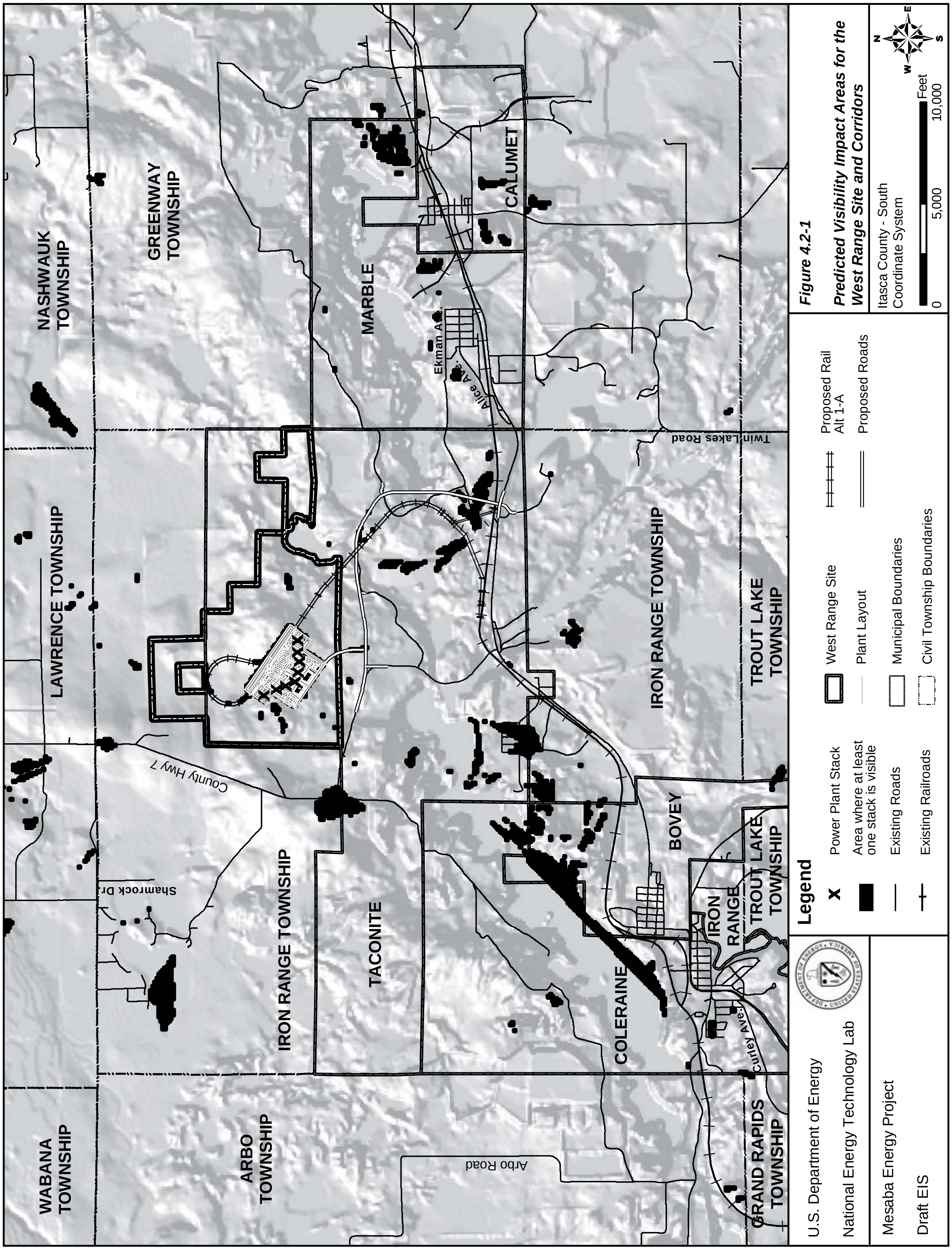
> *Any temporary or permanent structure, including all appurtenances, that exceeds an overall height of 200 feet above ground level (AGL) or exceeds any obstruction standard contained in 14 CFR Part 77, should normally be marked and/or lighted. However, an FAA aeronautical study may reveal that the absence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

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

Phase I and Phase II would be equipped with security lighting that would enhance visibility of the power plant during evening hours. This would negatively impact aesthetics for residents that live close to the power plant and those driving within visual range. A power plant lighting plan would be developed during the FEED and environmental review processes and would seek to minimize such aesthetic impacts as well as to consider any affects to viewing the northern lights. A lighting plan could include reduced lighting at night to make the plant less visible at night. The lighting plan would be developed in coordination with the Taconite City Council's input and ultimate approval.

HVTL Corridors

The visual impacts from the operation of the proposed HVTL corridors would be similar to the construction impacts described above. In addition to the changed visual viewscape, some of the HVTL structures may require obstruction lighting to comply with the FAA regulations. Although none of the HVTL towers would be taller than 200 feet high, their position in relation to local airports may require additional lighting, The WRA-1 and WRA-1A Alternative Alignments would be located more than 8 miles from the Grand Rapids Airport and would parallel the existing 5,755-foot runway. Therefore, it is unlikely these structures would require obstruction lighting.


NASHWAUK TOWNSHIP
GREENWAY TOWNSHIP
LAWRENCE TOWNSHIP
WABANA TOWNSHIP
ARBO TOWNSHIP
IRON RANGE TOWNSHIP
TACONITE
MARBLE
CALUMET
COLERAINE
BOVEY
IRON RANGE
TROUT LAKE TOWNSHIP
GRAND RAPIDS TOWNSHIP
IRON RANGE TOWNSHIP
TROUT LAKE TOWNSHIP
County Hwy 7
Shamrock Dr
Arbo Road
Twin Lakes Road
Ekman Ave
Alice Ave
Curley Ave
Legend
Power Plant Stack
Area where at least one stack is visible
Existing Roads
Existing Railroads
West Range Site
Plant Layout
Municipal Boundaries
Civil Township Boundaries
Proposed Rail Alt 1-A
Proposed Roads
Figure 4.2-1
Predicted Visibility Impact Areas for the West Range Site and Corridors
Itasca County - South Coordinate System
0
5,000
10,000
Feet
N
S
E
W
U.S. Department of Energy
National Energy Technology Lab
Mesaba Energy Project
Draft EIS

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

Pipeline Corridors

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

The majority of Process Water Supply Pipeline Segment 1 would travel over previously disturbed mining areas and along current road ROWs. The segment 2 pipeline would also have two line-of-sight views along a relatively short stretch of CR 7. Process Water Supply Pipeline Segment 3 would primarily travel over existing corridors and the permanent aesthetic impacts would be associated with the open space to accommodate the new pipeline. The pipeline for Cooling Tower Blowdown Outfall 2 would travel along existing corridors to Holman Lake, and would not cause additional impacts. The pipeline for Cooling Tower Blowdown Outfall 1 to the CMP would generate a line-of-sight view at the intersection with CR 7, but would otherwise cross through forest that would shield most views.

Rail Alignments

Increased rail traffic between the Mesaba Generating Station and coal/petroleum coke suppliers could occur. Noise impacts associated with rail line construction and train operations are presented in Sections 4.18.3.1 and 4.18.3.2, respectively.

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

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

Access Roads

Access Road 1 would be an extension of CR 7 that would require cuts through previously disturbed and undisturbed areas. Such cuts could be significant and the scenic view would be compromised if the road passed too closely to existing residential properties causing numerous driveways to be visible from the highway. The increase in the level of traffic past Big Diamond Lake and Dunning Lake residences would compound the negative aesthetic impact associated with construction of the Mesaba Generating Station. The county has indicated its intention to leave in place the existing segment of CR 7 between US

169 and the power plant, which would allow travel on alternate routes; heavy truck traffic would be required to travel via the new segment of highway.

Access Road 2 would not be expected to affect the aesthetic character of the existing surroundings. No direct view of the power plant would be provided to those traveling on the existing segment of roadway. Travelers on Access Road 1 would be able to see further up Access Road 2, but would not be able to see the power plant footprint.

4.2.4 Impacts on East Range Site and Corridors

4.2.4.1 Impacts of Construction

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

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

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

<u>HVTL Corridors</u>

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

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

The 39L/37 HVTL Route would require vertically configured 140-foot single-pole steel structures to carry one new 345 kV circuit and the existing 115-kV circuit across most of the route's length. The new corridors along the 43L HVTL Route and around the Thunderbird Mine Substation would not need to accommodate any existing circuits. The HVTL route would cross long stretches of relatively flat terrain, which would increase the number of visible towers. In addition, the 39L/37L HVTL Route would pass nearby relatively populated areas that would increase the number of residents having a direct line-of-sight to one or more of the HVTL structures. A greater concentration of tower views would occur around Hoyt

Lakes, Gilbert, and Eveleth. Other views of the 39L/37L HVTL Route would occur around relatively flat terrain and along the shores of area lakes, including Whitewater Lake, Ely Lake, and Embarrass Lake. The increased height of the upgraded towers would be more prominent and would cause a moderate change in the area visual resources.

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

Pipeline Corridors

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

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

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

Rail Alignments and Access Roads

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

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

4.2.4.2 Impacts of Operation

As with the West Range Site, the Mesaba Generating Station emission points and its HVTL structures would affect views in the vicinity of the East Range Site. The taller Mesaba Generating Station buildings and stack emission points would be visible from nearby residential areas, high vantage points, CR 666, and other points where clear line-of-sights between an observer and the power plant are available. The proposed HVTL structures would be taller than existing structures and would be visible from further distances than the existing 115-kV structures. The East Range Site is on private land along the western boundary of the Superior National Forest, which could impact views from within the forest. Other public lands, Bear Lake Park and Soudan Underground Mine State Park are located 16 and 20 miles to the north-northwest of the proposed site, and are unlikely to be affected.

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

The Mesaba Generating Station stack emission points would be visible from most vantage points along the south shore of Colby Lake, line-of-sight views from the southwest section of Hoyt Lakes, the southwest end of Whitefish Reservoir, and locations mostly to the north of the power plant footprint and East Range Site. Some locations within the region of influence would be shielded from view of the power plant by visual barriers. Residents living within the farthest south-east portions of Hoyt Lakes would not likely see the power plant or its stacks because of terrain obstacles. The power plant would be highly visible from CR 666. The change in the area's aesthetic character due to the presence of the power plant is not likely to be a negative development for those travelers.

During the growing season, the East Range Mesaba Generating Station buildings and stacks would be partially screened from homes located on the south shore of Colby Lake. In general, Colby Ridge residents and other homes on the south shore of the lake would be able to see the power plant buildings and stacks year round. During the winter months, the visibility of the Mesaba Generating Station and associated structures would increase due to the condensed water vapor and loss of leaves. During the summer, humidity could cause the appearance of a haze at the plant site. Section 4.3.4.2, Air Quality, discusses the impacts related to haze.

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

Lighting

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

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

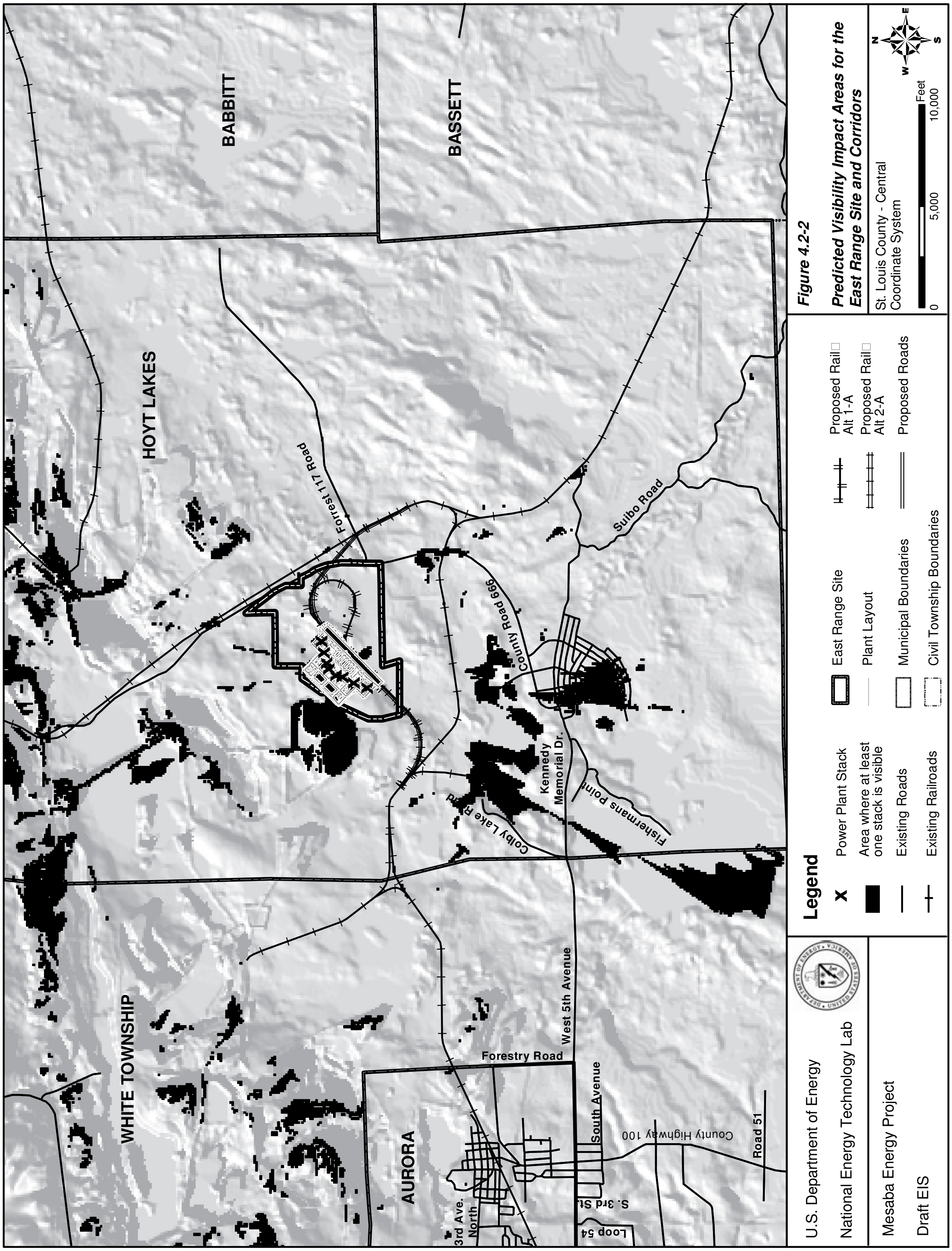


Figure 4.2-2

Predicted Visibility Impact Areas for the East Range Site and Corridors

HVTL Corridors

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

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

Pipeline Corridors

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

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

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

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

Rail Alignments and Access Roads

The existing rail alignment and proposed rail line alternatives would be located north of Colby Lake and shielded from local residential receptors and road traffic. No grade crossings occur in Hoyt Lakes and the nearest crossing occurs in Aurora in two places. Although there would be an increase in rail traffic, it would not be expected to impact visual resources in Hoyt Lakes.

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

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

The access roads to the power plant would have very low impacts on the aesthetic resources because they would be located on the northern section of CR 666 and shielded by forest.

4.2.5 Impacts of the No Action Alternative

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

4.2.6 Summary of Impacts

Basis for Impact	No Action	West Range	East Range
Block or degrade a scenic vista or viewshed.	No changes to scenic vistas or viewsheds.	Visual changes from power plant and HVTL structures.	Visual changes from power plant and HVTL structures.
Cause a change in area visual resources.	No changes to area visual resources.	Three public lands within 20 miles.	Adjacent to Superior National Forest Land, and two other public lands within 20 miles.
Create glare or illumination that would be obtrusive or incompatible with existing land uses.	No additional glare or light sources from area.	Security lighting around plant, aviation warning lights on tank boiler stack and some HVTL structures.	Security lighting around plant, aviation warning lights on tank boiler stack and some HVTL structures.

INTENTIONALLY LEFT BLANK

4.3 AIR QUALITY AND CLIMATE (INCLUDING GREENHOUSE GASES)

This section describes the potential impacts that may occur to local and regional air quality from implementing the Proposed Action and No Action Alternative. Potential visibility impacts that could occur from increases in regional haze and localized vapor plumes are also discussed. Potential impacts related to human health due to changes in air quality are discussed in Section 4.17.

4.3.1 Approach to Impacts Analysis

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

- Result in emissions of criteria pollutants and HAPs;
- Result in mercury (Hg) emissions and conflict with the CAMR as related to coal-fired electric utilities;
- Change in air quality related to the National and Minnesota Ambient Air Quality Standards (NAAQS and MAAQS);
- Result in consumption of PSD increments as defined by the Clean Air Act (CAA), Title I, PSD rule;
- Affect visibility and cause regional haze in Class I areas;
- Result in nitrogen (N) and sulfur (S) deposition in Class I areas;
- Conflict with local or regional air quality management plans;
- Result in emissions of greenhouse gases;
- Cause solar loss, fogging, icing, or salt deposition on nearby residents; and
- Discharge odors into the air.

To determine whether the Proposed Action would result in any of the above listed conditions, results of air dispersion modeling were reviewed against the stated conditions. Detailed air dispersion modeling was conducted as part of the application for a Part 70/New Source Review Construction Authorization Permit for the West Range Site to evaluate compliance with NAAQS and MAAQS, to conduct PSD increment analysis, and to review potential impacts to Class I areas. The permit application was submitted to the MPCA in June 2006 pursuant to the PSD regulations. The methods used for modeling are summarized below and described in detail in Appendix B. The results of the modeling and potential impact of the Mesaba Energy Project are used to represent an upper bound for assessing potential impacts, and are discussed in Sections 4.3.3 through 4.3.5.

4.3.1.1 Predictive Modeling Approach

The AERMOD air quality model was used with the PRIME building downwash algorithm (Version 04300) for the Mesaba Generating Station modeling (Excelsior, 2006d). The MPCA prefers the AERMOD modeling system and EPA has included AERMOD as an approved guideline model. No wet or dry depletion/deposition was included in the modeling (MPCA, 2007). The model was set to RURAL dispersion because the terrain/land use within 3 kilometers (1.9 miles) of the site is almost completely rural. The MPCA processed meteorological data suitable for input to AERMOD specifically for the West Range Site and East Range Site, and these data were used for the Mesaba Generating Station modeling.

The air quality modeling addressed the individual point sources, as well as all sources of fugitive particulate matter (Excelsior, 2006d). The basis for the air modeling is annual emissions rates during normal operations of both phases of the Mesaba Energy Project. Additionally, air modeling was conducted for non-steady state operation (such as startup and flaring of syngas) because emission rates and stack gas conditions for short-term averaging times (i.e., 24 hours or less) in these operation modes can be different from normal operations. These non-steady state operations scenarios represent worst-case maximum emissions. The modeling was conducted to determine which pollutants would have significant ambient air impacts and to identify the significant impact area (SIA) for each pollutant. Modeling was conducted for the criteria air pollutants, SO_2, CO, NO_X, and particulate matter less than 10 microns (PM_{10}), their respective applicable averaging time, and each operating scenario (normal operations, flaring, and startup). In the analyses, all particulate emissions were conservatively assumed to be PM_{10} (Excelsior, 2006d). Ozone (O_3) emissions could not be modeled or analyzed because O_3 is not emitted directly from a combustion source. O_3 is formed from photochemical reactions involving emitted VOCs and NO_X, which take a long time to complete. Consequently, O_3 can travel far from the sources of its precursors and the contribution of an individual source to O_3 concentrations at any particular location cannot be readily quantified. Emissions of lead (Pb) were not modeled because the potential Pb emissions from the proposed project would be less than the PSD significant threshold (see Section 4.3.2).

The SIA was determined for pollutants, which are shown to have a significant impact in ambient air at any point and more refined modeling was carried out to evaluate compliance with PSD increments and NAAQS. All point sources associated with Phase I and Phase II were included in the source input for PSD increment modeling. Additionally, data on the following nearby major increment-consuming (or -expanding) sources, which were provided by the MPCA, were also included as source input:

- Blandin Paper Company/Rapids Energy Center
- Potlatch – Grand Rapids
- Minnesota Power – Clay Boswell Plant
- Keewatin Taconite

Regional source impacts were included (for worst-case modeled impact times and receptors) by modeling the "FARDATA" emission inventory appropriate to the West Range Site and East Range Site, as provided by MPCA modeling staff. For comparison to the NAAQS, a background concentration representing natural or pristine background plus one significant impact level (SIL) was added to all model-predicted concentrations. In addition to the modeling analyses described above, model results were applied to address other PSD requirements: the potential need for pre-construction monitoring and additional impact analyses relating to growth, soils and vegetation, visibility impairment, and deposition.

4.3.1.2 Class I Area-Related Modeling Approach

An air quality modeling analysis was conducted to estimate impacts of the Phase I and Phase II Mesaba Generating Station on air quality in Class I areas. The Class I air quality related value (AQRV) analyses addressed PSD Class I increments for SO_2, PM_{10}, and NO_2, S and N deposition, and visibility impairment (regional haze). The dispersion modeling analysis used standard EPA long-range transport modeling methodologies, and followed guidance as presented in EPA's Guideline on Air Quality Models, the IWAQM Phase 2 report, and the FLAG Phase I report (Excelsior, 2006d). The analyses also incorporated suggestions and guidance received in pre-application meetings with the U.S. Forest Service and the National Park Service (Excelsior, 2006d). The CALPUFF air quality model was used for all Class I area analyses. CALPUFF is the approved EPA long-range transport model referenced in the *Guideline on Air Quality Models* and consists of the following three components:

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

Input options and data utilized in the models generally corresponded to default or recommended values; however for the Mesaba Energy Project, a list of representative, project-specific input parameters were used (Appendix B). The CALPUFF modeling analysis used meteorological data for the years 1990, 1992, and 1996. Additional surface, upper air, and precipitation data were used in CALMET to refine the meteorological fields. Hourly surface data from 13 stations were used along with precipitation data from 28 stations. Upper air data from two stations were used: St. Cloud, Minnesota, and International Falls, Minnesota, for 1990 and 1992; and Minneapolis, Minnesota, and International Falls, Minnesota, for 1996. The Class I AQRV analysis addressed impacts to the BWCAW, VNP and RLW (see Section 3.3.3.2). Class I areas such as the IRNP, which are more than 300 kilometers (186 miles) from the Mesaba Generating Station proposed project sites, are beyond the distance where long-range transport modeling has been shown to provide realistic impact predictions and therefore not addressed in this analysis (Excelsior, 2006d).

During normal operation of Mesaba Generating Station, the only significant air pollutant emissions would be from the CTGs and tank vent boilers (TVBs). Compared to the CTGs and TVBs emissions, emissions from other Mesaba Generating Station sources (flares, auxiliary boilers, and fugitive PM_{10}), would be very small and were considered negligible (i.e., approximately 0.15 percent of the CTGs and TVBs SO_2 emissions, 3.79 percent of the CTGs and TVBs PM_{10} emissions, and 1.32 percent of the CTGs and TVBs NO_X emissions) and were not included in the CALPUFF modeling (Excelsior, 2006d). The normal operating scenario represents the highest combined-source pollutant emission profile; therefore the normal operation was use as the worst-case scenario for both short-term and annual Class I area impacts. Additional methods for analyses are provided in Appendix B.

4.3.2 Common Impacts of the Proposed Action

The potential effects of air pollutants emissions discussed in this section are similar for the West Range Site and East Range Site. Potential criteria and non-criteria pollutant emissions are expected from the following Mesaba Generating Station sources: CTGs, TVBs, flares, fugitive emission leaks, material handling systems, auxiliary boilers, cooling towers, emergency generators, and emergency fire water pump engines (Excelsior, 2006b). Fugitive emissions of PM_{10} would result from the storage and handling of coal and other materials. Air quality modeling addressed emissions from all of the sources, except the two emergency fire pumps and the two emergency diesel generators. Emissions from the periodic testing of these emergency resources are negligible (Excelsior, 2006b). As demonstrated in Table 4.3-1, the Mesaba Energy Project has the potential to emit annually, one or more of the regulated criteria pollutants above the PSD significance threshold; therefore, it is a significant source of air emissions. Additionally, because the Mesaba Generating Station could potentially emit more than 100 tpy of the criteria pollutants (except Pb), it would be a major source of air emissions under the PSD regulation (see Table 4.3-1). Impacts due to these emissions for both the West Range and East Range sites are examined in more detail later in this section.

Table 4.3-1. Annual Criteria Air Pollutant Emission (Phase I and Phase II)

Pollutant	PSD Significance Threshold (TPY)	Plantwide Potential to Emit [1] (TPY)
CO	100	2,539
NO_X	40	2,872
SO_2	40	1,390
PM	25	503
PM_{10}	15	493[2]/709[3]
O_3 as VOC	40	197
Pb	0.6	0.03

Table 4.3-1. Annual Criteria Air Pollutant Emission (Phase I and Phase II)

Pollutant	PSD Significance Threshold (TPY)	Plantwide Potential to Emit [1] (TPY)
Sulfuric Acid (H_2SO_4) (mist)	7	130
Hydrogen Sulfide (H_2S)	10	17

(1) The potential to emit is the maximum capacity of a stationary source to emit any air pollutant under its physical and operational design (i.e., the worst-case scenario) and does not include any regulatory limitations. For the Mesaba Generating Station sources, the worst-case scenario assumes full load at 8760 hrs per year.
(2) West Range Site
(3) East Range Site: Higher emissions because water quality at the East Range Site results in higher PM_{10} emissions from the cooling tower; cooling tower PM_{10} emissions from the East Range Site would be approximately 256 tpy compared to 39 tpy at the West Range Site.
Source: Excelsior, 2006d

Table 4.3-2 shows that the potential to emit individual HAPs from the Phase I and Phase II Mesaba Generating Station would be below the 10-ton per year major source threshold. Additionally, at 12.0 and 24.1 tons per year of combined HAPs for Phase I and combined Phase I and II, respectively, the Mesaba Generating Station would be below the 25-ton per year major source thresholds for HAPs. Therefore, Phases I and II of the Mesaba Energy Project are not major sources of HAPs as defined under the NESHAP.

Table 4.3-2. Annual Hazardous Air Pollutant Emissions (Phase I and Phase II)

CAS No. or MPCA No.	Compound	Annual Average HAP Emission (TPY)				Total Phase I	Phase I & Phase II
		CTGs	TVB	Flare	Fugitive		
75-07-0	Acetaldehyde	0.044	1.60E-04	3.90E-04		0.045	0.089
98-86-2	Acetophenone	0.022	7.90E-05	2.00E-04		0.022	0.045
107-02-8	Acrolein	0.43	1.50E-03	3.80E-03		0.43	0.87
7440-36-0	Antimony	0.027	2.80E-04	7.00E-04		0.028	0.056
7440-38-2	Arsenic	0.059	1.50E-03	3.70E-03		0.064	0.128
71-43-2	Benzene	0.061	0.028	0.071	0.0063	0.167	0.333
100-44-7	Benzyl chloride	1.03	3.70E-03	9.20E-03		1.0	2.1
7440-41-7	Beryllium	0.0064	7.90E-06	2.00E-05		0.0064	0.0128
92-52-4	Biphenyl	0.0025	9.00E-06	2.20E-05		0.0025	0.0051
117-81-7	Bis(2-ethylhexyl)phthalate (DEHP)	0.11	3.90E-04	9.60E-04		0.109	0.218
75-25-2	Bromoform	0.06	2.00E-04	5.00E-04		0.057	0.114
7440-43-9	Cadmium	0.24	5.70E-05	1.40E-04		0.24	0.47
75-15-0	Carbon disulfide	1.13	4.00E-03	1.00E-02	0.034	1.18	2.35
463581	Carbonyl sulfide				0.058	0.058	0.116
532-27-4	Chloroacetophenone, 2-	0.0103	3.70E-05	9.20E-05		0.0104	0.0208

Table 4.3-2. Annual Hazardous Air Pollutant Emissions (Phase I and Phase II)

CAS No. or MPCA No.	Compound	Annual Average HAP Emission (TPY)				Total Phase I	Phase I & Phase II
		CTGs	TVB	Flare	Fugitive		
108-90-7	Chlorobenzene	0.032	1.10E-04	2.80E-04		0.032	0.065
67-66-3	Chloroform	0.088	3.20E-04	7.90E-04		0.089	0.179
0-00-5	Chromium, total (1)	0.013	1.10E-03	2.60E-03		0.016	0.033
18540-29-9	Chromium, (hexavalent)	0.0038	3.20E-04	7.90E-04		0.0049	0.099
7440-48-4	Cobalt (1)	0.0064	1.20E-03	3.00E-03		0.011	0.021
98-82-8	Cumene	0.0078	2.60E-05	6.60E-05		0.0079	0.0159
57-12-5	Cyanide (Cyanide ion, Inorganic cyanides, Isocyanide)	0.140	4.60E-03	1.20E-02	0.0088	0.16	0.33
77-78-1	Dimethyl sulfate	0.071	2.50E-04	6.30E-04		0.072	0.144
121-14-2	Dinitrotoluene, 2,4-	4.20E-04	1.50E-06	3.70E-06		4.20E-04	8.40E-04
100-41-4	Ethyl benzene	0.14	0.032	0.079	5.40E-06	0.25	0.50
75-00-3	Ethyl chloride (Chloroethane)	0.061	2.20E-04	5.50E-04		0.062	0.124
106-93-4	Ethylene dibromide (Dibromoethane)	0.0018	6.30E-06	1.60E-05		0.0018	0.0036
107-06-2	Ethylene dichloride (1,2-Dichloroethane)	0.059	2.10E-04	5.30E-04		0.060	0.119
50-00-0	Formaldehyde	0.42	1.50E-03	3.70E-03	1.10E-06	0.42	0.84
110-54-3	Hexane	0.10	3.50E-04	8.80E-04	1.50E-06	0.10	0.20
7647-01-0	Hydrochloric acid	0.096	3.00E-04	7.40E-04	0.034	0.13	0.26
7664-39-3	Hydrogen fluoride (Hydrofluoric acid)	1.2	5.30E-05	1.30E-04		1.2	2.5
78-59-1	Isophorone	0.86	3.10E-03	7.60E-03		0.87	1.73
7439-92-1	Lead	0.014	6.30E-05	1.60E-04		0.014	0.028
7439-96-5	Manganese	0.025	2.40E-03	5.90E-03		0.034	0.068
7439-97-6	Mercury	0.012	6.60E-04	1.60E-04		0.013	0.026
74-83-9	Methyl bromide (Bromomethane)	1.23	0.011	0.029		1.3	2.5
74-87-3	Methyl chloride (Chloromethane)	0.78	6.00E-03	1.50E-02		0.80	1.61
71-55-6	Methyl chloroform (1,1,1 – Trichloroethane) (4)	0.029	1.10E-04	2.60E-04		0.030	0.060
78-93-3	Methyl ethyl ketone (2-Butanone)	0.58	2.10E-03	5.10E-03		0.58	1.17

Table 4.3-2. Annual Hazardous Air Pollutant Emissions (Phase I and Phase II)

CAS No. or MPCA No.	Compound	Annual Average HAP Emission (TPY)				Total Phase I	Phase I & Phase II
		CTGs	TVB	Flare	Fugitive		
60-34-4	Methyl hydrazine	0.25	9.00E-04	2.20E-03		0.25	0.51
80-62-6	Methyl methacrylate	0.029	1.10E-04	2.60E-04		0.030	0.060
1634-04-4	Methyl tert butyl ether	0.051	1.80E-04	4.60E-04		0.052	0.104
75-09-2	Methylene chloride (Dichloromethane)	0.056	5.50E-04	1.40E-03		0.058	0.117
91-20-3	Naphthalene	0.064	8.10E-04	2.00E-03	2.60E-05	0.067	0.133
7440-02-0	Nickel	0.0096	4.20E-03	1.00E-02		0.024	0.048
108-95-2	Phenol	0.95	1.20E-02	3.00E-02	7.80E-08	0.99	1.98
123-38-6	Proprionaldehyde	0.561	2.00E-03	5.00E-03		0.568	1.136
7784-49-2	Selenium	0.014	2.40E-04	5.90E-04		0.015	0.029
100-42-5	Styrene	0.037	1.30E-04	3.30E-04		0.037	0.075
127-18-4	Tetrachloroethylene (Perchloroethylene)	0.063	2.30E-04	5.70E-04		0.064	0.129
108-88-3	Toluene	0.00081	0.0112	0.0280	6.60E-04	0.041	0.081
108-05-4	Vinyl acetate	0.011	4.00E-05	1.00E-04		0.011	0.023
1330-20-7	Xylenes	0.055	0.013	0.032	1.00E-05	0.10	0.20
	Total Federal HAPs	**11.4**	**0.2**	**0.4**	**0.1**	**12.0**	**24.1**

Source: Excelsior, 2006d

Common impacts associated with the Mesaba Energy Project are from emissions from construction of the Mesaba Generating Station and associated facilities, vehicle traffic, and cooling towers. In addition, coal delivery trains would emit a small amount of criteria pollutants from the train exhaust, and potentially emit PM during coal unloading and handling. However, coal handling emissions are not expected to change air quality appreciably, because the emissions would be reduced by minimizing points of transfer of the material, enclosing conveyors and loading areas, and installing control devices such as baghouses and wetting systems. Trains would be advanced hydraulically to minimize exhaust emissions.

4.3.2.1 Construction Emissions

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

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

4.3.2.2 Vehicle Traffic Emissions

During construction and operation of the Mesaba Generating Station and its associated facilities, emissions would be generated from vehicles, as by-products of combustion from vehicle engines and fugitive dust generated from traffic on the roadways near and on the power plant footprint and buffer land. During peak construction activities, when Phase I and Phase II overlap, on-site personnel are expected to reach about 1,500 persons. Assuming a 20 percent reduction in vehicle trips from carpooling, peak vehicle trips during this time are estimated to be about 1,200 trips per day of personal vehicles, and 20 to 30 delivery vehicles per day. During operation of Phases I and II, employees, on-site contractors, and visitors are expected to total between 107 and 182 persons (Excelsior, 2006b).

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

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

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

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

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

4.3.2.3 Cooling Towers Emissions

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

The most obvious impact of the Mesaba Generating Station cooling towers would be visible, condensed water plumes, which would occur during periods of low air temperature and light winds. The plumes, which would be similar to small natural cumulus clouds, can rise to heights of several thousand feet above the ground in extremely cold weather, and can persist for several miles downwind. Liquid water droplets emitted by cooling towers (referred to as "drift") constitute a very small fraction of the total emitted water. Drift droplets represent circulating cooling water from the tower and contain dissolved solids (such as particulate matter) from the circulating water. Deposition of drift solids has been identified as a potential cooling tower impact where towers use saline water or water with high solids content. Particulate matter emissions from the Mesaba Generating Station on the West Range Site would be lower than on the East Range Site (see Table 4.3-2 for emission rates) because of the high concentration of total dissolved solids found in pit waters in the vicinity of the East Range Site (see Section 3.5.2.2). The drift rate of the cooling towers serving the Mesaba Generating Station would be 0.001 percent of the circulating water and the solids content of the water at the West Range Site is 2,740 parts per million by weight. Thus, the total solids emission rate from cooling towers serving the Mesaba Generating Station would be a maximum of 9 pounds per hour. As shown by the PM_{10} modeling results (see Sections 4.3.3.1 and 4.3.4.1), impacts of cooling tower particulate matter emissions on ambient air concentrations would be very small. Deposition of these particles on surrounding ground surfaces would be negligible. Since the steam plumes consist almost entirely of condensed water, they have no adverse effects other than their visual impact.

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

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

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

4.3.3 Impacts on West Range Site and Corridors

The projected annual air emissions for Mesaba Generating Station, Phase I and Phase II are provided in Section 4.3.2. In this section, the site-specific impacts of air emissions as modeled at receptors and the Federal Class I areas nearest the West Range Sites and Corridors are discussed.

4.3.3.1 NAAQS and PSD Increment Impact Analysis

State and Federal air quality rules prohibit emissions from a new facility that cause or contribute to a conflict with MAAQS or NAAQS. In addition, emissions cannot exceed established PSD increments. To demonstrate compliance with these requirements, an air dispersion modeling analysis for the Mesaba Generating Station at the West Range Site was conducted (see Section 4.3.1.1 and Appendix B). The results are discussed below.

Significant Impact Analysis

Table 4.3-4 shows modeled impacts at normal operation, when the flares are operated, and during system startup. For normal operation, the emissions are included from both phases at 100 percent capacity for 8,760 hours per year. The flaring scenario represents both flares at maximum SO_2 emissions for applicable averaging times, with no emissions from other plant sources. Only CO impacts of the flares are relevant, since SO_2, PM_{10}, and NO_X emissions from the flares for the total facility are below normal operations (see Appendix B). The startup scenario assumes all combustion turbines in startup mode, with other sources at maximum emission rates for any condition. Startup modeling was limited to CO, since facility-wide emissions of all other pollutants at startup would be less than in normal operation.

Table 4.3-4. Highest Project Impacts and PSD SILs for the West Range Site

Pollutant	Averaging Time	Normal Operation µg/m^3	Flaring µg/m^3	Startup µg/m^3	SIL µg/m^3
SO_2	1-hour	130.2	75.8	N/A	25
	3-hour	77.6	22.8	N/A	25
	24-hour	31.2	5.4	N/A	5
	Annual	1.29	N/A	N/A	1
PM_{10}	24-hour	27.9	N/A	N/A	5
	Annual	1.68	N/A	N/A	1
CO	1-hour	172.2	414.1	3167.5	2000
	8-hour	59.8	122.7	379.0	500
NO_X	Annual	2.69	N/A	N/A	1

Source: Excelsior, 2006d

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

- Impacts are above the applicable SIL for all pollutants, and all averaging times, except for eight hours for CO.
- Impacts are greatest under normal operating conditions, except for CO; highest CO impacts would occur during startup.

Wherever modeled pollutant concentration increases exceed the SILs, further modeling is required under PSD rules to ensure that the Class II PSD increment for the area is not violated. Because the highest predicted impacts were significant, increment and NAAQS compliance modeling was necessary for SO_2, PM_{10}, and NO_X. This further evaluation included all sources within 50 kilometers (31 miles) of the project's area of impact. There are no applicable PSD increments for CO and NAAQS compliance need only be demonstrated for the one-hour ambient CO standard; therefore, the normal operation scenario was addressed in PSD increment and NAAQS analyses for SO_2, PM_{10}, and NO_X since they represent the highest concentrations. The startup scenario was addressed only for the CO one-hour NAAQS demonstration. No further modeling was conducted for the flaring scenario since it produces lower concentrations than created under other scenarios.

The farthest distance from the site where the SILs are exceeded determines the SIA. Based on the modeling results, the maximum radius of the SIA for each pollutant is 4.4 kilometers (2.7 miles) for SO_2, 1.6 kilometers (1.0 miles) for PM_{10}, 3.0 kilometers (1.9 miles) for NO_X, and 0.9 kilometers (0.6 miles) for CO. The highest predicted concentrations for any pollutant were found to occur within approximately 1 kilometer (0.6 miles) of the West Range Site. Thus, impacts of Mesaba Generating Station would be limited to a small area in close proximity to the site.

PSD Increment Analysis

Increment analyses were completed for SO_2, PM_{10}, and NO_X. The modeling included all Phase I and Phase II sources at maximum emission rates in normal operation plus all nearby increment consuming (and expanding) emissions sources. The results of the increment analyses are shown in Table 4.3-5, along with a comparison to the allowable Class II PSD increments. The data in Table 4.3-5 demonstrate that the Mesaba Energy Project, in combination with all other nearby and regional PSD sources, would comply with all state and Federal increment limits.

Table 4.3-5. Results of Class II PSD Increment Analysis at West Range Site

Pollutant	Averaging Time	Highest* Concentration ($\mu g/m^3$)	PSD Increment Limits ($\mu g/m^3$)
SO_2	1-hour	122.4	512
	3-hour	73.4	512
	24-hour	21.1	91
	Annual	1.40	20
PM_{10}	24-hour	23.5	30
	Annual	1.72	17
NO_2	Annual	2.62	25

*For short-term periods, the highest second-high concentration from five years of meteorological data is shown. For annual average, the highest concentration for any of the five years is listed.

Class II NAAQS Evaluation

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

Table 4.3-6 summarizes results of the NAAQS model analysis and the $PM_{2.5}$ estimation. For SO_2, PM_{10}, and NO_X the table shows maximum impacts of the Mesaba Energy Project alone, the Mesaba Energy Project plus local sources that were explicitly included in the five-year model runs, and the Mesaba Energy Project plus all regional sources from FAR modeling of the highest impact days. For CO, no inventory of regional emissions is available. Therefore, the data in Table 4.3-6 show CO concentrations from Mesaba Energy Project alone and conservative total concentration estimates obtained by adding an urban background concentration to predicted Mesaba Generating Station impacts. All predicted concentrations are far below allowable levels, and the results demonstrate compliance with all MAAQS and NAAQS. Data for $PM_{2.5}$ were estimated using PM_{10} concentrations as a basis. When using a multiplier of 0.11 for relative $PM_{2.5}$ to PM_{10}, the resulting concentrations of 24-hour and annual $PM_{2.5}$ would not exceed their respective NAAQS standards. Additionally, there are very low impacts of regional sources within the Phase I and II Mesaba Generating Station's SIA.

Table 4.3-6. Results of Class II NAAQS Modeling at the West Range Site

Pollutant	Averaging Time	Highest [1] Mesaba Alone (ug/m^3)	Highest [1] Mesaba & Nearby (ug/m^3)	Highest [1] Mesaba & Regional (ug/m^3)	Background (ug/m^3)	Total (ug/m^3)	NAAQS (ug/m^3)
SO_2	1-hour	122.4	322.2	327.4	10	337.4	1300
	3-hour	73.4	134.4	136.5	10	146.5	915
	24-hour	22.1	30.6	41.4	10	51.4	365
	Annual	1.29	1.99	2.67	2	4.67	60
PM_{10} [2]	24-hour	11.0	13.7	15.8	38	51.8	150
	Annual	1.59	1.95	3.14	16	19.14	50
$PM_{2.5}$ [3]	24-hour	1.21	1.51	1.74	19	20.74	35
	Annual	0.17	0.21	0.35	6	6.35	15
NO_X	Annual	2.60	3.18	5.09	5	10.09	100
CO	1-hour	2,669.8	N/A	N/A	7,000[4]	9,670	40,000

[1] Listed Highest Concentrations are highest second-high for one to 24-hour averaging times except for PM_{10}, which is the highest 6th high from five years. Annual average values are the highest for any year.
[2] Although the EPA revoked the annual PM10 standard in December 2006, the standard is still in the Minnesota regulations.
[3] $PM_{2.5}$ concentrations are estimated based on the 0.11 ratio of $PM_{2.5}$ to PM_{10}.
[4] Background CO concentrations are very conservative estimates from urban monitors in Minneapolis/St. Paul. No background data exist for the Mesaba Generating Station area.
Source: Excelsior, 2006d

Minnesota and PSD Regulations Monitoring Requirements

Minnesota and Federal PSD regulations specify *de minimis* monitoring concentrations. Pre-construction monitoring may be required to accurately characterize existing air quality. Under PSD regulations, preconstruction monitoring may be required if projected emissions from the Mesaba Energy Project exceed the *de minimis* threshold and background concentrations related to existing sources in the vicinity of the proposed Mesaba Generating Station are exceeding the *de minimis* levels. The PSD *de minimis* monitoring concentrations are shown in Table 4.3-7, in addition to the maximum projected Mesaba Energy Project SO_2, PM_{10}, NO_2, and CO concentrations (see also Table 4.3-4). The Pb and O_3 emissions were not modeled because O_3 is not emitted directly from a combustion source and potential Pb emissions from the proposed project are negligible.

Table 4.3-7. PSD Significant Monitoring Concentrations and Maximum Impacts from Mesaba Energy Project (Phase I and Phase II)

Pollutant	Averaging Time	Highest Mesaba Impact (µg/m^3)	*De Minimis* Monitoring Level (µg/m^3)
SO_2	24-hour	31.2	13
PM_{10}	24-hour	27.9	10
NO_2	Annual	2.7	14
CO	8-hour	379	575

Source: Excelsior, 2006d

Table 4.3-7 indicates that the Phase I and Phase II impacts for NO_2 and CO are below the *de minimis* monitoring concentrations and SO_2 and PM_{10}, model-predicted impacts from the Mesaba Energy Project exceed the threshold monitoring concentrations. However, based on background PM_{10} monitoring data available in northeast Minnesota from Virginia, Duluth, and from an IMPROVE monitoring in the northern Class I areas, background PM_{10} concentrations are below *de minimis* levels. Additionally, limited SO_2 data from Ely, MN and Voyageurs National Park also indicate that background SO_2 concentrations are low in northern Minnesota, and are generally below the *de minimis* monitoring levels. An application requesting a waiver of the preconstruction monitoring requirements was submitted to the MPCA with the application for a Part 70/New Source Review Construction Authorization Permit. Section 3.3.3 provides existing local and regional air quality data.

The results of the NAAQS compliance analysis (see Table 4.3-6) indicate that the Mesaba Energy Project, Phase I and II, would not violate any air quality standards and total ambient pollutant concentrations levels would remain well below applicable limits. The combination of existing representative regional monitoring data and low predicted ambient pollutant concentration levels, which do not violate any NAAQS standards, indicate that preconstruction monitoring is not necessary and would not contribute to a significant improvement in impact assessment.

4.3.3.2 Class I Areas-Related Impacts Analysis

An air quality modeling analysis was conducted to estimate impact of the Phase I and Phase II Mesaba Energy Project on air quality in Class I areas. The analysis addressed impacts to the BWCAW, VNP, and RLW. The Class I AQRV analyses addressed PSD Class I increments for SO_2, PM_{10}, and NO_X, as well as S and N deposition (see Section 4.3.1.2). The results are discussed below.

Class I Impacts and Increment Consumption

The CALPUFF model was used to calculate pollutant impacts from the Mesaba Energy Project. The two-phase Mesaba Generating Station was modeled alone and the results compared with Class I PSD increments and SILs (see Table 4.3-8). The data indicate that maximum Mesaba Energy Project impacts are below allowable increments for all pollutants in Class I areas. Impacts are also below the SIL in most cases, indicating that impacts would be insignificant, with no further analysis necessary. However, for short-term SO_2 concentrations, impacts are indicated to exceed the SIL in the BWCAW and VNP. Because of the 3-hour and 24-hour SO_2 projected impacts, it was necessary to conduct a cumulative impact analysis, including other regional SO_2 increment sources as well as reasonably foreseeable sources, to quantify total PSD increment consumption. The cumulative analysis is discussed in Section 5.2.

Table 4.3-8. Class I PSD Increment Modeling Results for West Range Site

Pollutant	Averaging Period	Year Evaluated			Class I Inc ($\mu g/m^3$)	Class I SIL ($\mu g/m^3$)	Max ($\mu g/m^3$)
		1990	1992	1996			
Boundary Waters Canoe Area Wilderness							
SO_2	3-Hour	1.3804	1.4547	1.5505	25	1	1.5505
	24-Hour	0.4554	0.3382	0.3589	5	0.2	0.4554
	Annual	0.0147	0.0127	0.0095	2	0.1	0.0147
NO_X	Annual	0.0174	0.0152	0.0109	2.5	0.1	0.0174
PM_{10}	24-Hour	0.0866	0.0617	0.0586	8	0.3	0.0866
	Annual	0.0041	0.0037	0.0026	4	0.2	0.0041
Voyageurs National Park							
SO_2	3-Hour	1.5911	1.0477	1.4836	25	1	1.5911
	24-Hour	0.2506	0.2943	0.4492	5	0.2	0.4492
	Annual	0.0128	0.011	0.0113	2	0.1	0.0128
NO_X	Annual	0.0151	0.0125	0.0142	2.5	0.1	0.0151
PM_{10}	24-Hour	0.0537	0.05	0.0745	8	0.3	0.0745
	Annual	0.0037	0.0032	0.0031	4	0.2	0.0037
Rainbow Lakes Wilderness							
SO_2	3-Hour	0.7088	0.7567	0.7012	25	1	0.7567
	24-Hour	0.1806	0.1917	0.1711	5	0.2	0.1917
	Annual	0.0075	0.0083	0.0065	2	0.1	0.0083
NO_X	Annual	0.0081	0.0071	0.0068	2.5	0.1	0.0081
PM_{10}	24-Hour	0.0369	0.0462	0.0316	8	0.3	0.0462
	Annual	0.0022	0.0028	0.0019	4	0.2	0.0028

Source: Excelsior, 2006d

Class I Visibility/Regional Haze Analysis

A visibility/regional haze impact analysis was carried out for BWCAW and VNP. The recommended methodology for assessing visibility impacts according to the Federal Land Managers' Air Quality Related Values Work Group (FLAG) guidance involves the use of CALPOST to process the data on concentrations of pollutants from the CALPUFF modeling of 24-hour emissions. In CALPOST, a daily value of light extinction is defined by the concentrations of each pollutant that can affect visibility, taking into account the efficiency of each particulate type in scattering light, and the relative humidity which influences the size of sulfates and nitrates. The FLM has established threshold changes in light extinction (Δb_{ext}) as a percentage of natural background that are believed to represent potential adverse impacts on visibility. These thresholds are 5 percent (a potentially detectable change) and 10 percent (a level that may represent an unacceptable degradation).

Table 4.3-9 presents results of the initial CALPUFF visibility analysis following the FLAG methodology and using "Method 2" of CALPOST for calculation of visibility impacts. The FLAG Method 2 represents a conservative screening approach, which generally over-predicts actual visibility effects that would be observed. In Method 2, relative humidity data from the nearest surface weather station is used to calculate both source and background light extinction.

Table 4.3-9. Class I Area Visibility Results for Mesaba Energy Project – West Range Site (Method 2 Analysis)

Class I Area and Meteorological Data Year	Days with ≥ 5% [1] Visibility Impact	Days with ≥ 10% [2] Visibility Impact	Maximum Δb_{ext} [3] (%)
Boundary Waters Canoe Area Wilderness			
1990	39	10	16.4
1992	36	15	24.1
1996	17	6	15.0
Voyageurs National Park			
1990	16	1	11.8
1992	25	4	19.0
1996	18	4	22.5

(1) 5% represents a potentially detectable change.
(2) 10% represents an unacceptable degradation
(3) Change in light extinction as a percentage of natural background that represent potential adverse impacts on visibility.
Source: Excelsior, 2006d

The data in Table 4.3-9 indicate that calculated visibility impacts greater than five or 10 percent could occur at some point within the BWCAW and VNP on a small number of days each year. Since these data suggest a potential for detectable visibility degradation due to Mesaba Generating Station emissions, additional analyses were carried out to better quantify and evaluate the possibility of visibility impacts.

Under 40 CFR 51.301, an adverse impact on visibility is defined as "visibility impairment, which interferes with the management, protection, preservation, or enjoyment of the visitor's visual experience of the Federal Class I area." This determination must be made on a case-by-case basis taking into account the geographic extent, intensity, duration, frequency and time of visibility impairments, and how these factors correlate with (1) times of visitor use of the Federal Class I area, and (2) the frequency and timing of natural conditions that reduce visibility. This definition indicates that a model-predicted extinction change exceeding a given threshold value does not necessarily imply an adverse impact. Some consideration should be given to local conditions at the time and location of the model result and conservative factors that are inherent to the FLAG Method 2 methodology that may have contributed to the predicted impact.

The CALPOST post-processing software contains several alternative algorithms for calculating the change in light extinction due to the modeled source. Method 6 substitutes monthly average relative humidity values (specific to each Class I area) for the hourly relative humidity data at nearby weather stations. This substitution mitigates, to some extent, the high extinction values calculated when very high humidity values are reported throughout the day at the nearest observation site. It is intended to account for the fact that the observed humidity may be unrepresentative of the Class I area because very high relative humidity are frequently associated with natural impairment by fog, clouds, and precipitation. The Method 6 calculation is recommended by the U.S. EPA for state regional haze, BART analyses. Method 7 is another modification of the standard Method 2 as it attempts to account for natural visibility reduction due to fog or precipitation. In Method 7, the actual measured visibility at the nearest weather station is used as background (instead of natural pristine background) on those hours when fog or precipitation is reported. Method 7 represents another attempt to account for natural visibility reduction in assessing the impact of man-made pollution.

Table 4.3-10 shows the results of Method 6 and Method 7 visibility calculations for the Mesaba Energy Project, with comparison to the Method 2 data. Both alternative analyses indicate lower frequency and magnitude of impacts relative to Method 2. For Method 7, there are only two days of predicted impacts from three years of data exceeding 10 percent change in light extinction at the BWCAW, and none at VNP. In EPA's BART guidance for regional haze, the 98^{th} percentile of light extinction predictions is recommended as a threshold for significant impact. This means that an average of seven days per year or more of impacts exceeding 5 percent indicates a significant impact. Under this criterion, the Method 7 results show no significant visibility impact of Phase I and Phase II at VNP. Based on the PSD permitting process to be completed, there could be additional emissions mitigation requirements. Further mitigation may also be required as a condition of the Record of Decision.

An analysis was carried out to characterize the times and meteorological conditions for those days on which CALPUFF, with Method 2, indicated light extinction changes exceeding five percent in either the BWCAW or VNP. Hourly meteorological data from Hibbing were assumed to represent the BWCAW, and data from International Falls were used for days of impacts at VNP. Days on which fog, precipitation, or low ceiling (less than 3,000 feet) occurred were tabulated, along with relative humidity measurements at 6:00 am and noon. These times typically represent near highest and lowest humidity values for the day. Also listed for each day was the value of f(RH) used in the CALPOST light extinction calculation. f(RH) represents the daily mean value of the relative humidity parameter that accounts for growth of sulfate and nitrate particles; high values of f(RH) indicate high humidity conditions under which light scattering by these particles is dramatically increased. The value of f(RH) varies from 1.0 for humidity less than 37 percent, to 9.8 at the maximum CALPOST humidity of 95 percent.

Results of the meteorological analysis are presented in Table 4.3-11. The main conclusions evident from the table are:

- Predicted impacts occur predominantly during the winter part of the year; 47 to 61 percent of all occurrences are indicated between November and March.
- A very high percentage of occurrences coincide with days of natural visibility degradation due to fog, precipitation, or low clouds. Eighty-two to 100 percent of the days had some occurrence of these weather elements.
- All occurrences of predicted visibility impact were on days of very high relative humidity.

Table 4.3-10. Class I Area Visibility Results for Mesaba Energy Project – West Range Site (CALPUFF Analysis)

	1990	1990	1990	1992	1992	1992	1996	1996	1996
	> 5 % (Days)	> 10 % (Days)	Max (%)	> 5 % (Days)	> 10 % (Days)	Max (%)	> 5 % (Days)	> 10 % (Days)	Max (%)
Speciated PM 12/5/2005	**Method 2**			**Method 2**			**Method 2**		
Boundary Waters Canoe Area	39	10	16.43	36	15	24.11	17	6	14.98
Voyageurs National Park	16	1	11.82	25	4	18.97	18	4	22.47
Speciated PM 12/5/2005	**Method 6**			**Method 6**			**Method 6**		
Boundary Waters Canoe Area	24	1	12.12	19	2	11.54	9	0	8.13
Voyageurs National Park	13	0	8.43	14	1	10.22	8	1	12.49
Speciated PM 12/5/2005	**Method 7***			**Method 7***			**Method 7***		
Boundary Waters Canoe Area	11	1	10.43	7	1	19.22	2	0	7.63
Voyageurs National Park	3	0	7.93	2	0	6.13	3	0	8.13

* Hibbing, MN used as primary weather station for Boundary Waters Wilderness, International Falls, MN used for Voyageurs NP.
Source: Excelsior, 2006d

Table 4.3-11. Characteristics of Days with Predicted Visibility Impacts

Meteorological Characteristic	Boundary Waters Canoe Area Wilderness		Voyageurs National Park	
	Total 92 Days > 5%	Total 31 Days > 10%	Total 59 Days > 5%	Total 9 Days > 10%
Percentage of days November through March	57%	61%	47%	56%
Percentage of days with precipitation	60%	68%	78%	100%
Fog	54%	77%	64%	89%
Ceiling < 3000 ft	68%	81%	69%	78%
Percentage of days with some natural visibility impairment	82%	94%	88%	100%
Average morning (0600) relative humidity	95%	97%	92%	94%
Average mid-day (1200) relative humidity	76%	85%	75%	83%
Mean daily f (RH)	5.34	6.45	4.73	5.91
Equivalent relative humidity	91%	92.50%	90%	92%

Statistics for BWCAW from hourly surface weather data at Hibbing MN; statistics for VNP from hourly surface data at International Falls, MN
Source: Excelsior, 2006d

4.3.4 Impacts on East Range Site and Corridors

The projected maximum annual air emissions for the Mesaba Generating Station, Phase I and Phase II are provided in Section 4.3.3. Air emissions would be the same at the East Range Site as for the West Range Site, except for PM_{10}. Due to the lower water quality used for cooling at the East Range Site (see Table 3.5-8 in Section 3.5), PM_{10} emissions from cooling towers would be greater: cooling tower PM_{10} emissions from the East Range Site being approximately 256 tons per year, compared to 39 tons per year at the West Range Site. In this section, the site-specific impacts of air emissions as modeled at receptors and the Federal Class I areas nearest the East Range Site and corridors are discussed.

4.3.4.1 Dispersion Modeling Impact Analysis

For the PSD and NAAQS modeling analysis, the same Mesaba Generating Station emissions profile as the West Range Station (except as described above for PM_{10}) was used for the East Range Site. Additionally, the same boundary and rectangular grid receptors were applied. Receptor elevations for all areas surrounding the East Range Site were determined from USGS DEM data to accurately represent topography at the site. The analysis used the same models, methodology and specifications as the West Range Site. However, the East Range Site analysis had the primary objective of identifying significant differences relative to the West Range Site. Accordingly, the East Range Site modeling was less comprehensive than that completed for the West Range Site. The analysis considered near-field impacts for Class II areas within 50 kilometers (31 miles) of the site.

Preprocessed meteorological data applicable to the East Range Site were obtained from the MPCA. Differences due to slightly different meteorological data and terrain were not significant from that of the West Range Site. For comparison to West Range Site results, model runs were made for SO_2 and PM_{10} emissions from the East Range Site, and assumed normal (i.e., worst case) operation for Phase I and Phase II. $PM_{2.5}$ concentrations were estimated based on a 0.11 ratio of $PM_{2.5}$ to PM_{10} (USEPA, 2005). Table 4.3-12 shows a comparison of East Range Site results to those for the West Range Site. The highest predicted concentrations for the two sites are comparable. Predicted SO_2 impacts are slightly lower for the East Range Site. PM_{10} concentrations are slightly higher at the East Range Site as a result of higher cooling tower emissions; therefore, $PM_{2.5}$ concentrations would also be slightly higher at the East Range Site. Due to similar predicted impacts at the two sites, additional modeling for other pollutants and operating scenarios at the East Range Site was deemed to be unnecessary. Based upon the similarity between predicted impacts for the East and West Range Sites, it is determined that there would be no significant Class II area PSD or NAAQS issues associated with the East Range Site.

Table 4.3-12. Comparison of Near-Field Model Predictions Impacts East Range Site/West Range Site

Pollutant/ Scenario	Averaging Times	East Range Site		West Range Site		Class II PSD Increment ($\mu g/m^3$)
		Highest ($\mu g/m^3$)	High Second-High ($\mu g/m^3$)	Highest ($\mu g/m^3$)	High Second-High ($\mu g/m^3$)	
SO_2 – Normal Operation	1-hour	126.9	103.1	130.2	122.4	512
	3-hour	64.8	64.7	77.6	73.4	512
	24-hour	27.5	20.3	31.2	21.1	91
PM_{10} – Normal Operation	24-hour	30.5	26.1	27.9	23.5	37
$PM_{2.5}$ – Normal Operation (1)	24-hour	3.36	2.87	3.07	2.59	NA

(1) $PM_{2.5}$ concentrations were estimated based on a multiplier of 0.11 used to scale $PM_{2.5}$ concentrations from PM_{10} data. There are no PSD increments for $PM_{2.5}$
Source: Excelsior, 2006b

4.3.4.2 Class I Areas-Related Impacts Analysis

<u>Class I PSD Increment</u>

A complete CALPUFF model analysis was conducted for the East Range Site, analogous to that performed for the West Range Site, as the site lies in close proximity to the BWCAW. Table 4.3-13 shows PSD increment consumption results for both the East Range Site and West Range Site at the three Class I areas evaluated. Although PM_{10} concentrations at the BWCAW over a 24-hr averaging period exceeded the SIL, they are well below the Class I PSD increments. As at the West Range Site, SO_2 impacts are above the SIL, but are far below allowable increment limits. Table 4.3-13 also shows that the SO_2 increment analysis, which included emissions from existing regional sources, that was carried out for the West Range Site demonstrated no threat to Class I PSD increments. The same regional increment-consuming sources are relevant to the East Range Site. Based upon the small fraction of allowable PM_{10} and SO_2 increment that would be consumed, it can be concluded that there would be no Class I increment violation attributable to the Mesaba Energy Project in the East Range Site. Lastly, Table 4.3-13 shows that the most PSD increment that would be consumed at the East Range Site is the 24-hr SO_2: 45 percent at the BWCAW, 14 percent at the VNP, and 8 percent at the RLW. The most PSD increment that would be consumed at the West Range Site is the 24-hr SO_2: 9 percent at the BWCAW, 9 percent at the VNP, and 4 percent at the RLW. PM_{10} increment consumption in the Class I areas would be 1 percent or less.

Table 4.3-13. Mesaba Energy Project (Phases I and II) PSD Increment Impacts East Range Site/West Range Site

Class I Area and Pollutant		Max. E. Range Conc. (μg/m³)	Max W. Range Conc. (μg/m³)	Class I SIL (μg/m³)	Class I Increment (μg/m³)	PSD Increment Consumed E. Range	PSD Increment Consumed W. Range
Boundary Waters Canoe Area Wilderness							
SO_2	3-hr	6.08	1.55	1	25	24%	6%
	24-hr	2.26	0.46	0.2	5	**45%**	**9%**
	Annual	0.06	0.01	0.1	2	3%	<1%
NO_X	Annual	0.09	0.02	0.1	2.5	4%	<1%
PM_{10}	24-hr	0.36	0.09	0.3	8	5%	1%
	Annual	0.01	0.004	0.2	4	<1%	<1%
Voyageurs National Park							
SO_2	3-hr	2.12	1.59	1	25	8%	6%
	24-hr	0.68	0.45	0.2	5	**14%**	**9%**
	Annual	0.01	0.01	0.1	2	<1%	<1%
NO_X	Annual	0.02	0.01	0.1	2.5	<1%	<1%
PM_{10}	24-hr	0.11	0.07	0.3	8	1%	1%
	Annual	0.004	0.004	0.2	4	<1%	<1%
Rainbow Lakes Wilderness							
SO_2	3-hr	1.19	0.76	1	25	5%	3%
	24-hr	0.39	0.19	0.2	5	**8%**	**4%**
	Annual	0.01	0.01	0.1	2	<1%	<1%
NO_X	Annual	0.01	0.01	0.1	2.5	<1%	<1%
PM_{10}	24-hr	0.08	0.05	0.3	8	1%	1%
	Annual	0.003	0.003	0.2	4	<1%	<1%

Bold text indicates the maximum PSD consumption expected from each of the proposed site at the Class I Areas
Source: Excelsior, 2006b

Class I Visibility

Visibility modeling results for the East Range Site are shown in Table 4.3-14. The results for VNP are comparable to those derived for the West Range Site. Predicted visibility impacts in the BWCAW, however, are substantially higher than the West Range Site results.

Table 4.3-14. Class I Area Visibility Impacts for Mesaba Energy Project – East Range Site CALPUFF Method 2 Model Results for East Range Site

Class I Area and Meteorological Data Year	Days with ≥ 5% (1) Visibility Impact	Days ≥ 10% (2) Visibility Impact	Maximum Δb_{ext} (3) (%)
Boundary Waters Canoe Area Wilderness			
1990	131	68	33.4
1992	137	69	58.3
1996	92	44	34.7
Voyageurs National Park			
1990	26	6	18.5
1992	28	8	18.4
1996	15	4	13.8

(1) 5% represents a potentially detectable change.
(2) 10% represents an unacceptable degradation.
(3) Change in light extinction as a percentage of natural background that represent potential adverse impacts on visibility.
Source: Excelsior, 2006b

According to Table 4.3-14, the models indicate that from the East Range Site, the Mesaba Energy Project would reduce visibility in the BWCAW by more than 10 percent from 40 to approximately 70 days per year. This is substantially higher than at the West Range Site (see Table 4.3-9). However, there are several reasons why the predicted BWCAW impacts are likely over-estimated, including:

- Some portions of the BWCAW are closer than 50 km to the East Range Site. More refined visibility analyses using other methods would be appropriate for such areas.
- As shown for the West Range Site, detailed analysis of the visibility impact days is likely to demonstrate natural visibility impairment on many of those days. Project-related impacts would add to the natural visibility impairment on such days.

Additional visibility analysis was not conducted for the East Range Site to satisfy all potential concerns about visibility impacts. However, recent permit actions in Minnesota together with developing regional haze strategies under Minnesota's Regional Haze/BART regulations indicate that such concerns can be addressed and visibility protection achieved. Additional air emission controls based on permitting requirements could be installed at the Mesaba Generating Station or emission reductions at other nearby sources could be purchased for the Mesaba Energy Project. Further emissions mitigation may also be required as a condition of the Record of Decision. Refer to Section 5.3.2.2 for a discussion of mitigation options considered for visibility impacts. Mesaba contributions to potential visibility impacts, though not insignificant under conservative FLM methodologies, are small relative to existing regional source contributions and existing air quality.

4.3.5 Additional Impact Analysis

Additional evaluation and review were performed to assess the impact of the proposed Mesaba Energy Project. Under the PSD requirements, an additional analysis was performed to evaluate the effects on soils, waters, and vegetation from regulated compounds emitted in significant quantities from a new or modified major stationary source. Also in this section, are discussions on impacts from mercury emissions, greenhouse gas emissions, and odor.

4.3.5.1 General Conformity Rule

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

4.3.5.2 Effects on Economic Growth

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

4.3.5.3 Deposition of Nitrogen and Sulfur

Potential impacts to soils, waters, and vegetation in Class I areas were evaluated on the basis of the model-predicted pollutant concentrations and the magnitude of predicted annual deposition of S and N. Criteria for assessment of deposition impacts are different for USFS areas (BWCAW and RLW) and National Park Service (NPS) areas (i.e., VNP). The NPS has established a Deposition Analysis Threshold (DAT) of 0.01 kilograms per hectare per year for both S and N deposition for Class I areas in the eastern United States. The DAT is a level below which adverse impacts are not anticipated. The USFS criteria for assessing impacts of deposition are provided in Section 4.3.5.4.

The CALPUFF results for each of the Class I areas were processed with CALPOST to calculate total annual deposition of N and S at each receptor as a result of Mesaba Generating Station emissions. Model results for annual impacts (maximum annual average emissions) were used, as described in Appendix B. Total sulfur deposition is calculated from the wet (rain, snow, fog) and dry (particle, gas) deposition of SO_2 and sulfate; total nitrogen is represented by the sum of nitrogen from wet and dry fluxes of nitric acid, nitrate, ammonium sulfate and ammonium nitrate, and the dry flux of NO_X. Results are shown in Table 4.3-15.

Table 4.3-15. Maximum Annual Deposition of S and N from Mesaba Energy Project in Class I Areas (kilogram per hectare per year)

Class I Area/Year	Sulfur	Nitrogen
Boundary Waters Canoe Area Wilderness		
1990	1.217E-2	9.549E-3
1992	9.797E-3	7.085E-3
1996	8.400E-3	6.217E-3

Table 4.3-15. Maximum Annual Deposition of S and N from Mesaba Energy Project in Class I Areas (kilogram per hectare per year)

Class I Area/Year	Sulfur	Nitrogen
Voyageurs National Park		
1990	1.016E-2	7.864E-3
1992	1.110E-2	8.562E-3
1996	9.780E-3	7.835E-3
Rainbow Lakes Wilderness		
1990	5.188E-3	4.225E-3
1992	6.336E-3	4.617E-3
1996	5.936E-3	4.749E-3

Source: Excelsior, 2006d

As shown in Table 4.3-15, the CALPUFF model results for deposition in VNP are very close to the 0.01 DAT for S, and below the DAT for N. In the case of S, two of the three years modeled produced a total S deposition value slightly greater than 0.01, and the third year resulted in a value slightly below 0.01. Because the deposition values in Table 4.3-15 represent the highest deposition for any receptor in the Class I area and that the annual emissions for Mesaba Energy Project used in the model are very conservative (worst-case emissions assuming two phases operating 8,760 hours per year), it can be concluded that it is unlikely that the DAT threshold for S deposition would be exceeded at any point in VNP. The DAT represents a screening level to assess any possibility of adverse impact, and is not a regulatory limit. Based upon these considerations, it has been concluded that S and N deposition from the Mesaba Energy Project would not cause adverse effects in VNP.

For the air dispersion modeling, 50 kilometers of the site is considered near field. The BWCAW is 40 kilometers from the East Range Site and 100 kilometers from the West Range Site. Since S and N deposition are independent of the proposed site, effects to the BWCAW are representative of near-field effects. Although the S and N deposition at BWCAW are slightly greater than 0.01 DAT, it is unlikely that the Mesaba Energy Project would cause an adverse effect from S and N deposition within the near field boundary of the IGCC power plant because the annual emissions used in the model are very conservative. Additionally, based on the deposition assessment criteria that the USFS used, S and N deposition rate from the Mesaba Energy Project are well below threshold at BWCAW (see Section 4.3.5.4).

4.3.5.4 Effects on Soils, Waters, and Vegetation

Potential impacts to soils, waters, and vegetation in Class I areas were evaluated on the basis of the model-predicted criteria pollutant concentrations and the magnitude of predicted annual deposition of S and N. The USFS has set screening criteria for potential air pollution impacts on vegetation for SO_2. According to the USFS "Green Line" screening values "were set at levels at which it was reasonably certain that no significant change would be observed in ecosystems that contain large numbers of sensitive components."

Though the USFS screening levels were established specifically for Class I areas administered by the Forest Service (i.e., BWCAW and RLW) it is reasonable to apply the same criteria to VNP, which is administered by the NPS but does not have a published standard similar to the USFS. Table 4.3-16 compares CALPUFF projections of Mesaba Energy Project impacts and existing background concentrations to the Green Line screening levels for each Class I area. The summation of Mesaba

Energy Project and background contributions is well below the Green Line levels. It can therefore be concluded that there would be no threat to sensitive vegetation from SO_2 emissions produced by the Mesaba Energy Project.

Mesaba Energy Project contributions, in addition to background concentrations, are all well below the Green Line levels. It can therefore be concluded that there would be no threat to sensitive vegetation from SO_2 emissions produced by the Mesaba Energy Project. There are no established screening criteria for NO_2 and PM_{10}. However, as shown in Section 4.3.3.2, Class I area concentrations of NO_X and PM_{10} from the Mesaba Energy Project would be below significance levels and therefore can be expected to have negligible impacts.

Table 4.3-16. Comparison of Projected Class I SO_2 Concentrations to Green Line Screening Criteria for Vegetation Impacts

Class I Area	Background (1) (µg/m³)		Max. Mesaba (µg/m³)		Total (µg/m³)		Green Line (µg/m³)	
	3-hr	Annual	3-hr	Annual	3-hr	Annual	3-hr	Annual
Boundary Waters Canoe Area Wilderness	10.8	1.2	1.55	0.015	12.35	1.215	100	5
Voyageurs National Park	6.3	0.7	1.59	0.013	7.89	0.713	100	5
Rainbow Lake Wilderness	14.4	1.6	0.76	0.008	15.16	1.608	100	5

(1) Background SO_2 concentrations from Mesaba Nugget Class I Air Modeling Report, Barr Engineering Company, May 2005.

For the USFS Class I areas, different screening criteria are recommended for assessment of S and N deposition impacts to terrestrial and aquatic ecosystems. Table 4.3-17 summarizes projected deposition rates in the BWCAW and RLW, calculated as background plus Mesaba Energy Project predicted deposition, and provides a comparison to the USFS Green Line values. It is shown that all deposition rates are within or below the acceptable Green Line levels. It can also be noted that all S deposition rates are below the State of Minnesota's limit for wet sulfate deposition of 11 kilograms per hectare per year (approximately 6 kilograms per hectare per year of total S deposition). It is therefore concluded that Mesaba Energy Project would not cause adverse impacts to terrestrial and aquatic ecosystems in the BWCAW or RLW.

Table 4.3-17. Comparison of Projected S and N Deposition Rates to Green Line Criteria for Impacts to Terrestrial and Aquatic Ecosystems

Class I Area	Parameter	Background (1) (kg/ha-yr)	Maximum Mesaba Impact (kg/ha-yr)	Total (kg/ha-yr)	Green Line (2) Value (kg/ha-yr)
BWCAW	**Terrestrial**				
	Total S Deposit	2.85	0.012	2.86	5-7
	Total N Deposit	4.75	0.01	4.76	5-8
	Aquatic[3]				
	Total S Deposit	2.85	0.012	2.86	7.5-8
	S + 20% N	3.8	0.014	3.81	9-10

Table 4.3-17. Comparison of Projected S and N Deposition Rates to Green Line Criteria for Impacts to Terrestrial and Aquatic Ecosystems

Class I Area	Parameter	Background (1) (kg/ha-yr)	Maximum Mesaba Impact (kg/ha-yr)	Total (kg/ha-yr)	Green Line (2) Value (kg/ha-yr)
RLW	**Terrestrial**				
	Total S Deposit	2.98	0.006	2.99	5-7
	Total N Deposit	5.88	0.005	5.89	5-8
	Aquatic[3]				
	Total S Deposit	2.98	0.006	2.99	3.5-4.5
	S + 20% N	4.16	0.007	4.17	4.5-5.5

(1) Background values from Mesabi Nugget Class I Air Modeling Report, Barr Engineering Company, May 2005.
(2) Green Line Values from Screening Procedure to Evaluate Effects of Air Pollution on Eastern Region Wildernesses Cited as Class I Air Quality Areas, USFS, 1991.
(3) For aquatic impacts, the Green Line values differ for the two Class I areas because of the different chemistry of sensitive lakes in the two areas.
Source: Excelsior, 2006d

4.3.5.5 Acid Rain

Acid rain or acid deposition can occur from the release of acid precursors such as SO_2 and NO_X into the atmosphere, which then react with oxygen and water in the atmosphere to form acids that can be deposited during precipitation events (Cooper, 1994). Acid rain can cause soil degradation, increased acidity of surface water bodies, and slower growth, injury, or death of forests and aquatic habitats. The Acid Rain Program, established under Title IV of the CAA, requires utility generating units greater than 25 MW to obtain a Phase II Acid Rain Permit and meet the objectives of the program (see Section 3.3.4). The proposed Mesaba Energy Project would be required to obtain and comply with a Phase II Acid Rain Permit and would be operated in a manner that is consistent with EPA's overall efforts to reduce emissions of acid precursors. Continuous emissions monitoring for SO_2, NO_X, and carbon dioxide (CO_2) emissions, as well as volumetric gas flow and opacity is a part of the acid rain regulations and includes requirements for monitoring, recordkeeping, and reporting. Since the proposed Mesaba Energy Project would operate within its prescribed allowance, no appreciable impacts related to acid rain would be expected to occur as a result of facility operations.

4.3.5.6 Greenhouse Gases

Greenhouse gases include water vapor, CO_2, methane, NO_X, O_3, and several chlorofluorocarbons. Next to water vapor, CO_2 is the second-most abundant greenhouse gas and would be the primary greenhouse gas that would likely be emitted from the Mesaba Generating Station. CO_2 emissions from the Mesaba Generating Station are a function of the feedstock consumed and the power plant's net heat rate (a measure of the overall efficiency under which the energy in the feedstock is converted to electricity). Fossil fuel burning is the primary contributor to increasing CO_2 concentrations (IPCC, 2001). Global CO_2 emissions resulting from fossil fuel combustion were estimated at 26,000 million tons for the year 2000 (IPCC, 2001). A more recent study estimated global emissions of CO_2 from fossil fuel combustion to be 28,000 million tons in the year 2003 (Marland et al., 2006). Because CO_2 is relatively stable in the atmosphere and essentially uniformly mixed throughout the troposphere and stratosphere, the climatic impact of CO_2 emissions does not depend upon the air source location on the earth. Instead, an increase in CO_2 emissions from a specific source is effective in contributing to global increases in CO_2 concentrations (DOE, 2007).

Based on samples of air trapped in arctic ice, scientists have determined that, prior to the industrial revolution (which began in England in the mid 1800s), the concentration of carbon dioxide in the atmosphere had been stable at a level of around 288 parts per million (ppm). After the industrial revolution (when people began to burn fossil fuels), the concentration of carbon dioxide in the atmosphere began to increase and is now at 370 ppm. This strong correlation indicates that increased concentrations of greenhouse gases in the atmosphere have likely increased the amount of heat from the sun that stays within the Earth's ecosystem, thus contributing to increased global temperatures.

Differences of opinion arise in (1) the extent to which any climate changes are caused by greenhouse gas emissions from human activity, and (2) how much and when the changes in the climate will disrupt agriculture, forestry, and other human activities as well as natural ecosystems beyond a level that can be easily adapted to. The Intergovernmental Panel on Climate Change (IPCC) is the leading scientific body studying the effects of increased greenhouse gases in the atmosphere. The IPCC's most recent report (2001) projects that, under a business-as-usual scenario, globally averaged surface temperature will increase by 2.5 to 10.4°F between 1990 and 2100. A 2.5°F increase in temperature would be a relatively mild outcome, but a 10.4°F increase in temperature would be severe. For comparison, during the last ice age the average temperature was roughly 6°F lower than it is today.

It is estimated that the Mesaba Generating Station would emit approximately 9.4 to 10.6 million tons per year of CO_2 (Excelsior, 2006e and 2006g). Without mitigation, this amount would add to the approximately 2.3 billion metric tons per year of energy-related CO_2 emissions for the electric power sector (as estimated by the Energy Information Administration in 2004 [EIA, 2005]). The CO_2 emission rates do not account for any CO_2 removal that would occur as a result of the equipment additions. The Mesaba Generating Station would be designed to be carbon capture adaptable (Excelsior, 2006f). Excelsior Energy has developed a plan for carbon capture and sequestration with regards to the Mesaba Energy Project (Excelsior, 2006f). The plan identifies opportunities for CO_2 emissions capture and sequestration from IGCC power plants. Additionally, the plan was prepared to provide options for the State of Minnesota to meet its obligations under future CO_2 regulations that may potentially affect coal-fired power plants. Further discussion of the carbon capture and sequestration plan is provided in Appendix A. The potential impacts of implementing the plan during commercial operation of the Mesaba Generating Station are addressed in Section 5.1.2.1.

4.3.5.7 Clean Air Mercury Rule

As discussed in Section 3.3.4, the CAMR establishes "standards of performance" limiting mercury emissions from new coal-fired power plants of more than 25 megawatts electric (MWe) that serves a generator that produces electricity for sale. The Mesaba Generating Station would be subject to the CAMR because it is a unit that would cogenerate steam and electricity and would supply more than one-third of its potential electric output capacity for sale. The maximum potential emissions of mercury from the Mesaba Generating Station (both Phase I and Phase II) would be 0.026 tons per year, which is below the major source threshold for HAPs of 10 tpy. The maximum potential emissions are based on the worst-case scenarios, which reflect the highest heat input rates and a cautious approach regarding the design optimizations that are expected (Excelsior, 2006b). However, for the Mesaba Energy Project, the IGCC Power Plant would include a mercury removal system, which would remove mercury from the syngas.

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

4.3.5.8 Deposition of Mercury

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

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

4.3.5.9 Odor

The State of Minnesota does not have regulations to control odor; however, public protection of nuisance odor emissions is offered through the state's public nuisance statute, Chapter 608.73 (SRF, 2004). The CAA regulates emissions of odorous compounds such as VOC and HAPs based on thresholds for human health impacts not odor. The potential for odors from coal-fired power plants is primarily related to the H_2S and ammonia (NH_3) being produce from the feedstock. In the proposed gasification process, most of the S and N in the feedstock would convert to H_2S and NH_3, respectively. In the syngas cooling step of the process, most of the NH_3 and a small portion of CO_2 and H_2S present in the syngas are absorbed in the water that is condensed. The water is collected and sent to the sour water treatment unit. The cooled sour syngas is fed to the Acid Gas Removal (AGR) system where H_2S is absorb in a solution and sent to the sulfur removal unit (SRU) where it is converted to elemental sulfur. The condensed water sent to the sour water treatment unit contains small amounts of dissolved gases (CO_2, NH_3, H_2S, and other trace contaminants). The gases are stripped from the sour water in a two-step process. First, the CO_2 and H_2S are removed in the CO_2-stripper column by steam stripping and directed to the SRU. The rest is treated in an NH_3-stripper column to remove the NH_3 and remaining trace components. The stripped NH_3

is combined with the recycled slurry water. The water that is stripped of the dissolved gases is reused within the plant to minimize water consumption and discharge. Since the SRU and the sour water treatment unit are completely enclosed, there would be no discharges to the atmosphere.

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

4.3.6 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. Since this alternative would probably not involve introducing new emission sources, the No Action Alternative is projected to have no impact on the air quality either regionally or locally. Therefore, air quality would be substantially similar to existing conditions.

.

4.3.7 Summary of Impacts

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

Basis for Impact	No Action	West Range	East Range
Result in emissions of criteria pollutants and HAPs and conflict with the NSR and PSD regulations	Would not result in emissions of criteria pollutants and HAPs or conflict with NSR and PSD regulations	Annual emissions of criteria pollutants from the Mesaba Generating Station would include 1,390 tons of SO_2, 2,872 tons of NO_X, 2,539 tons of CO, 0.03 tons of Pb, 493 tons of PM_{10}, and 197 tons of VOC. The facility would be a major source of air emissions under the PSD regulation because SO_2, NO_X, CO, PM_{10}, and VOC emissions would be greater than 100 tons per year. However, process modification and improved work practices would be implemented to limit potential annual emission rates. Based on the result of Class II PSD increment analysis (see Section 4.3.3.1 and Table 4.3-5), the Mesaba Energy Project would comply with all state and Federal increment limits.	Annual emissions of criteria pollutants from the Mesaba Generating Station would include 1,390 tons of SO_2, 2,872 tons of NO_X, 2,539 tons of CO, 0.03 tons of Pb, 709 tons of PM_{10}, and 197 tons of VOC. The facility would be a major source of air emissions under the PSD regulation because SO_2, NO_X, CO, PM_{10}, and VOC emissions would be greater than 100 tons per year. However, process modification and improved work practices would be implemented to limit potential annual emission rates. Based on the result of Class II PSD increment analysis (see Section 4.3.4.1 and Table 4.3-12), the Mesaba Energy Project would comply with all state and Federal increment limits. PM_{10} concentrations would be higher in the East Range Site as a result of higher cooling tower emissions. This result would be mitigated as discussed in Section 4.3.8.
Result in changes in air quality related to the NAAQS and MAAQS and conflict with local or regional air quality management plans	Would not result in changes in air quality related to the NAAQS and MAAQS and not conflict with local or regional air quality management plans	Based on the result of dispersion modeling analysis (see Section 4.3.3.1 and Table 4.3-6), all predicted concentrations of each the pollutants were below allowable levels and would demonstrate compliance with all NAAQS and MAAQS. Therefore the Mesaba Energy Project would neither result in significant changes air quality that would affect the attainment status of the area nor would it conflict with the local or regional air quality management plans.	Based on the similarities between predicted impacts for the East and West Range Sites, it is determined that there is no significant air quality issues associated with the East Range Site. The Mesaba Energy Project at the East Range Site would neither affect the attainment status of the area nor conflict with the local or regional air quality management plans.

Basis for Impact	No Action	West Range	East Range
Result in consumption of PSD increments, affect visibility, and cause regional haze in Class I areas	Would not result in consumption of PSD increments, affect visibility, or cause regional haze in Class I areas	Based on the result of Class I areas-related impacts analysis (see Section 4.3.3.2 and Table 4.3-8), impacts from the Mesaba Energy Project would be below allowable increments of all pollutants in Class I areas and there would be no violation attributable to the Mesaba Energy Project in the West Range Site. The result of visibility/regional haze analysis in Class I areas (see Table 4.3-9), indicate that there would be days with greater than 5 percent visibility or greater than 10 percent visibility at some point each year within the BWCAW and VNP. However based on additional analysis that factored in natural conditions (see Tables 4.3-10 and 4.3-11), it was determined that predicted impacts would occur during days of very high relative humidity, during the winter, and would coincide with days of natural visibility degradation due to fog, precipitation, or low clouds. Project-related impacts occurring at during periods of natural visibility degradation would have an added effect.	Based on the result of Class I areas-related impacts analysis (see Section 4.3.4.2 and Table 4.3-13), impacts from the Mesaba Energy Project would be below allowable increments of all pollutants in Class I areas and there would be no violation attributable to the Mesaba Energy Project in the East Range Site. The result of visibility/regional haze analysis in Class I areas (see Table 4.3-14), indicate that visibility impacts for VNP are comparable to those in the West Range Site. However, visibility impacts in the BWCAW are substantially higher than the West Range Site (see Table 4.3-9).
Result in N and S deposition in Class I areas	Would not result in N and S deposition in Class I areas	The DAT is a screen level established by the NPS to assess any possibility of adverse impact from deposition of N and S. Based on the result of the screening (see Section 4.3.5.3), which used conservative annual emissions from the Mesaba Energy Project, it is unlikely that the DAT threshold for N and S deposition would be exceeded at any point in the Class I areas.	The evaluation of N and S deposition are independent of the site and therefore would have the same impact in the East Range Site.
Exceed allowable emissions of SO_2 and NO_X under the state and Federal acid rain regulations	Would not exceed allowable emissions of SO_2 and NO_X under the state and Federal acid rain regulations	As a utility plant generating more than 25 MW of electricity, the Mesaba Energy Project would be required to obtain a Phase II Acid Rain Permit. Since the Mesaba Generating Station would be operated within its prescribed allowance, no appreciable impacts related to acid rain would be expected to occur.	The Acid Rain requirements are independent of the potential sites; therefore the impacts in the East Range Site would be similar to those in the West Range Site.

Basis for Impact	No Action	West Range	East Range
Exceed allowable emissions of mercury under the Federal CAMR	Would not exceed allowable emissions of mercury under the Federal CAMR	As a coal-fired power plant generating more than 25 MW of electricity for sale, the Mesaba Energy Project would be subject to the CAMR. The Mesaba Generating Station would potentially emit 0.026 tpy of mercury, which is below the HAP threshold. Additionally, the proposed power plant includes a mercury removal system to further reduce mercury emissions. Therefore, the Mesaba Energy Project would be able meet the requirements of the CAMR.	The CAMR requirements are independent of the potential sites; therefore, the impacts in the East Range Site would be similar to those in the West Range Site.
Discharge objectionable odors into the air	Would not discharge objectionable odors into the air	The potential for odors from the Mesaba Generating Station is primarily related to H_2S and NH_3 in the feedstock. Other odors would be emitted from activities such as equipment maintenance, coal pile handling, S storage and handling but would be localized. H_2S and NH_3 odor from processes involved in the IGCC power plant operations would be negligible because the processes are completely enclosed, eliminating discharges into the atmosphere.	Potential odor discharge is independent of potential site; therefore the impacts in the East Range Site would be similar to those in the West Range Site.
Result in fugitive dust emissions during construction and operation	Would not result in fugitive dust emissions during construction and operation	Fugitive dust emissions would be increased during construction and operations from vehicle traffic, transportation of materials, and material handling. The impact would be localized and would decrease with distance from the site (see Sections 4.3.2.1 and 4.3.2.2).	Emissions from construction and operations are independent of the potential site; therefore, the impacts in the East Range Site would be similar to those in the West Range Site.

Basis for Impact	No Action	West Range	East Range
Causes solar loss, fogging, icing, or salt deposition that interferes with quality of life for nearby residents	Does not cause solar loss, fogging, icing, or salt deposition that interferes with quality of life for nearby residents	Since the steam plumes from the cooling tower consist almost entirely of condensed water, they have no adverse effects other than their visual impact. The drift rate of the cooling towers serving Mesaba Generating Station would be very low (0.001 percent of the circulating water) and the solids content is also modest (2,740 ppm by weight). Therefore, deposition of these particles on surrounding ground surfaces would be negligible. Given data and experience at other cooling tower installations, it is concluded that there would be no significant fogging, icing, or drift deposition impacts of the Mesaba Generating Station cooling towers on off-site human activities or the environment. The only predicted impacts are the visual impact of steam plumes in cold, moist weather conditions, and occasional very light localized fallout of snow crystals during times of very low temperature.	Because the steam plumes from the cooling tower consist almost entirely of condensed water, they have no adverse effects other than their visual impact. The drift rate of the cooling towers serving Mesaba Generating Station would be very low (0.001 percent of the circulating water) and the solids content is also modest (2,740 ppm by weight). Therefore, deposition of these particles on surrounding ground surfaces would be negligible. Given data and experience at other cooling tower installations, it is concluded that there would be no significant fogging, icing, or drift deposition impacts of the Mesaba Generating Station cooling towers on off-site human activities or the environment. The only predicted impacts are the visual impact of steam plumes in cold, moist weather conditions, and occasional very light localized fallout of snow crystals during times of very low temperature.
Result in emissions of greenhouse gases	Would not result in emissions of greenhouse gases	Would result in emissions of greenhouse gases, the most abundant of which would be CO_2. It is estimated that without mitigation, the Mesaba Generating Station would emit approximately 9.4 to 10.6 million tpy of CO_2; thereby adding to the approximately 2.3 billion metric tpy of CO_2 from electric power sources. Excelsior has developed a plan to identify opportunities for CO_2 emissions capture and sequestration and the Mesaba Energy Project is design to be carbon capture-ready. These management options would serve to reduce (i.e., offset) CO_2 emissions that would be produced by the Mesaba Energy Project.	CO_2 emissions from the Mesaba Energy Project are independent of the potential sites; therefore, impacts to the East Range Site would be similar to those in the West Range Site.

4.3.8 Air Permitting and Mitigation Issues

All compounds regulated under the CAA that are emitted in significant amounts would be subject to best available control technology (BACT) analysis. Based on the potential annual emission rates, a BACT analysis was conducted for the criteria pollutants, except lead. The BACT analysis is independent of the location of the plant, so the results of the analysis are applicable to both the West and East Range Sites. The BACT analysis was conducted as part of the Mesaba Energy Project, PSD permit application. Because of the inherently high-efficiency and low-polluting IGCC technology, the BACT analysis for the Mesaba Generating Station emphasizes process modification and improved work practices based on BACT analysis conducted at existing permitted IGCC facilities (Excelsior, 2006d). The following process modification and improved work practices would be implemented:

- NO_X – Using diluent injection in the CTGs; using clean syngas or natural gas in the TVBs; incorporating good flare design; flaring only treated syngas; implementing good combustion practices (GCP) (such as a combination of temperature profile, residence time, turbulence, and excess air levels) in the TVBs; limiting the hours of operation of the fire pumps and emergency generators; and using low-sulfur diesel in the fire pumps and emergency generators.
- CO and VOC – Implementing GCP in the CTGs and TVBs; using clean syngas or natural gas in the TVBs; incorporating good flare design; flaring only treated syngas; limiting the hours of operation of the fire pumps and emergency generators; and using low-sulfur diesel in the fire pumps and emergency generators.
- SO_2 – Using clean syngas in the CTGs; using clean syngas or natural gas in the TVBs; implementing GCP in the TVBs; incorporating good flare design; flaring only treated syngas; limiting the hours of operation of the fire pumps and emergency generators; and using low-sulfur diesel in the fire pumps and emergency generators.
- H_2SO_4 – Using clean syngas in the CTGs.
- PM – Implementing GCP in the CTGs and TVBs; incorporating high efficiency drift eliminators in the cooling towers; using clean syngas or natural gas in the TVBs; incorporating good flare design; flaring only treated syngas; limiting the hours of operation of the fire pumps and emergency generators; and using low-sulfur diesel in the fire pumps and emergency generators.

4.4 GEOLOGY AND SOILS

4.4.1 Approach to Impacts Analysis

4.4.1.1 Regions of Influence

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

4.4.1.2 Method of Analysis

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

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

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

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

Minnesota Rule 4400.3450, subpart 4. ("Prime Farmland Exclusion") provides that "No large electric power generating plant site may be permitted where the developed portion of the plant site, excluding water storage reservoirs and cooling ponds, includes more than 0.5 acres of prime farmland per megawatt of net generating capacity, or where makeup water storage reservoirs or cooling pond facilities include more than 0.5 acres of prime farmland per megawatt of net generating capacity, unless there is no feasible and prudent alternative." The provision does not apply to areas located within home rule charter or statutory cities, areas located within two miles of home rule charter or statutory cities of the first, second, and third class, or areas designated for orderly annexation under Minnesota Statutes § 414.0325 (Excelsior, 2006a).

4.4.2 Common Impacts of the Proposed Action

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

4.4.2.1 Impacts of Construction

Direct impacts to the physical setting would occur during construction, which would last three years for Phase I, and an additional two to three years for Phase II. Both the West and East Range Sites would require clear cutting, grading, and basic earthmoving activities during the construction phase. In addition, the network of water (process water, potable water, and sanitary sewers) and natural gas pipelines would primarily require clearing vegetation and trenching. These activities could increase the potential for soil erosion as well as topsoil loss. Implementation of erosion best management practices, such as stockpiling and covering topsoil, installing wind and silt fences, and reseeding the disturbed areas would minimize the long-term impacts from construction.

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

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

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

Peat is also highly compressible and does not support heavy construction equipment; therefore, equipment movement over unstablized organic materials could generate unstable and unsafe conditions. This would be mitigated by use of stabilizing equipment such as crane mats and/or low ground pressure equipment. Construction during the winter months could also reduce the difficulty of construction within areas of peat, and it would minimize erosion impacts to the soft, compressible, wet soils found in the wetlands.

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

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

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

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

4.4.2.2 Impacts of Operation

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

Ground surface disturbances related to repair activities to the pipelines, HVTL, roads, and rail alignments could occur during the operation phase of the power station. However, these disturbances would be temporary, would occur within the areas previously disturbed during construction, and would not result in any additional impacts from those previously discussed for construction activities. Repairs may require clearing vegetation and some soil exposure in order to make the necessary repairs; however, with appropriate grading and re-vegetation practices, potential erosion impacts would be mitigated.

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

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

4.4.3 Impacts on West Range Site and Corridors

4.4.3.1 Impacts of Construction

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

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

Structure	Area of Disturbance (acres)	Total Prime Farmland Soils and Farmland of Statewide Importance (acres)	Earthwork Cut (cubic yards)	Earthwork Fill (cubic yards)
IGCC Power Plant Footprint & Buffer Land	1,275	137	2,975,000	1,750,000

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

Construction of the Mesaba Generating Station would disturb a maximum of 137 acres of “Prime Farmland,” “Prime Farmland if drained” and “Farmland of Statewide Importance” (Table 4.4-1). Soils within the proposed power plant footprint and in the most disturbed areas would be permanently altered. These soils are currently located in a forested area with no current farming production. NRCS would need to complete Form AD-1006, the Farmland Conversion Impact Rating, to calculate the potential impacts to farmland soils. The entire IGCC power plant would be located within the Taconite and Marble city limits, and thus, exempted from Minnesota Regulation 4400.3450, described in section 4.4.1.2.

The only facilities associated with the West Range Site that lie outside the city limits of Taconite and Marble are the LMP pumping station, Segment 1 of the Process Water Supply Pipeline, and the outfall at its point of termination of the Segment 1 pipeline (Excelsior, 2006a).

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

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

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

Structure	Area of Disturbance (acres)	Temporary ROW (width in feet)	Total Prime Farmland Soils and Farmland of Statewide importance (acres)		Tower Foundation Excavation requirements
			Temporary ROW area	Permanent disturbed area	
HVTL Alternative WRA-1	134	150	95	0.029	15-55 feet deep 7 to 12 feet diameter
HVTL Alternative WRA-1A	151	150	77	0.025	15-55 feet deep 7 to 12 feet diameter
HVTL Phase II Alternative Route WRB-2A	—[a]	—[a]	262	0.049	15-55 feet deep 7 to 12 feet diameter

[a] Data not available

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

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

All of the HVTL alternative corridors would cross “Prime Farmland” soils and “Farmland of Statewide Importance.” The soils would be permanently altered where the transmission tower foundations would be constructed. HVTL Alternative WRA-1 would permanently disturb 0.029 acres, Alternative WRA-1A would disturb 0.025 acres, and the Phase II Alternative would disturb 0.049 acres. Some farmland soils within the HVTL ROW may be temporarily disturbed from construction traffic, but would be restored with vegetation (Table 4.4-2).

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

Several pipeline corridors would be constructed as part the West Range IGCC power plant. Table 4.4-3 summarizes the key information used to describe the impacts from the construction of these pipelines. Some pipeline corridors would be constructed within previously undisturbed areas. Portions of the Process Water Segment 3 and the pipeline for Cooling Tower Blowdown Outfall 1 would require extensive clearing and grubbing activities for the new corridors. Some corridors (Process Water Segment 2, Blowdown Outfall 2, Sewer and Water Pipelines) would follow the new access roads used to connect the Mesaba Generating Station to CR 7 and US 169, which would require additional clearing. Other corridors (e.g., Process Water Segment 1 pipeline) would cross areas already disturbed from past mining activities.

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

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

Structure	Area of Disturbance (acres)	Temporary ROW (width in feet)	Total Prime Farmland Soils and Farmland of Statewide Importance (acres)		Excavation Requirements
			Temporary ROW Area	Permanent Disturbed Area	
Natural Gas Alternative 1	160	100	116	81	16-24” diameter pipe; Trench: 72” deep
Natural Gas Alternative 2	171	100	112	86	16-24” diameter pipe; Trench: 72” deep
Natural Gas Alternative 3	142	100	95	66	16-24” diameter pipe; Trench: 72” deep
Process Water Segment 1	40	150	4.0	3.0	Trench: 7-8 feet deep
Process Water Segment 2	37	150	28	19	Trench: 7-8 feet deep
Process Water Segment 3	88	150	52	35	Trench: 7-8 feet deep
Blowdown Outfall 1	39	150	25	17	Trench: 10 to 50 feet deep
Blowdown Outfall 2	44	150	33	23	Trench: 7-8 feet deep
Sewer and Water Line	34	100	20	8	**Sewer**: 12” diameter, trench graded but no deeper than 8 ft **Water**: 12” diameter trench 60” below surface

Potential construction impacts from unstable ground surface would be similar to those previously described for the HVTL corridors. In areas with large quantities of wet organic soils, construction may need to occur during the winter months. Construction of temporary haul roads may also be necessary along Process Water Segment 3 pipeline in the wetland areas to provide stable access for personnel and material delivery. These roads would be completely removed and re-vegetated after construction is complete.

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

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

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

The rail alignment alternatives and access roads would connect the Mesaba Generating Station area to existing highways and main rail corridors. These corridors would be built at the beginning of the construction phase to facilitate personnel, equipment, and materials transport. Table 4.4-4 presents the key information used to describe the potential impacts from construction activities.

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

Both alignments would require cuts and fills to attain an acceptable grade. Cuts would primarily be through till and coarse alluvium, and in some cases bedrock. The Alternative 1A route would require filling the low areas located between Big Diamond and Dunning Lake, and cutting through uneven terrain. Construction of the Alternative 1B track would require cutting through a large mine tailings pile east of Big Diamond Lake and Dunning Lake, filling in a portion of a large wetland area on the northeast corner of Dunning Lake, and significant contouring enroute to the rail loop. The rail loops of Alternatives 1A and 1B would both be located on up to 50 feet of fill material. Some of this fill would bury existing organic soils. Some of the cut material (sorted till, granite bedrock) would be used for the fill. Peat and muck would only be used as fill in constructed wetlands.

In the area between Big Diamond Lake and Dunning Lake and up to the power station, Alternative 1A construction would require cuts of 30 to 78 feet below grade. Alternative 1B construction would require cuts up to 125 feet below grade in the mine tailings pile east of the buffer land. In these locations, the bedrock is shallow enough to require blasting or tunneling. Embankments as high as 36 feet for Alternative 1A and 25 feet for Alternative 1B would be required to cross low areas. If a surplus of fill material occurs, it would be graded around the Mesaba Generating Station, covered in topsoil and re-vegetated.

Table 4.4-4. Key Information Regarding the West Range Rail Alignment Alternatives and Access Roads

Structure	Area of Disturbance (acres)	Maximum Temporary ROW (width in feet)	Total Prime Farmland Soils and Farmland of Statewide Importance (acres)		Earthwork Cut (cubic yards)	Earthwork Fill (cubic yards)
			Max temporary ROW	Permanent		
Rail Alignment 1A	139	Variable (80-450)	76	38	3,000,000	2,000,000
1A Center Loop	—[a]	—[a]	76	67	—[b]	—[b]
Rail Alignment 1B	179	Variable (80-450)	93	40	8,500,000	2,000,000
1B Center Loop	—[a]	—[a]	99	84	—[b]	—[b]
Access Roads 1+2 Total	122	200	91	55	—[a]	—[a]

[a] Data not available
[b] Data are included with the rail alignment

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

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

Two permanent access roads would be built to connect CR 7 and US 169 to the Mesaba Generating Station. This would require clearing vegetation and temporarily disturbing some soils within the construction corridor. After construction, vegetation would be re-established in areas of temporary impact. Excavations as much as 53 feet deep and embankments as high as 56 feet would be needed to achieve the required grades for West Range Access Road 1 and Access Road 2 alignment. Access Road 2 would leave the realigned CR 7 at about elevation 1,425 feet above mean sea level (amsl) and descend to the plant site at an elevation of 1,400 feet amsl. Therefore, the majority of the road would be in a cut section.

In areas with wet soil, additional dewatering processes and sediment compaction would be necessary to create a stable foundation for the roadbed. The roadway alignments would also cross organic (peat) soils outside of the plant site. To prevent the potential for subsidence, the peat deposits may either be removed or improved by dewatering processes with reinforced embankments. Additional construction procedures would be required to prevent construction impacts from subsidence on soft soils. Crane mats and/or low ground pressure equipment would be used in these areas. Construction during the winter months may also alleviate impacts due to construction.

4.4.3.2 Impacts of Operation

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

4.4.4 Impacts on East Range Site and Corridors

4.4.4.1 Impacts of Construction

Potential impacts to the physical setting at the East Range Site from construction would be similar to those described for the West Range Site. Phase I and II construction would occur within the buffer lands, encompassing 807 acres (Table 4.4-5). Part of the forest within the buffer lands has historically been harvested for timber. Prior to construction, the existing vegetation would be cleared and grubbed. The land would be graded and fill would be added, if needed. Topsoil removed during construction would be stockpiled for use during the restoration phase. These construction activities would disturb the soil and increase the potential for soil erosion, especially on the till deposits, which erode easily when disturbed. Careful grading and proper reseeding of the area surrounding the footprint would mitigate these potential impacts.

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

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

The proposed East Range IGCC Power Station Footprint and Buffer Land, as well as many of the Station's associated facilities are located entirely within the city limits of Hoyt Lakes, a statutory city. The Process Water Supply Pipeline Segment 7 is located within the City of Aurora, also a statutory city. The only associated facilities of the East Range Site that lie outside the city limits of Hoyt Lakes or Aurora are Segment 6 and Segment 8 of the Process Water Supply Pipeline. Therefore, the prime farmland exclusion does not apply to either the East Range IGCC Power Station Footprint, Buffer Land, any of the associated facilities or additional lands except for the two identified Process Water Supply Pipeline Segments. No active farming is currently being conducted at the East Range Site.

Table 4.4-5. Key Information Regarding Construction on the East Range IGCC Power Plant

Structure	Area of Disturbance (acres)	Total Prime Farmland Soils and Farmland of Statewide importance (acres)	Earthwork Cut (cubic yards)	Earthwork Fill (cubic yards)
IGCC Power Plant Footprint & Buffer Land	807	0[a]	--[b]	--[b]

[a] Preliminary soil survey results indicate no Prime Farmland Soils or Farmland of Statewide Importance are located in the buffer land area. This number may change when the soil survey is officially released.
[b] Data not provided
Source: Excelsior, 2006b

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

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

Table 4.4-6. Key Information Regarding the East Range HVTL corridors

Structure	Area of Disturbance (acres)	HVTL ROW (width in feet)	Tower Foundation Excavation Requirements
HVTL Alternative 1	455	100	15-55 feet deep 7 to 12 feet diameter
HVTL Alternative 2	457	100	15-55 feet deep 7 to 12 feet diameter

Organic deposits such as peat are also highly compressible and do not support heavy construction equipment. Therefore, construction in these areas would require the use of crane mats or low ground pressure equipment. Waiting for the organic deposits to freeze during the winter months may also alleviate the difficulty of construction, and it would minimize impacts to of the soft, compressible, wet soils found in the wetlands. Temporary haul roads may need to be constructed along the HVTL corridor in the wetland areas to provide access for material delivery and personnel. These haul roads would be completely removed when vegetation is re-established on the ROW. Potential impacts to wetlands from construction activities are discussed in Section 4.7.

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

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

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

All of the natural gas pipelines would be located on existing corridors or on disturbed ground. The natural gas pipeline would be constructed within an existing gas pipeline corridor serving Cliffs-Erie.

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

Table 4.4-7. Key Information Regarding the East Range Pipeline Corridors

Structure	Area of Disturbance (acres)	Maximum Temporary ROW (width in feet)	Excavation Requirements
Natural Gas Pipeline	350	100	16-24" diameter pipe; Trench: 72" deep
Process Water 2WX-SITE	16	150	Trench: 10 feet deep
Process Water 2WX-W	10	150	Trench: 10 feet deep
Process Water 2W-2E	2.9	150	Trench: 10 feet deep
Process Water 3-2E	10	150	Trench: 10 feet deep
Process Water K-2WX	3.4	150	Trench: 10 feet deep
Process Water S-2WX	39	150	Trench: 10 feet deep
Process Water 9S-6	9.6	150	Trench: 10 feet deep
Process Water 9N-6	18	150	Trench: 10 feet deep
Sewer and Water Line	25	100	**Sewer**: 12" diameter; Trench graded but no deeper than 8 feet **Water**: Pipe 6" diameter; Trench: 60" below surface

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

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

The process water pipelines primarily cross deposits from mining operations. In areas with glacial material remaining (Pipelines 6-S-2WX, K-2WX, 2WX-Site, 2WX-2W), the cleared area would be grubbed and any topsoil would be stockpiled for later use. The till found along these pipelines has an "easily erodes" characteristic, which would be minimized with BMPs. The amount of soils classified as

"Prime Farmland" and "Farmland of Statewide Importance" has not been determined around the process water pipelines. However, the pipelines would be located in highly disturbed areas from past mining activities.

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

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

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

Table 4.4-8. Key Information Regarding the East Range Rail Alignment Alternatives and Access Roads

Structure	Area of Disturbance (acres)	Maximum Temporary ROW (width in feet)	Earthwork Cut (cubic yards)	Earthwork Fill (cubic yards)
Rail Alignment Alternative 1	77	Variable (75-490)	2,300,000	60,000
Alternative 1 Center Loop	104	—[a]	—[b]	—[b]
Rail Alignment Alternative 2	74	Variable (75-490)	2,100,000	65,000
Access Roads	45	200	—[a]	—[a]

[a] Data not available
[b] Data are included with the rail alignment

4.4.4.2 Impacts of Operation

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

4.4.5 Impacts of the No Action Alternative

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

4.4.6 Summary of Impacts

Basis for Impact	No Action	West Range	East Range
Result in soil erosion or loss of topsoil.	No soil disturbance.	Soils disturbed within construction ROW, may increase erosion.	Soils disturbed within construction ROW, may increase erosion.
Result in direct conversion of prime and unique farmland to non-agricultural uses.	No prime or unique farmland conversion.	The site and buffer lands are exempted from Minnesota Regulation 4400.3450, as they are located within the cities of Taconite and Marble. Only the LMP pumping station, Segment 1 of the Process Water Supply Pipeline, and the outfall at its point of termination of the Segment 1 pipeline have potential for impacting prime farmlands. Depending on which corridors would be selected, approximately 390 to 470 acres of Prime Farmland soils would be disturbed during the construction process.[a]	The site and buffer lands are exempted from Minnesota Regulation 4400.3450, as they are located within the City of Hoyt Lakes. Preliminary information shows no Prime Farmland soils at the East Range power plant site. No soil survey data is currently available for the East Range corridors.
Result in the loss of availability of a known mineral resource that would be of value to the region.	No mineral resource loss.	No mineral resource loss.	No mineral resource loss.
Located on a geologic unit or soil that would be unstable as a result of the project.	Soils remain unmodified.	Portions located on wet glacial till and peat.	Portions located on wet glacial till and peat.
Expose people or structures to adverse effects from seismic activity.	No exposure to seismic activity.	No exposure to seismic activity.	No exposure to seismic activity.
Result in the contamination of soil or mineral resources.	No soil contamination.	Increased potential for spills.	Increased potential for spills.
Result in the loss of paleontological resources.	No loss to paleontological resources.	No loss to paleontological resources.	No loss to paleontological resources.

[a] This range was calculated from the maximum and minimum Prime Farmland values for the West Range power plant site and corridors, found in tables 4.4-1 through 4.4-4. Permanent loss of farmland acreage would occur on the footprints of aboveground structures only.

INTENTIONALLY LEFT BLANK

4.5 WATER RESOURCES

4.5.1 Approach to Impacts Analysis

4.5.1.1 Region of Influence

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

4.5.1.2 Method of Analysis

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

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

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

4.5.2 Common Impacts of the Proposed Action

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

4.5.2.1 Industrial Wastewater Treatment/Discharges

Zero Liquid Discharge System

The West Range and East Range Mesaba Generating Stations do not differ greatly in their need for water, but do differ greatly in how industrial wastewaters from the Mesaba Generating Station must be managed. For both sites, the wastewater generated from gasification and slag processing operations, containing certain levels of heavy metals and other contaminants from the feedstocks, would be treated in a Zero Liquid Discharge (ZLD) system. In addition, water from the bottom of the ammonia stripper would be treated in a ZLD unit. The blowdown stream would be pumped to a brine concentrator which would use steam or vapor compression to indirectly heat and evaporate water from the wastewater stream. The water vapor generated would then be compressed and condensed and the high quality distillate would be recycled to the syngas moisturization system or to other water uses in the plant, reducing fresh water consumption, and, more importantly, concentrating heavy metals and other contaminants of concern into a solid waste stream. The concentrated brine would be further processed in a heated rotary drum dryer/crystallizer. There the remaining water would be vaporized and a solid filter cake material would be collected for proper disposal in existing approved waste management facilities.

The ZLD system to be used for the Mesaba Generating Station (either site) would be the same system that has been successfully employed at the Wabash IGCC plant to control permit exceedances of metals in that plant's discharges. No wastewater discharges would be generated from the ZLD system. In the case of the East Range Mesaba Generating Station, all industrial wastewaters (i.e., non-domestic wastewaters) generated beyond those already used in the gasification and slag processing operations, discussed above, would also be processed through the enhanced ZLD system such that there would be no process-related wastewaters, including non-contact cooling tower blowdown, discharged from the Mesaba Generating Station. The reason for the difference in approach between the two sites is a function of the East Range Site's location in the Lake Superior Basin watershed which has more stringent water quality standards (see Section 2.3.2.3 to obtain citations to the rules governing discharges to this watershed). The water quality standard for mercury applied to surface waters in the Lake Superior watershed is 1.3 nanograms per liter (ng/L). In addition, dischargers to surface waters in the Lake Superior Basin watershed must meet this standard at the end of the discharge pipe (typically, in other watersheds, there is an allowance for a mixing zone where the concentration of mercury is allowed to equilibrate). The background concentration of mercury in the East Range source waters is on the order of 0.5 to 0.9 ng/L. Industrial wastewaters resulting from the cooling tower blowdown would have concentrations of mercury in the range of 1.5 to 9.0 ng/L (assuming that three to 10 cycles of concentration [COC] would be used in the cooling tower, respectively).

Discharge or ZLD Treatment of Industrial Discharges vs. Discharge to Local Treatment Plants

Consideration of conveying the cooling water blowdown discharges to local POTWs was not considered to be practical for several reasons. The first is the high volume of water that would be discharged to local POTWs at either the West Range or East Range sites. None of the local POTWs have adequate capacity to handle this additional flow (in the range of 2 million gallons per day or more). Secondly, even if the local POTWs did have the available capacity, the discharges of the blowdown, with very low levels of biological material, would substantially dilute the sanitary wastewater making it more difficult to treat.

Use of Domestic and other Industrial Wastewater Discharges for Source Water

Consideration was not given to using the wastewater discharges from local POTWs as a source for process water for the generating station. The flow from these POTWs is small compared to the needs of the generating station and their use would not affect the overall infrastructure requirements needed to supply water for cooling purposes. Consideration of effluents from other industrial sources as make-up water was made for the East Range Site.

Mercury and Phosphorus

As discussed in Sections 2.0 and 3.5, some of the watersheds and rivers in the vicinity of both proposed sites for the Mesaba Energy Project are impaired due to mercury levels in fish tissue, as well as phosphorus levels resulting in low dissolved oxygen (DO) concentrations in the surface water.

The design of the industrial wastewater treatment system (the ZLD discussed above) and discharge of industrial wastewaters took into consideration the current water quality in the potential receiving waters. As presented in the Joint Application (Excelsior, 2006a), the generating station would not use any chemicals that would add phosphorus to the discharges of cooling or other waters. Similarly, the use of the ZLD system should eliminate any discharges that could add mercury from the coal processing operations. However, both mercury and phosphorus are present in the raw water sources and the same mass of mercury and phosphorus contained in the raw water would be present in the cooling water discharges (West Range Site only). Furthermore, even though the total mass (i.e., weight) of either mercury or phosphorus in the intake and discharge would be equivalent, the concentration of both would increase in the discharge as a result of the evaporative losses in the cooling towers. For this reason, no industrial or cooling water discharges are being proposed for the East Range Site. For the West Range Site, the total mercury loading would be less than or equal to the current loading permitted for the HAMP complex under the NPDES permit issued to MNDNR for dewatering activities. The discharge concentrations of mercury would also be below the water quality standard for mercury of 6.9 µg/L.

Mercury, in its more common inorganic form, is of limited concern in terms of bioaccumulation within the food chain and human health, but methylmercury formation in the natural environment is complex and not completely understood. The presence of sulfate is believed to increase the likelihood of methylmercury formation as bacteria that feed on sulfate also may be responsible for methylating mercury. Other factors, such as the presence of wetlands adjacent to the water body of concern, may also contribute. However, because of sulfate's link to mercury, it is possible that the NPDES permit may specify a sulfate limit along with a mercury limit for discharges from the Mesaba Energy Project.

For the West Range Site, Excelsior is proposing a water management plan (see Section 4.5.3.1) that would regulate the concentrations in the receiving waters CMP to prevent concentrations of mercury from exceeding water quality standards. Additional information on expected discharge levels of mercury and phosphorus is provided in Section 4.5.3.2. Discharge limitations for both mercury and phosphorus for the West Range Site would be determined by MNDNR during the NPDES permit development process and may vary from the expected levels presented in this EIS. Due to the ZLD at the East Range Site and the water management plan proposed for the West Range Site, operations of either facility are not anticipated to have an adverse impact of either mercury or phosphorus within the surrounding surface water resources.

Total Dissolved Solids

Another water quality parameter that has the potential to impact the environment and influence the management of discharges for the West Range Site is the presence of total dissolved solids (TDS). TDS typically is not considered a toxic pollutant, but rather a parameter that, at high levels, can make drinking water less palatable (i.e., giving it a salty taste) or can cause scaling in piping or industrial equipment. There is no TDS water quality standard for unlisted waters (which include the CMP and Holman Lake). Unlisted waters, according to Minnesota Rules 7050.0430, are classified as Class 2B, 3B, 4A, 4B, 5, and 6 waters. The only water quality standard for TDS is 500 mg/L for Class 1B waters, those waters that are considered as sources for drinking water.

The majority of the TDS discharges from the Mesaba Generating Station is expected to be dissolved inorganic salts (with only a small fraction being comprised of dissolved gases and dissolved organics). Therefore, assuming that most of the TDS is comprised of total dissolved salts, the water quality standard for total dissolved salts for Class 4A waters of 700 mg/L would apply. Class 4A waters are defined as suitable for crop irrigation use. Modeling results by Excelsior (Excelsior, 2006a), using the water management plan developed to control the mass of mercury discharged to Holman Lake, estimates indicate that the water within the CMP would remain below the 700 mg/L total dissolved salts standard for the first 26 years of operation (see Figure 4.5-5). Beyond that period, a reduction in the COC or additional effluent treatment may be necessary to keep levels of TDS below water quality standards in the CMP, if the water quality standard is applicable to the CMP. However, the TDS concentration in Holman Lake will reach the standard of 700 mg/L within the first two years of operation. While there are no affected users of the water in Holman Lake, Excelsior is expected to request a variance from the TDS and hardness water quality standards due to this discharge.

4.5.2.2 Process Water Requirements

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

The largest share of the water appropriated is consumed by evaporative cooling. The annual average rate of evaporative loss would be on the order of 3,320 gallons per minute (gpm) for Phase I (evaporative losses from Phase II would be expected to be identical). Peak evaporative losses for each phase of the Mesaba Generating Station are identified in the NPDES permit application as approaching 3,500 gpm. Peak utilization rates would occur on hot summer days. Most of the water lost to evaporation would come from mine pits that currently do not have an outflow (e.g., no discharge of overflow water) into local streams or rivers. These mines pits have been filling with water since the cessation of mining activities, generally 10 to 20 years ago. Some water that is currently part of the water balance for the watersheds would be lost to evaporation (water from the Prairie River, dewatering of the HAMP complex, withdrawals from Colby Lake), but these losses are relatively small in comparison to the average flows of the Prairie and Swan Rivers.

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

4.5.2.3 Sanitary Discharges

Sanitary wastewaters produced during the operation of the Mesaba Generating Station would be relatively small (about 30 gallons per person per day) and would be discharged to a nearby POTW. In the case of the West Range Site, the closest POTW is the Coleraine-Bovey-Taconite (CBT) regional WWTF located in Bovey. This system would be accessed via the City of Taconite’s sanitary sewer system. In the case of the East Range Site, the closest WWTF is the Hoyt Lakes POTW. The Hoyt Lakes POTW would be accessed in the vicinity of the Laskin Energy Center, where the City would be responsible for constructing a satellite WWTF there or constructing a new pipeline from that point to the City’s existing WWTF. As an alternative, sanitary wastewaters from plant activities could be managed on site via a septic system or stand alone wastewater treatment system. Specific impacts of sanitary discharges are discussed in Sections 4.5.3.3 and 4.5.4.2 for the West Range and East Range Sites, respectively.

4.5.2.4 Water Intakes and Pumping Systems

The types of water intake structures and pumping systems would be similar for the West and East Range Sites. Two types of intake structures would be employed for water withdrawal: one designed for permanent withdrawals and one for seasonal withdrawals. These two types of intake structures, caisson and floating, are depicted in Figure 4.5-1.

Process water pumped from a combination of nearby water features would be piped to the Mesaba IGCC Power Plant. Raw water from the pipeline would be processed through a micro-filtration system prior to use in the plant.

As the engineering and design of the generating station proceeds, the design concepts presented herein would be tailored to each specific circumstance and optimized to reduce power consumption demands.

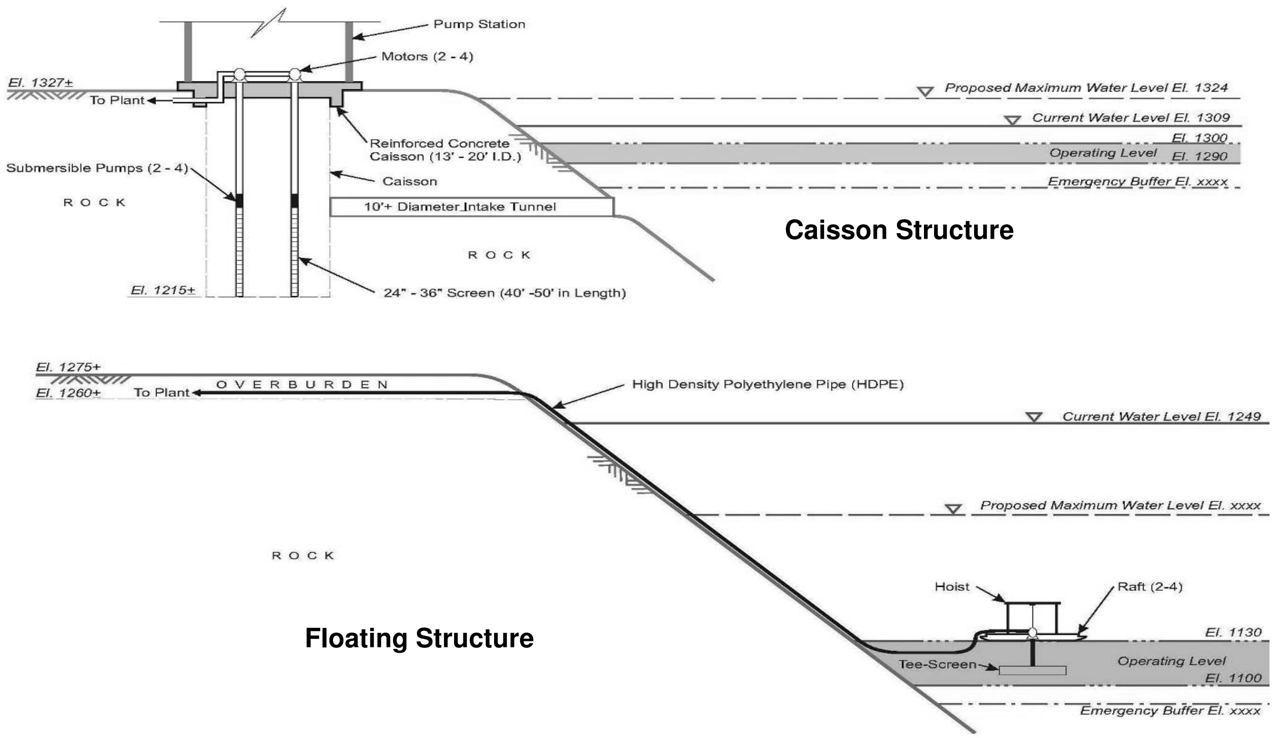


Figure 4.5-1. Water Intake Structures, Conceptual Designs

4.5.2.5 Stormwater Management

Pre-Construction

Prior to any construction activities, Excelsior would have to apply for an NPDES/SDS stormwater permit for construction activities, either the general permit or an individual permit. The steps involved in applying for the permit are as follows:

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

- Complete and submit an application form for a stormwater permit for construction activity.

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

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

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

The SWPPP would be submitted to the MPCA for approval prior to the initiation of any construction activities.

Construction

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

Operation

Stormwater generated during the operation of the Mesaba Generating Station would be managed in three ways:

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

- Stormwater from other areas not associated with industrial activity would be routed to the stormwater detention pond where settling can occur and initial rainfall ("first flush") could be contained, checked, and released in a controlled manner to a permitted outfall.

4.5.2.6 Groundwater

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

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

4.5.3 Impacts on the West Range Site and Corridors

One of the reasons the West Range Site is a potential location for the generating station is that abundant sources of good quality water are located nearby. Several abandoned mine pits located in proximity to the site are either currently filled with water and overflowing, are being pumped to avoid flooding of important historical resources due to rising water levels, or are threatening to flood due to rising water levels. Specifically, these pits include the CMP, the LMP, and the HAMP Complex. The HAMP Complex is made up of the Arcturus Mine Pit (AMP), GMMP, and HAMP. Figures 4.5-2 and 4.5-3 provide an overview of the water balance for each stage of the proposed power plant.

4.5.3.1 Process Water Supply Systems

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

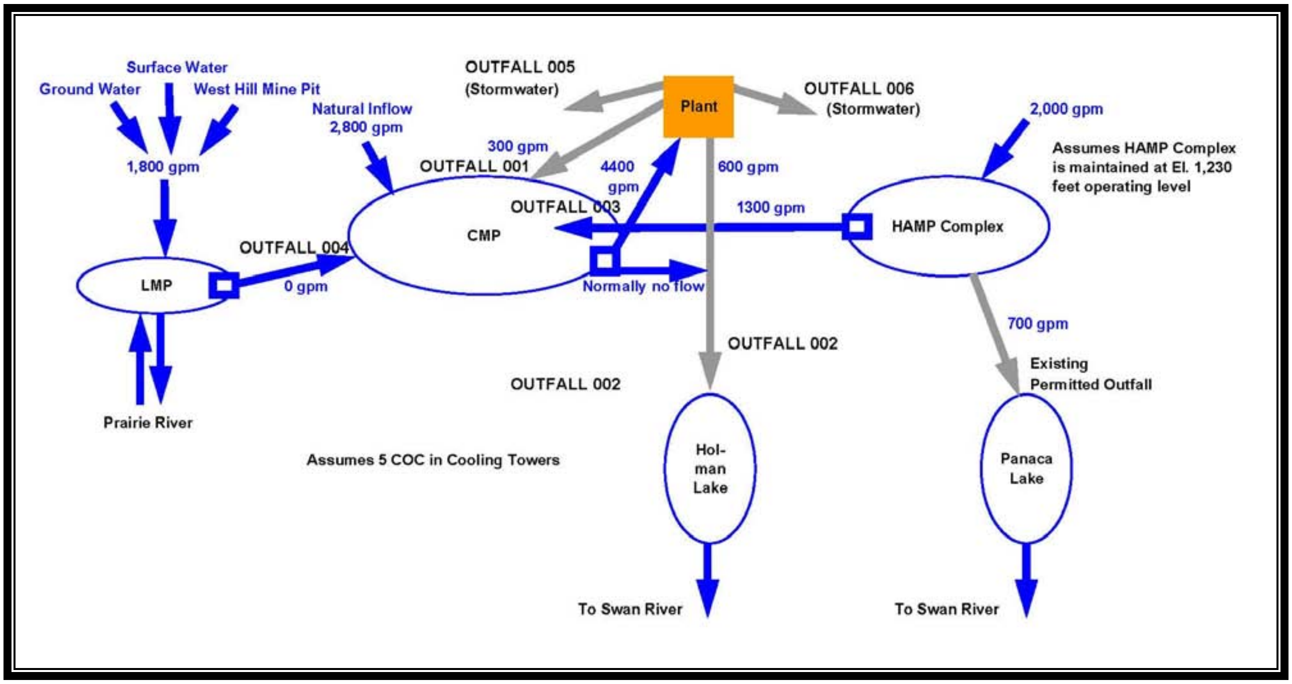


Figure 4.5-2. Phase I Water Balance: West Range IGCC Power Station

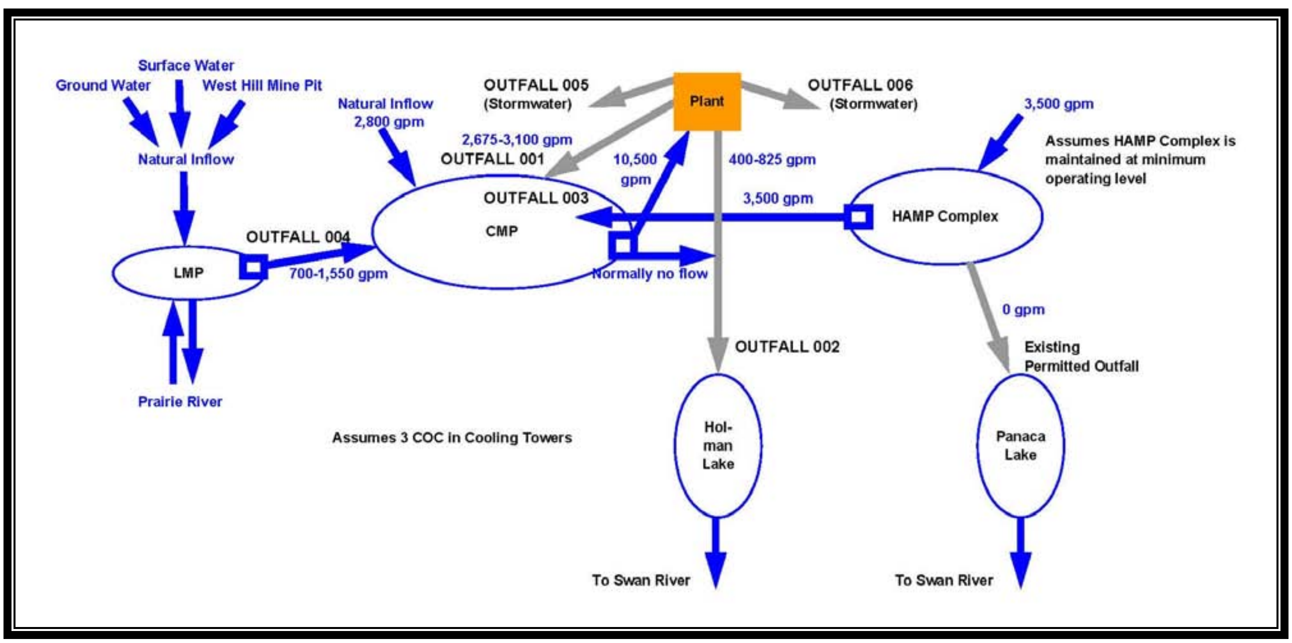


Figure 4.5-3. Phase I and II Water Balance: West Range IGCC Power Station

Table 4.5-1. Process Water Resources Identified for Use at the West Range Site

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

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

Under Alternative 1, the West Range Site water would be supplied from the mine pits, the Prairie River, and the recycled process water discharge. The estimated water supply capabilities for the potential sources are presented in Table 4.5-2. The sustainable supply capability for each water source was estimated using information supplied by the MNDNR, previous engineering studies, and information supplied by local government units. The actual sustainable rates that would be realized are dependent on factors including precipitation, evaporation, pit water levels, and hydrogeological conditions. For the combined needs of Phases I and II, existing data currently show that flows greater than those presented in Table 4.5-2 for the CMP might be available, as the inflow of water may increase with decreasing water levels in the CMP. To be conservative, Excelsior has not assumed the availability of such potential excess flows.

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

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

Table 4.5-2. Water Source Supply Capability

Water Source	Estimated Range of Flow Available for Withdrawals (gpm)	Assumed Sustainable Withdrawal Flow for Water Balance Modeling (gpm)
Canisteo Mine Pit	810-4,190	2,800
HAMP Complex	1,590-4,030[a]	2,000[b]
Lind Mine Pit	1,600-2,000	1,800[c]
Prairie River	0-2,470[d]	2,470[d]
Discharge from Mesaba Generating Station	350-3,500	Varies[e]
Total	4,350-16,190	>9,100[f] >11,700[g]

[a] Maximum flow occurs at minimum operating elevation.
[b] At an operating elevation of 1,230 feet msl.
[c] Estimates of flow are based on one summer flow measurement at the LMP outlet and one summer and one winter measurement taken at the West Hill Mine Pit outlet.
[d] Maximum available flow assumed to be 25% of the 7Q10 flow of the Prairie River.
[e] Water returned to the CMP is expected to be 350 gpm during Phase I operations and 2,650-3,500 gpm during Phase II operations.
[f] Total does not include any of the water discharged back to the CMP from the Mesaba Generating Station
[g] Total includes the minimum quantity of water expected to be discharged back to the CMP during the operation of Mesaba I and II of 2650 gpm, rounded to two significant figures.

Information available for the HAMP Complex also suggests increased water flows into the HAMP Complex with decreasing water elevations. For example, records show evidence of flows between 3,900 and 4,000 gpm during the initial years following cessation of mining. However, this increased flow is also not used in the sustainable flow values presented in Table 4.5-2.

Additional flow is also available from non-contact cooling water discharges from the Mesaba Generating Station directly into the CMP. The basis for direct discharges into the CMP is discussed in greater detail in this section. Such discharges would be conducted in accordance with all rules and regulations and could decrease reliance on one or more of the water resources listed. However, because of the uncertainty of sufficient flows for Phases I and II from such sources, Excelsior has chosen to also propose water appropriation from the Prairie River and the LMP to supplement, if necessary, the other mine pit water supplies for both phases. The water balance for Mesaba Phases I and II are shown graphically in Figures 4.5-2 and 4.5-3.

Table 4.5-3 compares the long-term sustainable water needs for the Mesaba Generating Station with the potential supplies shown in Table 4.5-2. The data in Table 4.5-3 is based on: (1) discussions with the MNDNR regarding the availability of water in each of the above resources; (2) analyzing stage-storage data made available by the MNDNR; (3) reviewing information the MNDNR had published on each such resource (Excelsior, 2006b); and (4) collecting primary data to confirm the available resource. The last column in Table 4.5-3 represents Excelsior's conclusion with regard to the capability of the resources listed to meet the operational requirements of Phases I and II, namely that sufficient water supplies are available to demonstrate the long term, sustainable provision of water for the power plant's needs (Excelsior, 2006a).

Table 4.5-3. Process Water Requirements Matched with Water Supply Capabilities

Phase	Average Annual Requirement (gpm)[a]	Peak Requirement (gpm)[a]	Long Term Sustainable Flow (gpm)[b]	Sufficient to Meet Annual Avg. Flow Requirement (Yes/No)
I	4,000-4,400	6,500	> 9,100	Yes
II	8,800-10,300	15,200	> 9,100 > 11,700[c]	Yes

[a] From Table 2.2-3
[b] The flow presented is sum of the values in the third column of Table 4.5-2 rounded to two significant figures; greater than symbol is applied because quantity does not account for 300 gpm discharged back to the CMP during Phase I operations.
[c] The flow presented is sum of the values in the third column of Table 4.5-2 and includes the minimum quantity of water expected to be discharged back to the CMP during the operation of Mesaba I and II of 2,675 gpm, rounded to two significant figures. The greater than symbol (>) is used because quantity assumes minimum quantity discharged back to the CMP.

The surface elevation for each of the water resources identified for the West Range Site (the LMP, HAMP Complex, and CMP) is lower than that of the Mesaba Generating Station; therefore, conveyance of the process water to the plant would require pumping.

Even if Excelsior completely utilized all the water from any single potential resource in the vicinity of the West Range Site, there would be no such resource capable of supplying all of the water requirements for both phases of plant development. Therefore, in consideration of its own needs and to help solve the local flooding problems previously described, Excelsior undertook to develop a comprehensive water resource management plan for the West Range Mesaba Generating Station. In doing so, it identified the four sources of water (the CMP, HAMP Complex, LMP, and Prairie River) that would support the full load operation of two phases.

Water Resources Management Plan

The proposed water supply system for Phases I and II would consist of three mine pits, three pumping stations, and an intake to draw water from the Prairie River. In the case of Phase I, water in the CMP would be pumped to the Mesaba Generating Station and water from the HAMP Complex would be pumped to the CMP as necessary to maintain water levels from dropping too low (the intent prior to operation of the Mesaba Generating Station would be to lower water levels in the CMP to allow for stabilization of the nearby rail line). Phases I and II would require an additional pump station on the LMP and installation of an intake that would allow water from the Prairie River to flow by gravity to the LMP. A pumping station in the LMP would then pump water to the CMP. The pumping capacity for each of the pump stations is summarized in Table 4.5-4.

Table 4.5-4. West Range Pumping Station Capacities

Pump Station Location	Pumping Capacity (gpm)
CMP	15,200
HAMP Complex	7,000
LMP / Prairie River	7,000

Each pump station intake would meet the CWA Rule 316(b) requirements for cooling water intake structures (CWIS), which states that the maximum amount of water that can be taken is "5 percent of the mean annual flow or 25 percent of the 7Q10, whichever is the lesser (66 FR 65300) amount." The 7Q10 is the seven day low flow average with a 10-year recurrence interval. The Weibull distribution is the preferred statistical method used to determine the 7Q10, and requires that the top 80 percent of flow measurements be dropped as they are not considered to be true "low flows." The basis for the calculations used in determining the 7Q10 flow rate for the Prairie River is presented in Appendix F of the Water Appropriation Permit Application as part of the Joint Application (Excelsior, 2006a). In general, river flows are plotted (on a log scale) against a recurrence interval (on a normal scale) and an exponential regression is used to best fit a regression line to the data points. The point on the graph where the best fit line intersects the 10-year recurrence interval is the 7Q10.

CMP Pumping Station

A series of pumps would provide a pumping capacity between 3,500 gpm and 7,000 gpm for Phase I and between 8,800 gpm and 15,200 gpm for Phases I and II. This capacity would be provided in a permanent pumping station proposed at the southeast corner of the CMP. Process water would be pumped from the CMP directly to the Mesaba Generating Station. Figure 2.3-3 provides the location for the process water pump stations and pipelines.

A standby pump would be incorporated for use during a failure or maintenance of one of the primary pumps. The pump station intake would meet the Section 316(b) CWA requirements for cooling water intake structures (such requirements are to be addressed as part of the NPDES permitting process). Excelsior (2006a) is proposing to construct a caisson-type intake structure (see Figure 4.5-1) consisting of a 13- to 20-foot diameter vertical shaft that would be formed with concrete in the unconsolidated overburden but may be able to use the bedrock as a wall in the deeper parts of the structure depending on competence and fractures. The actual diameter of the vertical shaft would be based on equipment requirements, such as the number of pumps and the dimensions of the pumping equipment, as well as constructability issues related to connecting the shaft to the pit. The caisson would be constructed at an elevation necessary to obtain submerged pumping conditions under the lowest anticipated pit water levels, including an emergency buffer.

Connecting the shaft to the mine pit would either be accomplished by: (1) constructing a large horizontal tunnel, approximately 10 feet diameter; or (2) connecting the caisson to the pit using several smaller diameter pipes (roughly 36 inches in diameter) from the caisson to the mine pit. In both cases, the horizontal tunnel would be sized to limit intake velocities to 0.5 feet per second to prevent the entrainment of aquatic life. With this method, 316(b) screening would be accomplished in the caisson itself using either tee screens or conventional well screens.

The proposed intake at the CMP would be at least 200 feet below the water surface, which is below the anticipated thermocline. Operating at depths below the thermocline is also expected to avoid the inadvertent transfer of rainbow smelt into Holman Lake.

The pipeline that extends from the CMP to the Mesaba Generating Station would be approximately 36 inches in diameter. The length of the pipeline that extends from the CMP to the Mesaba Generating Station would be approximately 11,100 feet.

HAMP Complex and LMP Pumping Stations

A floating pump station would be installed at the GMMP end of the HAMP Complex. This pump station would have a capacity of 7,000 gpm and would direct water into the CMP. A floating intake structure is proposed for these mine pits as they are conducive to fluctuating water levels and commonly used by mines for pumping systems. This system includes placing pumps and intake structures on a floating platform in the mine pit. A pipe with wedgewire screen is extended to withdraw water from the desired depth. Sufficient length of screen is provided to ensure intake velocities are maintained below 0.5 feet per second and to ensure thermal stratification is not negatively disrupted. Flexible supply pipe would be designed to convey water from the floating platform to a permanent conveyance pipeline on land. For the HAMP Complex, the pipeline that extends from the GMMP to the CMP would be approximately 24 inches in diameter and is expected to be approximately 25,400 feet in length.

A pump station designed in the same manner as the HAMP Complex pumping station with a capacity of 7,000 gpm would be installed in the northeast corner of the LMP, and would direct water to the CMP. The pipeline that extends from the LMP to the CMP would be approximately 24 inches in diameter with a length of 11,300 feet.

Pumping capacity at the HAMP Complex and the LMP must allow for the capture of the 12-month average annual water supply on a seasonal basis.

Prairie River Intake

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

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

Pipeline Infrastructure

Routing for the pipelines would be primarily on public property adjacent to existing transportation corridors. Figures showing the entire length of each segment of pipeline are attached as Appendix B in the Proponent's Water Appropriation Permit Application included in the Joint Application (Excelsior, 2006a).

Water Management

The operation of Phases I and II and their impacts on water levels in the CMP have been modeled by Excelsior (Excelsior, 2006a). Modeling results indicate that water levels in the CMP could fluctuate up to 2 feet during a year with average rainfall. Under drought conditions, water levels in the CMP could fluctuate up to 6 feet. Based on the model runs conducted, Excelsior is proposing to operate the CMP within an operating range of 1,260 to 1,290 feet mean sea level (msl) during normal weather conditions. Under extreme drought conditions, Excelsior would operate the CMP in the 1,250 to 1,260 feet msl range. Excelsior proposes to operate within the 1,290- to 1,300-foot msl range during extremely wet periods.

In the event that water levels in the CMP continue to rise even in light of the water withdrawals being made for operating Phase I and/or Phases I and II, a cross-tie into the Holman Lake discharge pipe would allow excess CMP waters to be pumped to Holman Lake on an as needed basis. The cross-tie would contain sufficient protection to ensure that unwanted species are not inadvertently directed into Holman Lake. Excelsior and/or the MNDNR, through an approved mechanism derived during the permitting process, would have the capability to operate the existing pump in the HAMP to manage water levels in the complex during wet periods.

Water Levels and Water Balance During Operations

The CMP contains some land bridges that are below a water surface elevation of approximately 1,260 feet msl. The intended operation of the CMP would be to maintain water levels above 1,260 feet msl, unless other levels are deemed necessary (i.e., drought conditions). Exposing the land bridges within the

CMP will have limited affects on the water capacity and would not occur over long periods of time. The water surface elevation of the pit would be 1,290 ± 2 feet msl during a typical year. Water from the other pits would help to augment water levels in the CMP, and should help to prevent significant water level changes.

The GMMP would typically be operated in the range of 1,220 to 1,230 feet msl. Significantly higher flows are believed to be available if the water level in the HAMP is reduced below the now-submerged land bridge located between the GMMP and the HAMP. Discussions would be required between Excelsior and the MNDNR to determine whether operation at greatly reduced water levels in the HAMP is advisable and, if so, under what conditions such operation would be desirable.

The LMP would be operated in the range of 1,190 to 1,250 feet msl during a typical year. The operating ranges in the GMMP and LMP would allow for storage of water during non-pumping periods. Pumping would be unlikely to occur during the winter or if there is equipment failure or system maintenance needs.

Within the context of the permitting process, Excelsior would create a monitoring plan to record levels within the mine pits from which water supplies for the Mesaba Generating Station would be derived, levels within the receiving waters to which cooling tower blowdown would be discharged, and the pumping rates at which waters would be transferred.

Water Management Plan Impacts

Currently, water levels in the CMP are rising and, in time, can be expected to overflow. In the case of the HAMP Complex, water has been seasonally pumped out of the complex to keep features of past mining operations from being flooded and thereby interfering with State Park tours (the MNDNR plan for the park is available at http://files.dnr.state.mn.us/input/mgmtplans/parks/hillannexmine/plan.pdf). No such direct outflow of the CMP has occurred since various mining operations ceased in the mid 1980's.

As previously noted, there are no competing uses for the water in the CMP, HAMP Complex, and LMP other than aesthetic and recreational uses. Use of the water resources by the West Range Mesaba Generating Station in terms of the process water usage and discharges, the Water Appropriation Permit Application, and the NPDES Permit Application (Excelsior, 2006a) would assure that the aesthetic and recreational uses are minimally affected.

Under conditions of extreme drought, Phases I and II could potentially reduce water levels within the CMP to a point where land bridges that could isolate one part of the CMP from another begin to appear. This would occur in the event of: (1) the absence of any precipitation input into the pit on the order of 5 years in duration; and (2) peak power production from Phases I and II over the entire period. It is expected that these conditions are not likely to occur. Therefore, no adverse impacts to water resources are anticipated with the water appropriation required for the West Range Site using the mining pits as a source of water.

4.5.3.2 Process Water Discharges and Water Quality Criteria

The expected average annual flow rate and proposed permitted peak flow rate for each outfall for Phase I and II operations are summarized in Table 4.5-5. The proposed peak discharge rates are typically based on modeled peak rates plus some additional capacity to provide operational flexibility.

Table 4.5-5. Discharge Flow Rates for the West Range Site

Outfall	Phase I		Phases I & II	
	Average (gpm/MGD)	Peak (gpm/MGD)	Average (gpm/MGD)	Peak (gpm/MGD)
From Power Station to CMP (001)	900/1.3	3,000/4.3	3,500/5.0	6,000/8.6
From Power Station to Holman Lake (002)	600/0.9[1,2]	3,000/4.3	825/1.2[1]	6,000/8.6
From HAMP to CMP (003)	2,000/2.9	7,000/10.1	3,500/5.0	7,000/10.1
From LMP to CMP (004)	0	0	1,800/2.6	7,000/10.1

[1] Normally, no discharge would occur through Outfall 002 during Phase I
[2] Limited by mercury concentration in the discharge

The West Range Site is located within the Upper Mississippi River Basin (UMRB) watershed. The direct receiving waters for discharges of cooling tower blowdown from the Mesaba Generating Station would be the CMP and Holman Lake. Holman Lake would receive discharges from the CMP for purposes of water level control in the CMP and/or to maintain water quality within the CMP (to keep the concentration of solids from building up). The combination of surface flow/infiltration of water to the CMP, the input of excess water from the HAMP Complex, and the discharge of water from the CMP (or directly from the Mesaba Generating Station) to Holman Lake would act to reduce the concentration of mineral constituents in the CMP.

The anticipated discharges from the power station to the CMP and Holman Lake are shown in Table 4.5-6. These levels represent the discharge concentrations after 3 years of operation (for Phase I) and 27 years of operation (Phase II), and therefore represent the maximum levels. The anticipated discharges are expected to be within water quality criteria standards without mixing, except for hardness, TDS, sulfate and conductivity. Within the CMP, the levels of these four parameters would rise over time during the operation of the power station and approach or exceed water quality standards. In Holman Lake, the concentrations of these parameters would also increase over time and likely exceed water quality standards after mixing, especially after 30 years of operation. However, once the discharge mixes with the Swan River, the concentrations would be below water quality standards. At this time it is not known whether or not the MPCA would apply the water quality standards for TDS and sulfate to the CMP and/or Holman Lake as these standards do not seem to apply to these “unlisted” waters. Discharge levels, however, would be subject to the NPDES permit and may ultimately be different (i.e., lower) than the anticipated discharge levels presented in this EIS and if any parameters are expected to exceed water quality standards, Excelsior would have to apply for a waiver.

Water quality standards applied to waters located within the UMRB are defined at Minnesota Rules Chapter 7050. The most stringent water quality standard for mercury in all waters within the UMRB watershed is 6.9 ng/L (chronic standard). The median concentration of mercury in water recently sampled in the main pits from which water supplies for the Mesaba Generating Station would be appropriated is 0.9 ng/L. The potential allowance of a mixing zone provides some operational flexibility for the plant.

Table 4.5-6. Expected IGCC Power Station Discharges and Applicable State Numerical Water Quality Standards

Constituent	Units	WQ Standard (chronic)	WQ Standard (acute/max)	Class	Anticipated Effluent Water Quality – Phase I (5 COC)	Anticipated Effluent Water Quality – Phase II (3 COC)
Hardness	mg/L	250	-	3B	1,576	2,052
Alkalinity	mg/L		n/a		--	--
Bicarbonate	mg/L		n/a		892	1,200
Calcium	mg/L		n/a		--	--
Magnesium	mg/L		n/a		--	--
Iron	mg/L		n/a		--	--
Manganese	mg/L		n/a		--	--
Chloride	mg/L	230 (T)	860 (T)	2B	27	38
Sulfate	mg/L		250/10	1B/4A	499	590
TDS	mg/L		500/700[5]	1B/4A	1,733	2,070
pH	mg/L		6 - 9	2B	6 - 9	6 - 9
Aluminum	µg/L	125 (T)	1072 (T)	2B	52	74
Arsenic	µg/L	53 (H)	360 (T)	2B	--	--
Barium	µg/L		n/a		--	--
Cadmium	µg/L	2[1] (T)	73[1] (T)	2B	Note 3	Note 3
Chromium (6+)	µg/L	11 (T)	16 (T)	2B	Note 3	Note 3
Copper	µg/L	15[1] (T)	34[1](T)	2B	Note 3	Note 3
Fluoride	mg/L		n/a		--	--
Mercury	ng/L	6.9 (H)	2400 (T)	2B	4.7	6.6
Nickel	µg/L	283[1](T)	2549[1] (T)	2B	26	37
Selenium	µg/L	5 (T)	20 (T)	2B	Note 3	Note 3
Sodium	mg/L		n/a		--	--
Specific Conductivity	umhos/cm	1,000	-	4A	2,400[4]	3,269[4]
Zinc	µg/L	191[1](T)	211[1](T)	2B	Note 3	Note 3
Phosphorus	mg/L		1[2]		0.02	0.05

[1] indicates a hardness based standard. It is assumed hardness in the receiving water is >200 mg/L based on available data.
[2] phosphorus standard is an effluent limit and not a water quality standard.
[3] results below detection limit.
[4] Values depicted reflect assumed values in the groundwater and LMP.
[5] WQ Standard of 700 mg/L is for total dissolved salts
WQ Standard- based on T-Toxicity Standard or H – Human Health Standard
Class denotes the appropriate MN water use classification for which the WQ standard is based upon. Note the TDS and sulfate standards would not apply to water in the CMP or Holman Lake, but would be applicable to any water used as a drinking or irrigation water source.
Source: Excelsior, 2006a

Holman Lake and the CMP and HAMP are not impaired waters; however, the water from these water bodies would ultimately discharge into the Swan River, which is impaired for mercury and dissolved oxygen. Water from the HAMP is currently pumped to the Upper Panaca Lake, which ultimately drains into the Swan River. Holman Lake also drains to the Swan River. Water from the CMP would ultimately reach the Swan River from discharges to Holman Lake, either from the discharge of process water to Holman Lake or directly from the CMP to Holman Lake for water level control. The Swan River flows into a reach of the Mississippi River (between the Swan River and Sandy River) that is also impaired for mercury. Other downstream segments of the Mississippi River are also impaired for fecal coliform, polychlorinated biphenyls (PCBs), DO, and turbidity. Cooling tower blowdown would not contain fecal coliform, PCBs or unacceptable levels of turbidity and is expected to meet effluent limits.

Holman Lake is a natural lake that has experienced both natural and man-made fluctuations in water levels and flow over the past several decades. During the operation of the Canisteo Mine, water from dewatering operations was discharged into the lake. Although the flow of water from these dewatering operations is not known, it is expected that the flow volume exceeds the amount planned during either Phase I or Phase II. When the lake was receiving the mine dewatering water, the lake level was controlled by a constructed spillway. This spillway no longer functions as a result of recurring beaver dams upstream of the spillway. The water level in the lake is now affected by the partial dismantling of the beaver dam when the water level reaches a height that inundates an adjacent railroad trestle (generally once per year). The water flow that results from this action lowers the water level in the lake roughly 1 to 2 feet over a period of several days, and this level of flow exceeds the increased flow that would result from the project.

Information provided in the remainder of this section demonstrates that the proposed Mesaba Generating Station discharge would not cause or contribute to the impairment of the water bodies downstream of the proposed discharge, and therefore, would be permitable under the CWA.

Water Discharged from the Mesaba Generating Station

As previously discussed in Section 4.5.2.1, the operation of the Mesaba Generating Station would not add mercury, phosphorus or other pollutants that are associated with impairment concerns to the receiving waters. The Power Station is not expected to contribute mercury or phosphorus to the proposed discharge into Holman Lake (Outfall 002). Waste streams that would be discharged from the Mesaba Generating Station would consist primarily of cooling tower blowdown blended with relatively low volumes of additional wastewater from other plant operations (including HRSG blowdown, boiler feed water demineralizers, and stormwater from the oil/water separator serving the plant drainage system). All other process water would be managed and treated in the ZLD system. All sanitary wastewater would be sent to a nearby POTW (see Section 4.5.3.3).

Mass Discharge from Mesaba Generating Station versus Current Discharges

The proposed operation of the Phase I Mesaba Generating Station would not increase the mass of mercury or phosphorus over that currently permitted from the HAMP Complex under NPDES Discharge Permit MN0030198. The MNDNR also holds a water use permit, No. 510144, for appropriating water from the HAMP. General permit information is summarized in Table 4.5-7 and a copy of the HAMP Complex NPDES Permit is attached as Appendix E of the Joint Application (Excelsior, 2006a). The MNDNR has been pumping water from the HAMP since the 1989 timeframe to control water levels in the pit, and has discharged the water into Panaca Lake and ultimately to the Swan River. Prior to 1989, the HAMP Complex was pumped to allow mining activities.

Table 4.5-7. Summary of Hill-Annex Mine Pit NPDES and Appropriations Permits

Permit Number	Date Issued	Expiration Date	Permit Holder	Average Discharge Rate (MGD/ gpm)	Maximum Discharge Rate (MGD/ gpm)	Annual Average Discharge Volume (acre-feet)	Receiving Water Body
NPDES Permit							
MN0030198	June 3, 2003	May 31, 2008	MNDNR	4.5/3,125	9.0/6,250	—	Panaca Lake
Appropriations Permit							
510144	Not available	NA	MNDNR	10.08/7,000	—	10,485	—

The mass of a constituent permitted to be discharged to the Swan River watershed under the existing HAMP pumping permit was estimated by using the average discharge rate in the NPDES permit and an assumed mine pit water concentration based on the analytical results from the HAMP. The estimated mass of mercury and phosphorus permitted annually is shown in Table 4.5-8. Water quality modeling for mercury in both the discharge and the CMP was performed by Excelsior (2006a) and shown in Figure 4.5-4. The results show that the concentration of mercury, in both the discharge and after mixing in the CMP, remains below the 6.9 ng/L water quality standard after 30 years. The same discharge concentrations shown in Figure 4.5-4 would also apply to discharges to Holman Lake. The mercury concentration in the discharge is reduced at the beginning of Phase II due to the change from 5 COCs to 3 COCs.

For phosphorus, the standard used in this EIS is the effluent standard, or concentration in the discharge (not after mixing with the receiving water). The estimated maximum concentration of phosphorus in the discharge (see Table 4.5-6) would be 0.05 mg/L, well below the 1.0 mg/L effluent standard. At the expected discharge flow to Holman Lake, the annual phosphorus loading would be less than currently permitted from the Hill-Annex Mine Pit (Table 4.5-8).

Table 4.5-8. Estimated Annual Mass Permitted for Discharge to the Swan River Watershed From the Hill-Annex Mine Pit

Constituent	Estimated Concentration	Permitted Average Annual Discharge Rate	Permitted Annual Mass Discharge
Mercury	0.9 ng/L	3,125 gpm	5.6 g
Phosphorus	~0.004 mg/L		~25 kg

Excelsior would operate the Mesaba Generating Station within parameters that assure that the actual mass of mercury and phosphorus discharged to the Swan River would not exceed that currently allowed under the existing MNDNR NPDES permit. The mass discharged would be the sum of each constituent associated with:

- Water discharged into Holman Lake at Outfall 002 from the Mesaba Generating Station or the CMP. (Mercury and phosphorus contained in the minor volume water streams that ultimately flow to the ZLD system need not be considered in the water discharge mass balance calculations. Similarly, mercury volatilized in the cooling towers or in the processes is expected to be negligible and is not considered in this calculation.)

- Water pumped to Panaca Lake from the HAMP Complex for water level control permitted under existing NPDES Permit MN0030198.

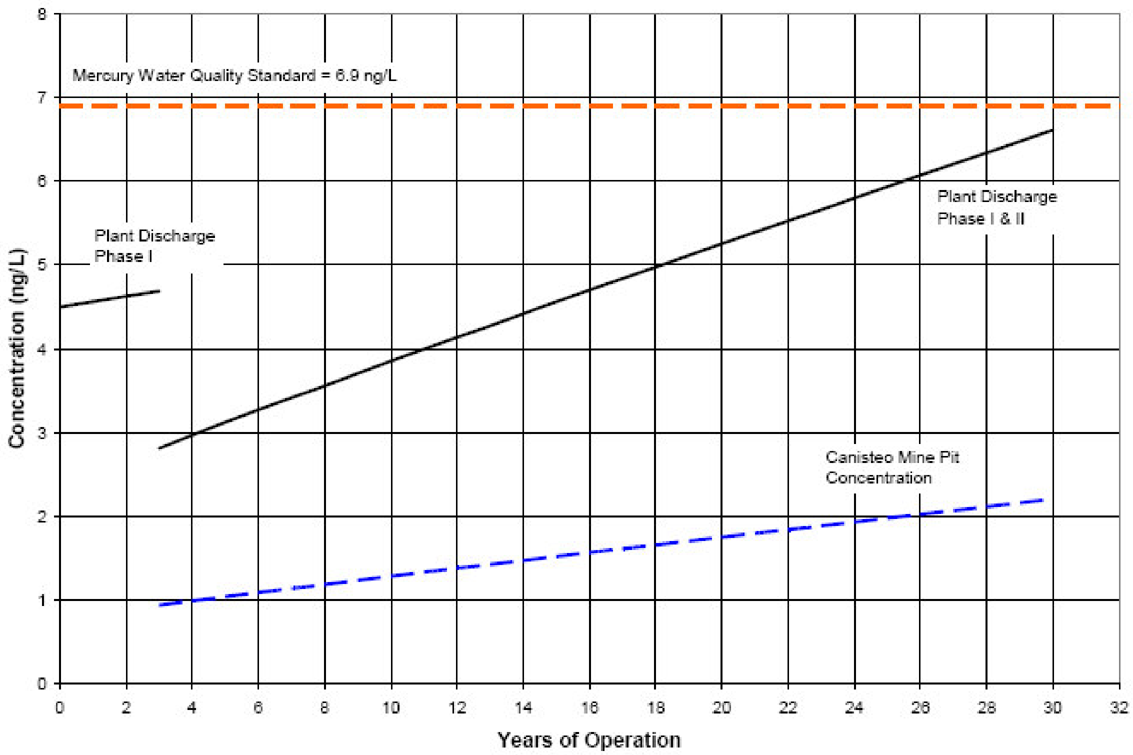


Figure 4.5-4. Modeled Mercury Levels in the CMP and Plant Discharge for the West Range Site

In addition, Excelsior Energy (2006a) also modeled TDS and hardness to determine how the concentrations of these constituents would vary over time, both within the discharge and within the CMP. The results of this modeling effort are shown in Figures 4.5-5 and 4.5-6, respectively. The results show TDS levels increasing in the CMP over the period of operation, reaching the water quality standard of 700 mg/L after year 24 of operation, while hardness concentrations would reach the standard after 14 years of operation. Beyond these periods, a reduction in the COC or additional effluent treatment may be necessary to keep levels of TDS, sulfate and hardness below water quality standards in the CMP, if these water quality standards are applicable to the CMP and Holman Lake. Otherwise, Excelsior would have to apply for and be granted a waiver for the discharges that result in water quality standards being exceeded.

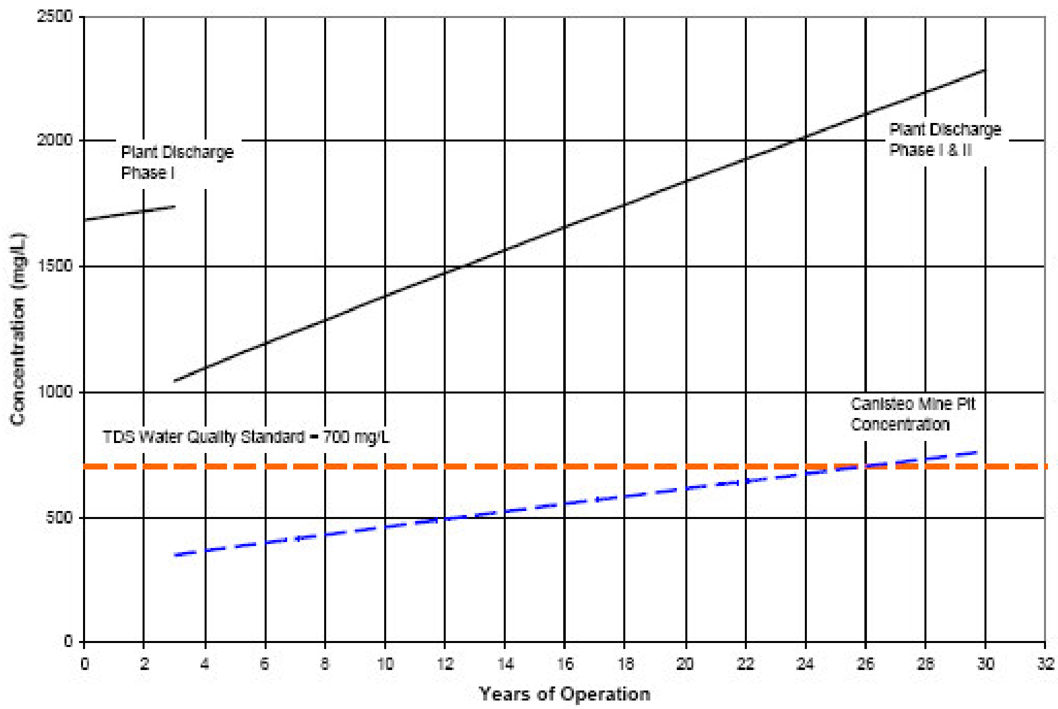


Figure 4.5-5. Modeled TDS Levels in the CMP and Plant Discharge for the West Range Site

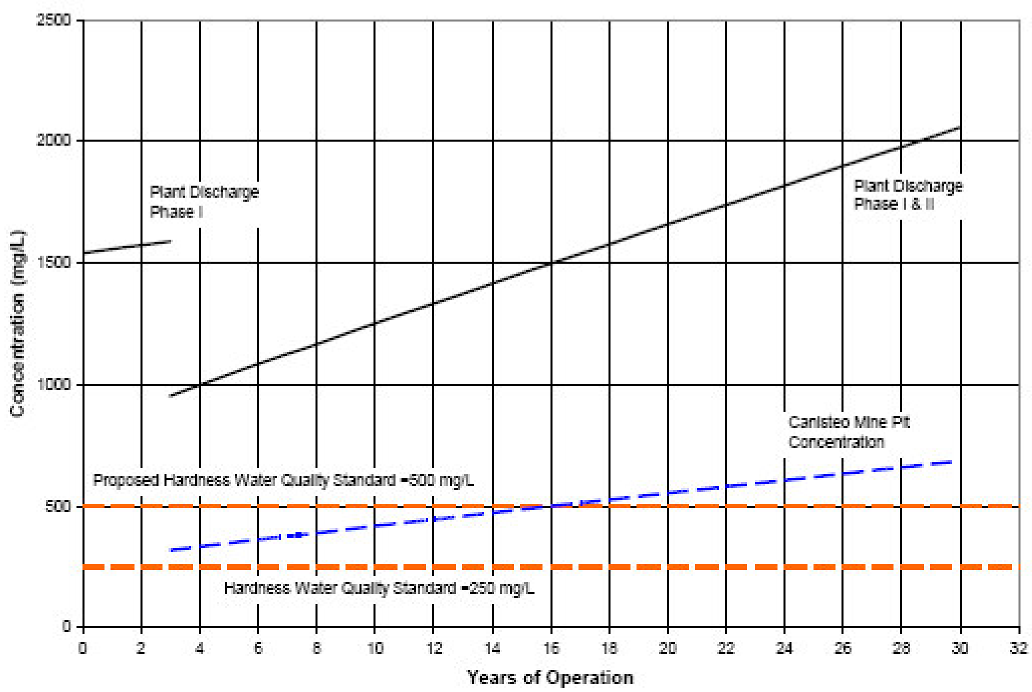


Figure 4.5-6. Modeled Hardness Levels in the CMP and Plant Discharge for the West Range Site

The chemicals that are expected to be added to the circulating water system and the residual amounts that ultimately would be discharged from the Mesaba Generating Station to receiving waters are identified and listed in Table 4.5-9. Excelsior has screened the chemicals identified in this table for phosphorus containing compounds and would establish in the design basis for the Mesaba Generating Station that use of such chemicals is to be avoided. These chemicals are primarily needed to control cooling water corrosion and fouling, and to neutralize certain undesirable constituents in the plant discharge stream. The point of introduction for each of the chemicals is indicated in the table. The estimated combined chemical usage for Phases I and II is also listed (half the indicated amount would be used for Phase I). However, the majority of the chemicals would be consumed in the plant processes and only residual amounts would be present in the water ultimately discharged to the CMP and Holman Lake. These quantities are preliminary estimates only and are subject to revision when the specific water chemistry program for the facility is developed for submission to appropriate regulatory agencies for review and approval.

Table 4.5-9. Chemical Additives Used Per Year (Phases I and II)

Chemical	Point(s) of Introduction	Estimated Usage (lbs/year)	Estimated Residual in Discharge (lbs/year)	Basis, Percent in Discharge	Estimated Amount in Discharge (ppm)[1]
Scale Dispersant	Cooling Towers	75,000	750	1%	0.04
Corrosion Inhibitor	Cooling Towers	300,000	3,000	1%	0.16
Dechlorination – Sodium bisulfite	Cooling Tower Blowdown Sump, Reverse Osmosis System	15,000 7,500	150 75	1%	0.008 0.004
Oxygen Scavenger	Boiler Feed Water	6,600	66	1%	0.003
Condensate Corrosion Inhibitor-Neutralizing Amine	Boiler Feed Water	2,200	22	1%	0.001
Chlorination - Sodium Hypochlorite	Cooling Towers	300,000	1,500	0.5%	0.08
pH control-93% Sulfuric acid	Cooling Towers, Reverse Osmosis, Mixed Bed	18,000 3,000 11,000	36 6 22	0.2%	0.002 0.0003 0.001
Sodium Hydroxide	Mixed Bed regeneration	11,000	0	(totally neutralized)	0.0
Scale & Corrosion inhibitor	Boiler/HRSG	13,000	130	1%	0.007
Anti-Scalant	Reverse Osmosis, Deionizer	150 200	2 2	1%	0.0001 0.0001
Non-Oxidizing Biocide	Cooling Towers	11,000	22	0.2%	0.001

[1] Based on an average daily flow of 6.2 million gallons per day (see Table 4.5-5)

Thermal Discharges from Mesaba Generating Station

The Mesaba Generating Station would discharge cooling tower blowdown directly to the CMP and Holman Lake that would be 10 to 15°F higher than the natural water temperature. To evaluate the impacts of this discharge, Excelsior (2006a) conducted thermal modeling, including both a heat balance analysis and plume modeling. The model was applicable to both the CMP and Holman Lake discharges and used a discharge flow rate of 2,400 gpm.

The heat balance analysis is intended to provide general information on the effect of the cooling tower discharges on the overall temperature of surface layers of the receiving water body. It assumes a well-mixed uniform temperature throughout the surface layers. The results of the heat balance analysis indicate the temperature rise in the CMP due to the addition of the cooling tower blowdown is in the vicinity of 1 to 2°F, and slightly less for Holman Lake. The large surface areas of both the CMP and Holman Lake, together with the small relative volume of water discharged at the higher temperatures (up to 10 to 15°F higher than ambient) to the volume of water in the receiving water bodies, influence the relatively small temperature rise. For Class 2B waters, the temperature standard is 3°F above natural water temperatures in lakes. In reality, the cooling tower discharge would have a greater effect on water temperatures closer to the point of discharge, and a lesser effect far from the point of discharge.

To evaluate the extent of the higher water temperatures near the point of discharge, Excelsior (2006a) used the CORMIX software to model the thermal plume to determine the size of the mixing zone that would be required (i.e., the distance from the discharge pipe to the edge of the thermal plume where the water temperature would be 3°F above the natural water temperature). CORMIX is an EPA-supported mixing zone model for environmental impact assessment of regulatory mixing zones resulting from continuous point source discharges (http://www.cormix.info/). The modeling results, shown in Table 4.5-10, indicate that the required mixing zone would be 100 feet or less for any of the evaluated discharge scenarios (discharge velocities and discharge pipe depth).

Table 4.5-10. Dimensions of Required Mixing Zones for IGCC Power Station Discharge – Spring Conditions

Depth of Discharge (feet)	End-of-Pipe Velocity (feet/sec)	Length Mixing Zone Required (feet)	Comments
0	3	98	Surface plume spreads as it moves away from shore.
0	6.7	75	Surface plume spreads as it moves away from shore.
10	2	33	Plume rises rapidly to surface, and then spreads across surface.
10	6	38	Plume rises rapidly to surface, and then spreads across surface.
10	10	41	Plume is diluted to allowable limits before rising to the surface. Once it reaches the surface the plume spreads across surface.
40	2	29	Plume is diluted to allowable limits before rising to the surface. Once it reaches the surface the plume spreads across surface.
40	10	31	Plume is diluted to allowable limits before rising to the surface. Once it reaches the surface the plume spreads across surface.

Discharge temperature = 79°F.
Ambient water temperature = 57°F.
Allowable water temperature at edge of mixing zone = 60°F.
Source: Excelsior, 2006a

4.5.3.3 Domestic Wastewater Treatment

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

Excelsior has evaluated two options for treating and disposing domestic wastewater produced during construction and operation for both Phases I and II. The first option involves constructing a WWTF to treat domestic wastewater on site and releasing treated effluents to Little Diamond Lake or adding the treated effluent to the cooling tower blowdown stream that is discharged to the CMP and Holman Lake. The second option, preferred by Excelsior, would involve connecting to the CBT POTW at the Taconite pump station located approximately 2 miles south of the West Range Mesaba Generating Station.

Domestic Wastewater Alternative No. 1

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

Once treated, effluent from the WWTF would be routed off site through: (1) an 8-inch diameter gravity sewer pipeline to Little Diamond Lake (located approximately 1.4 miles south-southeast of the Mesaba Generating Station), or (2) via the cooling tower blowdown line leading to the CMP and/or Holman Lake. Alternative 1 would require a construction ROW 50 feet wide and a permanent ROW 30 feet wide resulting in a total impact of approximately 10 acres and 6 acres, respectively.

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

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

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

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

Swan River

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

While there is currently no water quality standard for phosphorus, the MPCA has a current practice of limiting such discharges to 1.0 mg/L at the end-of-the-pipe. In practice, however, a discharger able to meet this limit may still be prohibited by the MPCA from obtaining a permit if the Agency has reason to believe that measurable quantities of phosphorus would be released upstream of a receiving water impaired for DO. The proponents have taken care to avoid the use of phosphorus-containing chemicals to minimize the impact of the Agency's current practice in this regard.

Domestic Wastewater Alternative 2

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

One issue concerning Taconite's collection system is the amount of inflow and infiltration (I/I) entering the system during periods of rainfall or high groundwater. At such times, excess flow can exceed the capacity of the main wastewater pump station in Taconite, creating a need to bypass untreated wastewater into a natural pond system. 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 amount of I/I entering the Taconite collection system can cause the natural pond system to overflow, releasing untreated wastewater into nearby surface waters.

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

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

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

Domestic Wastewater Impacts

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

The improvements to the Taconite main pump station would protect the environment from untreated wastewater discharges that have, and can, occur from this pump station during rainfall and snow melt events.

4.5.3.4 Surface Water Resource Permits

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

Existing Permits

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

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

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

Water that is pumped from the HAMP Complex flows overland through a series of wetlands and small streams and ultimately discharges into Upper Panasa Lake. The CMP does not currently have a surficial outlet. However, if the pit were allowed to naturally overflow, the water would flow into Trout Lake.

New Permits

Different types of water-related permits would be required to construct and/or operate the West Range generating station and its associated facilities. This section identifies the types of permits that would be required and introduces the process that would be completed to obtain them. The permits that are issued would be premised on minimizing water-related impacts associated with the construction and operation of Phase I and Phase II.

MNDNR Water Appropriation Permit

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

MNDNR Public Waters Work Permit

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

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

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

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

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

MPCA NPDES/SDS Permit for Cooling Tower Blowdown

Process water (cooling tower blowdown) discharges are discussed in detail in the NPDES Permit Application (Excelsior, 2006a), including expected discharge volumes, parameter concentrations, and modeling results. The MPCA may set effluent limits at or below expected parameter concentrations during the NPDES/SDS permitting process. Potential impacts on water quality criteria resulting from the four proposed process water outfalls are expected to be minimal. Also, impacts of the volumetric discharges to the CMP and Holman Lake are expected to be minimal. No residents live on the CMP or Holman Lake so slight changes in water levels are not expected to be an issue; however, the recreational use of the CMP may be discontinued. Increased flows through Holman Lake would potentially benefit recreational users of the Gibbs Park swimming beach as any instances of stagnation in the lake would be reduced. The chemical parameters that would exceed water quality standards are not considered toxic pollutants. The geomorphology of the downstream reaches of the Swan River would not be significantly affected since the peak rate of water discharged from the Mesaba Generating Station would be less than that pumped by the Park Service during the seasonal pumping conducted at Hill-Annex State Park.

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

See Section 2 for a discussion of Cooling Water Intake Structure rules applicable to Phases I and II.

Industrial Stormwater Permitting

Discharge of stormwater associated with industrial activities from the project area to waters of the U.S. and State would be permitted as part of the NPDES/SDS permit described above.

Construction Stormwater Permitting

An NPDES Construction Permit would be required for stormwater discharges associated with construction activity. BMPs would be followed in accordance with the NPDES Permit and MPCA BMP Manual, 2000. BMPs would include temporary and permanent erosion control measures such as, timely re-vegetation of disturbed areas, silt fence, inlet protection, ditch checks, and sedimentation ponds.

A SWPPP would be required to address erosion and sediment control during and after construction for each NPDES permit. The SWPPP would address erosion prevention measures, sediment control measures, permanent stormwater management, dewatering, environmental inspection and maintenance, and final stabilization.

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

Since the project is adding impervious surfaces, runoff rates are expected to increase. The receiving waters downstream of the project and of the permanent stormwater management structures would be analyzed to determine potential impacts from increased rates of surface water runoff. If a Total Maximum Daily Load (TMDL) study has been completed prior to the final design of the project and discharges are proposed to that water body, the final design of the project would need to incorporate measures to meet the TMDL requirements.

Surface Water Quality Standards

The key water quality constituents associated with Outfall 001 and 002 discharges would be mercury, TDS, sulfate, and hardness. Mercury would be addressed by operating the Mesaba Generating Station (e.g., adjusting the cycles of concentration) such that the concentration of mercury in its effluent discharges would not exceed the water quality standard of 6.9 ng/L. TDS, sulfate, and hardness discharge concentrations would cause the receiving waters to exceed water quality standards within the confined CMP and within Holman Lake. Excelsior would have to apply for a waiver to exceed standards for these parameters and be granted the waiver by MPCA during the permitting process in order to operate the generating station. The outflow from Holman Lake, once mixed with water from the Swan River, would be below water quality standards for these three parameters.

Impaired Waters

Holman Lake, Panaca Lake, the CMP and the HAMP Complex are not impaired waters. However, the water from those water bodies, either now or in the future, would ultimately discharge into the Swan River, which is impaired for mercury (MPCA, 2006e). The Swan River flows into a reach of the Mississippi River between Swan River and Sandy River, which is also impaired for mercury. Other reaches further downstream on the Mississippi are impaired for:

- Mercury
- Fecal Coliform
- PCBs
- Low DO (excess nutrients, primarily phosphorus)
- Turbidity

Concerns over the environmental effects of PCBs led to a North American ban in 1977 on their manufacture, importation and most non-electrical uses, and also to restrictions on their use in existing electrical and mechanical equipment (Health Canada, 2005). Effluents from Phases I and II would not contain PCBs.

Phosphorus concentrations in recent samples collected from proposed source waters (CMP, HAMP Complex, and the LMP) have been shown to be below 0.1 mg/L. While there is currently no water quality standard for phosphorus, the MPCA has established a discharge standard of 1.0 mg/L that is applied at end-of-pipe discharges. However, even though such a discharge may meet the discharge standard of 1 mg/L, because it is upstream of an impaired body of water, no additional contribution of phosphorus is permitted.

As previously mentioned, Excelsior has taken steps to eliminate the Station's use of phosphorus-containing chemicals that might otherwise cause the discharge of blowdown to cause or contribute to a violation of water quality standards in waters impaired for DO. The proposed operation of the Mesaba Generating Station would result in no increase in the mass of mercury or phosphorus over that currently permitted from the HAMP Complex under NPDES Discharge Permit MN0030198.

4.5.3.5 Utility and Transportation Water Crossings

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

HTVL Routes

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

The HVTL Alternative 1A Route crosses six rivers or streams. Five of these crossings are over the Swan River (perennial) and one crossing is over a perennial stream between Big and Little Diamond

Lakes. As with the preferred route, the stream between Big and Little Diamond Lakes was the only water crossing field surveyed, and Swan River is identified as protected water by the MNDNR PWI. The total length of water crossings for this alternative is estimated at 533 linear feet.

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

As these crossings would be overhead crossings, no adverse impacts are anticipated on the physical characteristics of the stream as no disturbances to streambank, streambed or streamflow would occur. Removal of vegetation providing canopy or shade over the stream to accommodate these crossings would cause a decrease in stream shading. However, the linear feet of decreased stream shading is anticipated to be minimal and should not adversely impact stream temperatures. Table 4.7-4 (Section 4.7) summarizes surface water crossings associated with West Range HVTL alternatives.

Natural Gas Pipelines

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

For the Natural Gas Pipeline Alternative 2, a total of four river or stream crossings are associated with the pipeline. Two of these crossings are over the Swan River (perennial). The other crossings are over the Prairie River (perennial) and a perennial stream between Big and Little Diamond Lakes. The perennial stream between Big and Little Diamond Lakes was the only water crossing in this alternative that was field surveyed during the 2005 field season due to access limitations. The Swan River and Prairie River are both identified as protected waters by the MNDNR PWI.

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

As these crossings are anticipated to be directionally drilled, no adverse impacts are anticipated on the physical characteristics of the stream as no disturbances to streambank, streambed or streamflow would occur. Removal of vegetation providing canopy or shade over the stream to accommodate the new utility corridors would cause a decrease in stream shading. However, the linear feet of decreased stream shading is anticipated to be minimal and should not adversely impact stream temperatures. Table 4.7-6 (Section 4.7) summarizes surface water crossings associated with West Range natural gas pipeline alternatives.

Process Water Supply Pipeline

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

Cooling Tower Blowdown Pipelines

There are two stream crossings associated with the pipeline for Cooling Tower Blowdown Outfall 2 (Mesaba Generating Station Footprint to Holman Lake). Both crossings are over perennial streams, one drains from Little Diamond Lake and the other draining to Holman Lake. Neither stream was field surveyed during the 2005 field season due to access limitations. The NWI is the basis for evaluating wetlands associated with the stream crossings. There are no water crossings associated with the pipeline for Cooling Tower Blowdown Outfall 1 (power plant footprint to CMP).

These crossings may either be directionally drilled or open cut trench. If open cut trenching occurs, impacts to the stream would be temporary and are not anticipated to be adverse. BMPs would reduce or prevent impacts to water quality and stream grades would be restored to their original contours and stabilized. Removal of vegetation providing canopy or shade over the stream to accommodate these crossings would cause a decrease in stream shading. However, the linear feet of decreased stream shading is anticipated to be minimal and should not adversely impact stream temperatures. Table 4.7-6 (Section 4.7) summarizes surface water crossings associated with the pipeline for West Range Cooling Tower Blowdown Outfall 2.

Potable Water and Sewer Pipelines

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

Railroad Lines

No water crossings associated with Railroad Alternatives 1A or 1B have been identified based on NWI, USGS, and MNDNR PWI mapping resources.

West Range Roads

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

4.5.3.6 Water Crossing Impact Minimization

The following section describes some mitigation measures that may reduce the impacts associated with the water crossings.

Natural Gas Pipelines

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

Cooling Tower Blowdown Pipelines

There are two water crossings associated with the pipeline for Cooling Tower Blowdown Outfall 2. The entire length of the crossing would impact the bodies of water that are crossed and adjacent to wetlands. The total length of water crossings is 6 linear feet over water and a total of 50 linear feet in the adjacent wetlands. Impacts to wetlands due to the water crossings are based on a 150-foot temporary ROW and 100-foot permanent ROW.

4.5.3.7 Groundwater Resources

No high-capacity groundwater wells would be constructed for the facility's potable water supply or process water needs. The depth to groundwater and groundwater quality and flow direction of the aquifers at the site would not be altered or impacted by operation of the facility. Significant impacts to the local aquifers are not expected from this project. The facility would take precautions and implement the engineering controls necessary and required to prevent a release of hazardous chemicals or substances that could potentially enter the groundwater and impact groundwater quality.

Public water supply systems of local municipalities may be sensitive to potential contaminant sources and may be hydrologically connected to affected surface water bodies (lakes and mine pits). Therefore, any necessary discharges from the facility would be properly managed in accordance with the NPDES permits issued for plant, and applicable state and local regulations to prevent degradation of source water aquifers used for public water supplies.

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

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

4.5.4 Impacts on East Range Site and Corridors

The water supply required to support the East Range Mesaba Generating Station is reduced in comparison to that required for the West Range Mesaba Generating Station. The cooling tower blowdown that would otherwise be discharged to receiving waters (for example, Holman Lake in the case of the West Range Mesaba Generating Station) would be processed through a reverse osmosis (RO) system to recover water that can be recycled within the plant. The brine wastewater from the RO system would be processed in a Mechanical Vapor Recompression (MVR) evaporator/crystallizer that would serve as the principal component of the ZLD system (further described below). Water recovered from the enhanced ZLD system would be recycled for make-up water where needed.

Water appropriations can be reduced by up to 700 gpm per phase through the use of such recycling efforts. The auxiliary power required to operate the ZLD system is about 2 megawatts (MW) per phase. In addition, the TDS present in the East Range mine pit waters would produce significant quantities of additional solids that must be disposed in an industrial solid waste landfill (discussed in more detail in Section 4.16).

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

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

4.5.4.1 Process Water Alternatives

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

Water levels in several of the pits are rising, but pose no current threat to public health and/or welfare unlike levels in the HAMP Complex and CMP located near the West Range Site. Unlike the CMP and HAMP Complex, there is no current need to control water levels in any of the pits proposed for use on the East Range Site. Therefore, water supplies from any of the individual East Range pits can be over-pumped as necessary to meet the demands of Phases I and II. As noted for the West Range Mesaba Generating Station, the water management plan for the East Range Mesaba Generating Station would be subject to environmental review and permitting process approvals. Mine Pit 2WX would serve as the reservoir from which the plant would appropriate water to meet its needs. This is similar to the function the CMP serves in the West Range Water Resource Management Plan. A permanent pumping station would be placed within Mine Pit 2WX and would receive input from one or more of the pits identified in Table 4.5-12. In the event of high inflow rates into Colby Lake during spring runoff or during high precipitation events, water would be pumped from Colby Lake into Mine Pit 2WX.

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

Process Water Source	Estimated Range of Flow (gpm)	Information Source	Average Annual Flow (gpm)
Mine Pit 6		1	1,800
Mine Pit 2 WX		1	700
Mine Pit 2 West		1	900
Mine Pit 2 East		1	100
Mine Pit 3	150-450	2	300
Donora Mine Pit	130-380	2	260
Stephens Mine Pit	190-590	2	390
Knox Mine Pit	20-70	2	45
Mine Pit 9S	90-270	2	180
Mine Pit 1 Effluent	0-1000	3	1,000

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

Process Water Source	Estimated Range of Flow (gpm)	Information Source	Average Annual Flow (gpm)
PolyMet Mining Dewatering Operations	2,000-8,000	4	4000
Colby Lake	See Note 5	5	2,900*
		Total Resource (gpm)	12,600

1. East Range Hydrology Report, MNDNR, Division of Lands and Minerals, Division of Waters, March 2004.
2. Range of flow based on the surface drainage area to the pit and average yearly rates of runoff. See Figure 1.12-72 to identify the watershed basins that contribute to the surficial input into each mine pit. This should be considered a first order approximation as the actual flow rates are likely much more dependent on groundwater components. The groundwater inflow/outflow component in this area can be highly variable as a result of fractures in the bedrock and/or highly pervious tailings dikes. Due to the complexity associated with the groundwater component, groundwater inflow/outflow has not been evaluated.
3. MPCA NPDES Permit Issued to Mesabi Nugget. Mine Pit 1 effluent represents the wastewater discharged from Mesabi Nugget's permitted operation of Mine Pit 1 in accordance with terms of a NPDES Permit.
4. North Met Mine Environmental Assessment Worksheet.
5. MP–Cliffs-Erie Water Appropriation Permit No. 490135; Permitted withdrawal is 12,000 gpm average daily withdrawal over continuous 60-day average; 15,000 gpm peak; and 6,307.2 million gallons per year.
*Approximate average appropriation rate in CY2000

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

Process Water Discharges and Water Quality Criteria

The West and East Range Mesaba Generating Stations do not differ greatly in their need for water, but do differ greatly in how wastewaters from the Mesaba Generating Station must be managed. The East Range Site is located within the Lake Superior Basin watershed and the standards that apply to discharges of bioaccumulative chemicals of concern (BCC) in the Basin effectively preclude wastewater discharges from Phases I and II. The principal reason for this prohibition is that mercury (a BCC) is found in the source waters for the East Range Site at concentrations nearly equal to the water quality criteria standard applied to end-of-the-pipe discharges.

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

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

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

Alternatives for Managing Cooling Tower Blowdown

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

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

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

4.5.4.2 Domestic Wastewater Treatment

The two primary options available for wastewater treatment and disposal for the East Range Mesaba Generating Station include constructing a WWTF to treat domestic wastewaters on site or connecting to the existing Hoyt Lakes wastewater system.

Alternative 1: On-Site Wastewater Treatment

There are many styles of WWTF but most are categorized as either pond systems or mechanical plants (usually activated sludge). A stabilization pond facility would require chemical application to meet the limit for phosphorus. An activated sludge facility can remove phosphorus biologically, which is dramatically cheaper than chemical removal.

This alternative would consist of constructing a stabilization pond facility with the capacity to treat 30,000 gpd at a location near the facility. The stabilization pond facility would consist of three earthen-dike basins that provide a total detention time of 210 days. The basins would require a total area of 12 acres. A 12-inch effluent gravity sewer would be constructed to convey treated effluent to the mine drainage stream running northeast to southwest through the project site. The effluent stream would discharge into Colby Lake. The length of this sewer pipe would be approximately 1,200 feet to reach the stream.

A disadvantage of this alternative is that the treatment facility would require a capacity of 30,000 gpd to meet construction demands, but would receive only about 25 percent of this design flow after the construction of the project is complete. Thus, part of the facility would have to be abandoned and other modifications made to the facility at the completion of Phase II. Another potential concern with the on-site WWTF is that effluent from the system would discharge into Colby Lake, which is the source for the Hoyt Lakes drinking water treatment plant.

The project would be required to obtain an NPDES permit for this discharge and a part-time licensed WWTF operator would be required to manage the treatment system. This staffing requirement would increase annual operating costs. The MPCA has designated Colby Lake and the Partridge River as impaired for mercury and fish consumption (see listings of impaired waters approved by the U.S. EPA and the new 2006 list drafted by the MPCA on the MPCA's web site at http://www.pca.state.mn.us/water/tmdl/index.html#tmdl). However, neither Colby Lake nor the Partridge River are listed as impaired for nutrients or DO. As well, the St. Louis River (of which the Partridge River is a tributary) from its headwaters to its discharge into Lake Superior is not listed as impaired for nutrients or DO. Finally, Lake Superior is not listed as impaired for either nutrients or DO. Therefore, the MPCA's Phosphorus Strategy applies and would require that the proposed WWTF meet a limit of 1 milligram per liter total phosphorus.

For the relatively small treatment facility needed for the volume of wastewater produced by the project, the capital cost and O&M costs for an activated sludge facility would far exceed the cost savings recognized from biological phosphorus removal. Due to the high capital and O&M costs, an activated sludge facility was eliminated as an option.

Alternative 2: Connect to the Hoyt Lakes Wastewater System

The East Range Mesaba Generating Station is located approximately 1.6 miles north of CR 110, the main road cutting through the City of Hoyt Lakes. The City of Hoyt Lakes owns, operates and maintains a POTW comprised of a wastewater collection system and wastewater treatment units. The POTW receives wastewater from the residential, commercial and industrial establishments within the city and discharges treated effluent to Whitewater Lake. The system has a design capacity of 680,000 gpd and receives an average flow of approximately 300,000 gpd.

The second alternative for the disposal of domestic wastewater is to connect to the City of Hoyt Lakes' wastewater collection and treatment system. This alternative would require the construction of approximately 9,500 feet of a 12-inch gravity sewer pipeline, a pump station, and about 2,500 feet of a 4-inch force main. The wastewater piping would parallel the existing high voltage power line easement along the west side of the proposed property boundary, south to Colby Lake. A pump station would be located on the north side of Colby Lake. The force main would be directionally drilled beneath Colby Lake and then connected to the existing city gravity sewer near MP on the north end of Colby Lake Road. The 12-inch sewer pipeline would have ample capacity to convey the estimated wastewater flow of 30,000 gpd during construction. The existing Hoyt Lakes WWTF has capacity available to treat the estimated flow from the proposed project.

There are several advantages to this option when compared to on-site treatment. One advantage is ownership of the sewer lines constructed for the project could be turned over to the City of Hoyt Lakes for operation and maintenance. Thus the only annual operating and maintenance costs for this option would be the sewer use charges from the city. A WWTF operator would not be required to monitor the system.

One disadvantage is the sewer system has to cross Colby Lake. This increases the cost and would require a MNDNR permit. The lake is about 10 feet deep where the crossing would be constructed and the sewer is expected to be placed about 15 feet below the lake bottom. If rock is encountered at the lake crossing, then microtunneling would be required in lieu of directional drilling which would increase construction costs. Soil borings would be required to confirm rock elevations along the proposed pipe alignment and at the location of the proposed treatment.

Wastewater Impacts

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

Both of the alternatives would require piping which would have to traverse forested areas and hilly terrain, which does not preclude either alternative. However, the environmental impact of discharging to Colby Lake, the City's water supply, may preclude the first alternative. The existing Hoyt Lakes POTW has a permit to discharge into Whitewater Lake and that system would not require modification to add the anticipated wastewater flow from Phases I and II.

Construction of a 12-inch gravity sewer pipeline from the generating station Footprint to the City of Hoyt Lakes collection system has tangible advantages over the option of an on-site treatment facility and is the preferred approach to handle domestic wastewaters from Phases I and II.

4.5.4.3 Water Withdrawals and Permits

Unlike the CMP and HAMP, there would be no immediate need to control water levels in any of the pits on the East Range Site. Therefore, water supplies from any of the individual East Range pits could be over-pumped as necessary to meet demands of the project. Existing MNDNR water appropriation permits for East Range surface waters are shown in Table 4.5-13.

Table 4.5-13. Existing Water Appropriation Permits for Surface Waters around East Range Site

Permitee	Resource	Permitted		Reported Pumping (Million Gallons)				
		GPM	MG/Y	2000	2001	2002	2003	2004
MP & Cliffs-Erie, LLC (CE)	Colby Lake	12,000	6,307	2,945.7	69.2			
MP	Colby Lake	100,500	50,000	71.4	60.4	63.4	96.1	117.2
MP	Colby Lake	100,500	50,000	23,851.7	24,061.7	24,261.9	24,132.9	22,458.9
MP	Colby Lake	100,500	50,000	21,734.0	24,133.9	24,185.4	24,132.9	23,541.8
MP	Colby Lake	100,500	50,000	51.1	4.0	3.4	0.0	21.1
MP	Colby Lake	100,500	50,000	4.3	41.6	28.8	0.1	0.4
MP	Colby Lake	100,500	50,000	17.3	0.1			
MP	Colby Lake	100,500	50,000	474.0	516.4	523.6	525.5	525.1
City of Hoyt Lakes	Colby Lake	1,050	160	123.1	116.4	120.4	122.8	120.4
City of Hoyt Lakes	Partridge River		4	2.4	1.8	1.7	2.2	1.5
CE		3,600	1,155	1,055.4				
CE		3,600	1,155					
CE		3,600	1,155					
CE		1,500	551					
CE		20,000	10,512					
CE		20,000	10,512					
CE		20,000	10,512	1,860.2				
CE		20,000	10,512					
IRRRB	Embarrass Mine Pit	600	50		4.9	22.0	26.3	48.3
City of Aurora		1,020	160	73.7	74.7	81.8	106.5	93.4
CE		5,000	788					

Table 4.5-13. Existing Water Appropriation Permits for Surface Waters around East Range Site

Permitee	Resource	Permitted		Reported Pumping (Million Gallons)				
		GPM	MG/Y	2000	2001	2002	2003	2004
CE		12,000	3,049	316.9				
CE		12,000	3,049					
CE		12,000	3,049					
CE		3,000	1,050					
CE		3,000	1,050	1,807.2				
IRRRB	Wynne Lake	1,800	50	70.7	67.2	56.8	54.9	55.9
IRRRB	Wynne Lake	600	29	51.4	41.3	36.0	37.9	29.0
United Taconite LLC	St. Louis River	7,000	4,010	2,835.6	3,18.0	3,811.7	2,550.8	2,400.0

The type of permits required for the East Range Site mirrors the permits required for the West Range Site with the exception of the NPDES permit covering discharges of cooling tower blowdown (in the case of the East Range generating station there would be no such discharge).

MNDNR Water Appropriations Permit

An MNDNR Water Appropriations Permit for Non-Irrigation (FORM #A-02623-06) would be required for water appropriations. A separate permit application would be completed for each water source, but the applications and supporting data would be submitted in one package. The MNDNR would issue one permit to Excelsior that covers all of the water sources. An annual Water Use Report would be required by the MNDNR for all Water Appropriations Permits.

MNDNR Public Waters Work Permit

A MNDNR Public Waters Work Permit (FORM #NA-026620-03B) would be required for temporary and permanent impacts to Public Waters. A MNDNR Public Waters Work Permit would be required for work that takes place in any of the identified public waters. For stream crossings (see Section 4.5.4.4), the MNDNR must review and approve any proposed hydraulic changes to the stream.

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

East Range HVTL

- Embarrass River (two crossings)
- Cedar Island Lake
- Norcund River
- Colby Lake
- Whitewater Lake
- Partridge River (two crossings)
- St. Louis River (three crossings)
- Two River (two crossings)

East Range Gas Pipeline

- Two River
- Unnamed Creek
- Elbow Lake
- Maryt Lake
- Lost Lake
- Forth Lake
- Esquagama Lake
- Unnamed Tributary to St. Louis River
- Colby Lake
- Whitewater Lake
- Partridge River
- First Creek

East Range Rail Line Alternative 1

- Unnamed Creek

East Range Rail Line Alternative 2

- Unnamed Creek
- Colby Lake

MPCA NPDES/SDS Permit

MPCA NPDES Permits would be required for stormwater discharges associated with industrial activity and construction activities. No discharges of cooling tower blowdown would occur, therefore, no NPDES permit for this discharge would be required. Sanitary discharges would be routed to the Hoyt Lakes POTW and would require a permit from the local authority. Such discharges do not require an NPDES pre-treatment permit.

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

These rules are not expected to be applicable to the East Range water resources as there are no established fisheries in any of the abandoned mine pits.

Industrial Stormwater Permitting

Discharge of stormwater associated with industrial activities from the project area to waters of the U.S. and State would be permitted as part of the NPDES/SDS Permit.

Construction Stormwater Permitting

Permitting requirements would mirror those for the West Range Site.

4.5.4.4 Utility and Transportation Water Crossings

Utility crossings over, under, or through water bodies listed as protected waters on the MNDNR PWI for the East Range Site would require Licenses for Utility Crossings of Public Lands and Waters under Minnesota Statutes § 84.415 and Minnesota Rules Chapter 6135. There would be no water crossings associated with siting, placement, or construction on the generating station footprint or on buffer land and roads. The following subsections describe the water crossings within the HVTLs, gas pipelines, water supply, process water discharge lines, sewer and water line, and rail lines. Because of their relationships to impacts on wetlands, surface water crossings are included in tables in Section 4.7.

HTVL Routes

There are a total of 21 crossings of streams or other water bodies associated with 38L HVTL Route and 20 crossings associated with the 39L/37L HVTL Route. The longest crossing for either route would be over Colby Lake, with a linear crossing of approximately 540 linear feet. Colby Lake, an unnamed pond, and nine other rivers and streams are identified as protected waters by the MNDNR PWI. The total length of water crossings for the 38L HVTL Route is estimated at 1,194 linear feet, whereas the total length of water crossings for the alternative route (39L/37L HVTL Route) is estimated at 1,760 linear feet.

As these crossings would be overhead crossings, no adverse impacts are anticipated on the physical characteristics of the stream as no disturbances to streambank, streambed or streamflow would occur. Removal of vegetation providing canopy or shade over the stream to accommodate these crossings would cause a decrease in stream shading. However, the linear feet of decreased stream shading is anticipated to be minimal and should not adversely impact stream temperatures. Table 4.7-14 (Section 4.7) summarizes surface water crossings associated with East Range HVTL alternatives.

Natural Gas Pipelines

There are a total of 19 crossings of streams or other water bodies associated with the proposed natural gas pipeline route. The largest water crossing is over Colby Lake, with a linear crossing of approximately 430 feet. The total length of water crossings for this pipeline is estimated at 792 linear feet. Colby Lake and 12 rivers and streams are designated as protected waters by the MNDNR PWI.

As these crossings are anticipated to be directionally drilled, no adverse impacts are anticipated on the physical characteristics of the stream as no disturbances to streambank, streambed or streamflow would occur. Removal of vegetation providing canopy or shade over the stream to accommodate the new utility corridors would cause a decrease in stream shading. However, the linear feet of decreased stream shading is anticipated to be minimal and should not adversely impact stream temperatures. Table 4.7-16 (Section 4.7) summarizes surface water crossings associated with the East Range natural gas pipeline.

Process Water Supply Pipelines

There are two crossings of streams or other water bodies associated with process water supply pipeline: Area 6 and Stephens Mine to Area 2WX. The largest water crossing is over Second Creek, with a linear crossing of approximately 30 feet. The total length of water crossings for this alternative is estimated at 33 linear feet. Both Stephens Creek and Second Creek are designated as protected water by the MNDNR PWI.

There is one crossing of a stream or other water body associated with process water supply pipeline – Area 9 South to Area 6. Total length of water crossing for this pipeline is estimated at 3 linear feet. First Creek is designated as protected water by the MNDNR PWI. For Area 9 North (Donora Mine) to Area 6, there is one crossing. The total length of water crossing for this pipeline is estimated at 3 linear feet. Table 4.7-16 (Section 4.7) summarizes surface water crossings associated with East Range process water pipelines.

Potable Water and Sewer Pipelines

There is one crossing of a water body associated with the potable water and sewer pipelines. The total length of water crossing for this pipeline is estimated at 460 linear feet through Colby Lake.

This crossing will be directionally drilled under the Lake. BMPs at the drilling locations would reduce or prevent impacts to water quality, and the shoreline would be restored to its original contours and stabilized. Table 4.7-16 (Section 4.7) summarizes surface water crossings associated with the East Range potable water and sewer pipelines.

Rail Lines

There are two crossings of streams or other water bodies associated with Rail Line Alternative 1. A tributary to Colby Lake is crossed twice by the center loop for the rail line. The total length of water crossings for Alternative 1 is estimated at 6 linear feet. In terms of Rail Line Alternative 2, two crossings of streams or other water bodies are considered. The total length of water crossings is estimated at 6 linear feet. Both Wyman Creek and the tributary to Colby Lake are designated as protected waters by the MNDNR PWI. While only 6 linear feet of streams would be crossed with either alternative, the disturbed areas within the rights of way could extent up to several hundred feet on either side of the crossing (See Section 4.7, Wetlands).

Appropriate crossing structures would be used to minimize the rail footprint impact on these streams. Short-term impacts during construction include decreased water quality from waterborne sediments. Permanent impacts from the construction of the rail line in the streambeds would be minimized by the use of culverts under the railroad bed. No long-term adverse impacts are anticipated on these streams. Table 4.7-18 (Section 4.7) summarizes surface water crossings associated with East Range rail line alternatives.

East Range Roads

There are no stream crossings associated with the roads.

4.5.4.5 Water Crossing Impact Minimization

The following section describes some mitigation measures that may reduce the impacts associated with the water crossings during construction.

HVTL Routes

There are 21 crossings of streams or water bodies associated with HVTL Alternative 1 that would require crossing of 1,194 linear feet of water, and 20 crossings associated with HVTL Alternative 2 that would require crossing of 1,760 linear feet of water. Placement of the power poles supporting the HVTL would be designed to avoid direct impacts to streams, rivers, or other bodies of water within the project area. The average expanse between poles would be approximately 650 feet for HVTL Alternative 1 and 530 feet for HVTL Alternative 2, but in sensitive or otherwise important areas that should be avoided, the expanse between power poles may be shortened to whatever length necessary or lengthened to approximately 1,000 feet. As a result, impacts within the bed of any water bodies would be avoided.

Natural Gas Pipelines

The East Range Natural Gas Pipeline Alternative 1 would cross approximately 792 linear feet of streams and bodies of water, not including adjacent wetland habitat. For water crossings, the natural gas pipeline would be directionally drilled under water bodies starting at approximately 100 feet from the edge of each bank. This would minimize impacts to wetlands associated with water crossings. The remainder of the natural gas pipeline would include open trench installation.

4.5.4.6 Groundwater Resources

No high-capacity groundwater wells would be constructed for the facility's potable water supply or process water needs. The depth to groundwater and groundwater quality and flow direction of the aquifers at the site would not be altered or impacted by operation of the facility. Significant impacts to the local aquifers are not expected from this project. The facility would take precautions and implement the engineering controls necessary and required to prevent a release of hazardous chemicals or substances that could potentially enter the groundwater and impact groundwater quality.

Public water supply systems of local municipalities may be sensitive to potential contaminant sources and may be hydrologically connected to affected surface water bodies (mine pits). However, as there would be no wastewater discharges associated with the East Range Site (other than domestic wastewater discharged to the local POTW), there would be no potential for contaminated sources affecting surface water bodies.

4.5.5 Impacts of the No Action Alternative

Under the No Action Alternative, the proposed project would not be built. As a result, no project-related development would occur, and consequently, there would be no impact or change in baseline conditions relating to surface water resources.

The primary impact of the No Action Alternative is the potential overflowing and flooding that may occur in the near future at the CMP near the West Range Site. The water level in this mine pit complex has been rising continuously since mining operations ceased. At present, there is no existing infrastructure that would allow the water level in the CMP to be lowered and prevent potential overflows.

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	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 prevent its current use as a recreation facility. The pumping of the HAMP would benefit the park by lowering the water level.	Water Resource Management Plan developed to ensure capacity and availability of existing and future withdrawals.
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.	Cumulative effects on receiving waters would be monitored to ensure parameter concentrations do not exceed water quality standards.	No discharges directly to surface waters.
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.

Basis for Impact	No Action	West Range	East Range
Violate any Federal, state, or regional water quality standards or discharge limitations.	No new discharges would occur.	Discharges of cooling tower blowdown would be within expected NPDES permit levels. Cumulative affects on receiving waters would be monitored to ensure parameter concentrations do not exceed water quality standards. 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.	Lowering of the water levels in the CMP should limit any migration of mine pit water into the local aquifers.	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.

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 NFIP 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 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 are located with in 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 means for crossing the floodplain. Therefore, temporary impacts would be associated with the construction and placement of the natural gas pipelines.

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 come near to 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.

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.

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 right-of-way (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.

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.

Basis for Impact	No Action	West Range	East Range
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 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..
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 above and beyond the Federal and state requirements.

4.7 WETLANDS

4.7.1 Approach to Impacts Analysis

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 rights-of-way (ROWs). The NWI mapping was used to supplement and identify potential wetlands and "other waters" in areas where access was not granted during the 2004 and 2005 field season. GIS applications were then used to determine area calculations of potential wetlands and other waters occurring in areas where field investigations had not been performed, but 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 primary impacts, relating to the direct loss of wetlands due to the placement of dredge or fill material, and as secondary impacts, relating to the altering or conversion of wetland function due to the removal of vegetation or change in hydrological regime.

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.

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 impact 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.

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

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.

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 approximately 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 would be suspended lines that would have no impact to surface waters.

ROW Clearing and Maintenance

Common secondary 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 of conversion 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, would occur. Initially, wetlands would be converted from one vegetative class into another; scheduled maintenance of the 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 thermal temperatures from the loss of shade trees lost; the area could experience decreased temperatures during the winter months due to increased wind velocities.

Pipelines and Access Roads

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 lay down 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. Secondary 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 impacts 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 impact 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 and a 70-foot (21-meter) permanent ROW. Stream impacts could be avoided through the use of directional drilling under the existing water resources, including wetlands. The proposed drilling would occur for all of the natural gas alternatives approximately at 100 feet landward from the wetland/upland edge of the wetland resource. This construction procedure would be implemented for all of the natural gas pipeline alternatives.

Impacts to wildlife habitat, flood flow attenuation and sediment stabilization functions would likely occur as a result 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.

Rail Line Construction

The railroad alternatives are the only utility or transportation corridors that have designed engineering construction limits established. Consequently, all wetland impacts within the permanent and temporary ROW 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 railroad 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.

4.7.2.2 Impacts of Operation

The majority of impacts to wetlands would be consequences related to construction activities. Wastewater effluent (West Range Site only) would not result in a significant increase in temperature in receiving waterbodies, which would not favor zebra mussel habitat. Impacts to wetlands during operations would generally be limited to the potential for spilled materials to impact 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

<u>Mesaba Generating Station</u>

Wetland impacts related to the construction of the footprint of the Mesaba Generating Station at the West Range Site are summarized in Table 4.7-1.

Table 4.7-1. Summary of Permanent Wetland Impacts (West Range Site)

Wetland Classification	Proposed Permanent Impact Area (acres)		
	Phase I	Phase II	Total
Type 3 (shallow marsh)	0	0.04	0.04
Type 3/6/8 (shallow marsh, shrub swamp, bog complex)	0	11.52	11.52
Type 3/7 (shallow marsh, wooded swamp complex)	0.47	0.08	0.56
Type 7 (wooded swamp)	16.86	1.99	18.84
Total	**17.33**	**13.63**	**30.96**

Source: Excelsior, 2006b

The total wetland losses for the West Range Site power plant footprint are estimated at 30.96 acres. Approximately 17.33 acres of wetlands would be lost during Phase I construction, and an estimated 13.63 acres of wetlands would be lost during Phase II construction. The most common wetland resource affected would be Type 7 (wooded swamp) wetlands.

Wetland-dependant wildlife could be affected by the proposed construction of the plant at the West Range Site. The forested wetlands at the site appear to possess a moderate wildlife habitat function, providing vertical layers that could be used by avifauna.

West Range Utility and Transportation Corridors

West Range HVTL Alternative 1

HVTL Alternative 1 is an existing 100-foot wide permanent ROW that extends south of the West Range Site to Trunk Highway 169 (TH 169). Impacts to wetlands under HVTL Alternative 1 would occur primarily from the placement of power poles in wetland areas. A total of 16 power poles would be placed in wetland areas for this alternative. A total of 0.01 acres of wetlands would be permanently lost (Table 4.7-2).

Table 4.7-2. Wetland Impacts - HVTL Alternatives (West Range Site)

Corridor/Alignment	Wetland Classification	Estimated Number of Poles	Total Area (acres)
HVTL Alternative 1	Types 1/4/5 (seasonally flooded basin or flat, deep marsh, shallow open water complex)	0	0
	Type 2 (wet meadow)	1	0.0006
	Type 3 (shallow marsh)	2	0.0012
	Type 6 (shrub swamp)	2	0.0013
	Type 7 (wooded swamp)	4	0.0026
	Type 8 (bog)	7	0.0045
Total		**16**	**0.01**
HVTL Alternative 1A	Types 1/4 (seasonally flooded basin or flat, deep marsh complex)	0	0
	Type 2 (wet meadow)	1	0.0006
	Type 3 (shallow marsh)	2	0.0012
	Type 5 (shallow open water)	1	0.0006
	Type 6 (shrub swamp)	2	0.0012
	Type 7 (wooded swamp)	3	0.0019
	Type 8 (bog)	7	0.0045
Total		**16**	**0.01**
HVTL Phase II	Types 3/6/8 (shallow marsh, shrub swamp, bog complex)	1	0.0006
	Type 2 (wet meadow)	6	0.0039
	Type 3 (shallow marsh)	17	0.0109
	Type 6 (shrub swamp)	11	0.0071
	Type 7 (wooded swamp)	1	0.0006
	Type 8 (bog)	3	0.0019
Total		**39**	**0.03**

NOTE: Wetland impacts in this table are associated with the placement of utility poles in wetland areas.
Source: Excelsior, 2006b

South of TH 169 a new 100-foot wide ROW would require the removal of above ground woody vegetation. As shown in Table 4.7-3, wetlands anticipated to be cleared of trees and shrubs to establish HVTL Alternative 1 include approximately 30.21 acres of wetlands, including Type 6, 7, and 8 wetlands south of TH 169, which would result in conversions of wetland type.

Table 4.7-3. Tree and Shrub Clearing in Wetlands - HVTL Alternatives (West Range Site)

Corridor/Alignment	Wetland Classification	Total Area of Tree and Shrub Clearing (acres)
HVTL Alternative 1	Types 2/3 (wet meadow, shallow marsh complex)	0
	Type 6 (shrub swamp)	8.63
	Type 7 (wooded swamp)	7.37
	Type 8 (bog)	14.21
Total		**30.21**
HVTL Alternative 1A	Types 2/3 (wet meadow, shallow marsh complex)	0
	Type 6 (shrub swamp)	1.38
	Type 7 (wooded swamp)	5.54
	Type 8 (bog)	17.61
Total		**24.53**
HVTL Phase II	Types 2/3/4/6/7/8	0

Source: Excelsior, 2006b

There are two aerial crossings associated with HVTL Alternative 1: an unnamed perennial stream between Big and Little Diamond Lakes and the Swan River. The total length of the aerial water crossing for HVTL Alternative 1 is estimated at 123 linear feet. Wetland impacts would not be expected to occur (Table 4.7-4).

Table 4.7-4. Surface Water Crossings - HVTL Alternatives (West Range Site)

Corridor/Alignment	Number of Crossings	Total Length of Crossings (linear feet)	Permanent ROW Wetland Impacts Adjacent to Crossings (acres)
HVTL Alternative 1	2	123	0
HVTL Alternative 1A	6	533	0
HVTL Phase II	5	283	0

Source: Excelsior, 2006b

West Range HVTL Alternative 1A

The alignment for HVTL Alternative 1A is characterized as a 100-foot wide permanent ROW. The initial segment of HVTL Alternative 1A is within an existing 100-foot electric utility ROW that extends south of the West Range Site to approximately TH 169, and would be the same corridor alignment proposed for HVTL Alternative 1. South of TH 169 a new 100-foot ROW would be constructed slightly east of the HVTL Alternative 1 corridor. Permanent wetland impacts would be limited to those areas where overhead utility poles would be placed within wetland habitat. A total of 16 power poles would be placed in wetland areas for this alternative. Approximately 0.01 acres of permanent wetland losses associated with the poles for HVTL Alternative 1A corridor would occur (Table 4.7-2). Additional secondary wetland impacts from tree clearing and continued maintenance within the new corridor south of TH 169 would be required and would impact approximately 24.53 acres of mostly Type 8, bog wetlands (17.61 acres) (Table 4.7-3), which would result in conversions of wetland type.

There are six aerial crossings associated with HVTL Alternative 1A, five of which would go over the Swan River, a protected water listed by the MNDNR PWI. Since a portion of HVTL Alternative 1A follows the same alignment as HVTL Alternative 1, there are two similar water crossings: a perennial stream between Big and Little Diamond Lakes and the Swan River. The four additional crossings over the Swan River occur along the southern portion of the HVTL Alternative 1A alignment. Direct impacts to soils or vegetation in the form of earth disturbance or plant removal are not expected for the Swan River crossings, and would be avoided to the extent feasible. The total length of water crossings for HVTL Alternative 1A is estimated at 533 linear feet. Wetland impacts would not be expected to occur because the HVTLs would be suspended over the wetland areas (Table 4.7-4).

West Range HVTL Phase II

The West Range HVTL Phase II alignment is a 200-foot wide permanent ROW within an existing MP ROW. The ROW used during construction activities would be contained within this 200-foot wide corridor and permanent wetland impacts would be confined to those areas where overhead utility poles would be placed within wetland habitat. A total of 39 power poles would be placed in wetland areas for this alternative, resulting in approximately 0.03 acres of wetland losses (Table 4.7-2). Since this corridor is already established and maintained free of trees and shrubs, additional secondary wetland impacts involving vegetation clearing would not be anticipated for this alternative (Table 4.7-3).

There are five aerial crossings of “other waters” associated with the HVTL Phase II alternative alignment. All of the crossings would be over protected waters listed in the MNDNR PWI. The water resource crossings include the Swan River and one of its tributaries, Snowball Creek, Oxhide Creek, and Oxhide Lake. Wetland impacts within any portions of these water bodies would be avoided. The total length of water crossings for HVTL Phase II is estimated at 283 linear feet; no impacts to adjacent wetlands would be anticipated (Table 4.7-4).

West Range Natural Gas Pipeline Alternative 1

Wetlands within the proposed Natural Gas Pipeline Alternative 1 corridor include six wetland basins delineated during the 2005 field surveys and 23 wetland basins identified by NWI mapping that have not been field-verified. In the proposed 100-foot temporary ROW, a total of 24.69 acres of wetland resources would be temporarily affected as a result of the Proposed Action. In the 70-foot permanent ROW, 17.47 acres of permanent wetland losses would occur, mostly in shrub swamp and wooded swamp wetlands. A summary of these impacts is provided in Table 4.7-5.

Table 4.7-5. Wetland Impacts - Utility Pipelines Alternatives (West Range Site)

Pipeline	Wetland Classification	Wetland Impacts (acres)	
		Temporary ROW	Permanent ROW
Natural Gas Pipeline Alternative 1	Types 4/5 (deep marsh, shallow open water complex)	0	0
	Type 1 (seasonally flooded basin or flat)	0.18	0.12
	Type 2 (wet meadow)	1.83	1.28
	Type 3 (shallow marsh)	1.57	1.14
	Type 6 (shrub swamp)	5.54	3.98
	Type 7 (wooded swamp)	9.77	6.94
Total		**24.69**	**17.47**
Natural Gas Pipeline Alternative 2	Types 1/ 4/5 (seasonally flooded basin or flat, deep marsh, shallow open water complex)	0	0
	Type 2 (wet meadow)	0.53	0.31
	Type 3 (shallow marsh)	1.78	1.29
	Type 6 (shrub swamp)	19.40	11.58
	Type 7 (wooded swamp)	2.94	2.09
	Type 8 (bog)	4.21	2.86
Total		**28.86**	**18.13**

Table 4.7-5. Wetland Impacts - Utility Pipelines Alternatives (West Range Site)

Pipeline	Wetland Classification	Wetland Impacts (acres)	
		Temporary ROW	Permanent ROW
Natural Gas Pipeline Alternative 3	Types 1/5 (seasonally flooded basin or flat, shallow open water complex)	0	0
	Type 2 (wet meadow)	0.43	0.30
	Type 3 (shallow marsh)	7.50	5.52
	Type 4 (deep marsh)	0.29	0.20
	Type 6 (shrub swamp)	2.51	1.69
	Type 7 (wooded swamp)	0.44	0.31
	Type 8 (bog)	1.65	1.10
Total		**12.82**	**9.12**
Process Water Supply Pipeline Segment 1 – Land Pit to Canisteo Pit	NA	0	0
Process Water Supply Pipeline Segment 2 – Canisteo Pit to West Range Site	Types 1/ 2/3/4/5/8	0	0
	Type 3/6/8 (shallow marsh, shrub swamp, bog complex)	4.20	2.81
	Type 6 (shrub swamp)	0.17	0.04
	Type 7(wooded swamp)	1.11	0.88
Total		**5.48**	**3.73**

Table 4.7-5. Wetland Impacts - Utility Pipelines Alternatives (West Range Site)

Pipeline	Wetland Classification	Wetland Impacts (acres)	
		Temporary ROW	Permanent ROW
Process Water Supply Pipeline Segment 3 – Gross-Marble Pit to Canisteo Pit	Types 1/2/3 (seasonally flooded basin or flat, wet meadow, shallow marsh complex)	0	0
	Type 4 (deep marsh)	0.62	0.42
	Type 5 (shallow open water)	0.64	0.20
	Type 6 (shrub swamp)	2.45	1.33
	Type 6/7 (shrub swamp, wooded swamp complex)	0.27	0.18
	Type 7 (wooded swamp)	1.56	1.29
	Type 8 (bog)	0.63	0.37
Total		**6.17**	**3.79**
Cooling Tower Blowdown Outfall 1 (from IGCC plant to the CMP)	Types 1/2/3/4/5	0	0
	Type 6 (shrub swamp)	8.46	5.71
	Type 7 (wooded swamp)	0.35	0.24
	Type 8 (bog)	11.57	7.65
Total		**20.38**	**13.60**
Cooling Tower Blowdown Outfall 2 (from IGCC plant to Holman Lake)	Types 1/ 2/3/4/5	0	0
	Type 3/6/8 (shallow marsh, shrub swamp, bog complex)	4.35	2.87
	Type 6 (shrub swamp)	0.41	0.32
	Type 7 (wooded swamp)	1.08	0.88
	Type 8 (bog)	0.02	0.0001
Total		**5.86**	**4.07**

Table 4.7-5. Wetland Impacts - Utility Pipelines Alternatives (West Range Site)

Pipeline	Wetland Classification	Wetland Impacts (acres)	
		Temporary ROW	Permanent ROW
Potable Water and Sewer Pipeline	Types 1/2/3/4/5/8	0	0
	Type 3/6/8 (shallow marsh, shrub swamp, bog complex)	2.84	1.14
	Type 6 (shrub swamp)	0.46	0.13
	Type 7 (wooded swamp)	1.18	0.52
Total		**4.48**	**1.79**

Note: Impacts within Temporary ROWs include impacts in Permanent ROWs.
Source: Excelsior, 2006b

Wetland resources within the ROW are emergent, and possess varying hydrologic conditions. Most emergent wetlands are characterized as Type 2 or 3, seasonally flooded and one wetland is characterized as a permanently flooded wetland resource possessing a water column of an unknown depth. Consequently, there would be temporary impacts to water quality, water dependant wildlife habitat, and herpetofauna during construction activities. Vegetation would be cleared from the ground surface and would cause impacts such as losses in the ability to bind and retain sediments, sheet erosion during seasonal rain events, and reduced flood flow attenuation functions. The introduction of unconsolidated sediments into the permanently flooded wetlands would increase the turbidity of the water, which might result in decreased photosynthetic activity by plants and phytoplankton, which would affect invertebrates downstream.

There are four water crossings associated with Natural Gas Pipeline Alternative 1. The Swan River would be crossed twice by Natural Gas Pipeline Alternative 1. Other water crossings include a tributary of the Swan River and a perennial stream between Big Diamond and Little Diamond Lakes. The total length of water crossings is 133 linear feet. Wetland resources that would be affected where the pipeline emerges on either side of the crossing would total approximately 1.34 acres in the temporary ROW and 0.94 acres in the permanent ROW (Table 4.7-6).

Table 4.7-6. Wetland Impacts Adjacent to Surface Water Crossings - Utility Pipeline Alternatives (West Range Site)

Pipeline	Number of Crossings	Total Length of Crossings (linear feet)	Wetland Impacts (acres)[1]	
			Temporary ROW	Permanent ROW
Natural Gas Pipeline Alternative 1	4	133	1.34	0.94
Natural Gas Pipeline Alternative 2	4	313	2.18	1.53
Natural Gas Pipeline Alternative 3	4	236	2.32	1.62

Table 4.7-6. Wetland Impacts Adjacent to Surface Water Crossings - Utility Pipeline Alternatives (West Range Site)

Pipeline	Number of Crossings	Total Length of Crossings (linear feet)	Wetland Impacts (acres)[1]	
			Temporary ROW	Permanent ROW
Process Water Supply Pipeline Segment 2 – Canisteo Pit to West Range Site	0	N/A	0	0
Process Water Supply Pipeline Segment 3 – Gross-Marble Pit to Canisteo Pit	0	N/A	0	0
Cooling Tower Blowdown Outfall 2 (Holman Lake)	2	6	0.17	0.11
Cooling Tower Blowdown Outfall 1 (CMP)	0	N/A	0	0
Potable Water and Sewer Pipelines	0	N/A	0	0

Note: [1]The wetland impacts shown are the same wetland impacts presented in the previous tables (i.e., they are not additional wetland impacts).
Note: Impacts within Temporary ROWs include impacts in Permanent ROWs.
Source: Excelsior, 2006b

West Range Natural Gas Pipeline Alternative 2

The field investigations identified six wetland basins that were delineated during the 2005 field surveys and 24 wetland basins identified by NWI mapping that have not been field investigated along the Natural Gas Pipeline Alternative 2 corridor. Mostly Type 6 (shrub-swamp) wetlands would be affected by this alternative. In the 100-foot temporary ROW a total of 28.86 acres of wetland resources would be temporarily impacted by Natural Gas Pipeline Alternative 2. Permanent wetland losses for the 70-foot permanent ROW would be 18.13 acres. A summary of wetland types occurring along the ROW and the affected area is presented in Table 4.7-5.

As for Natural Gas Pipeline Alternative 1, the wetland resources within the ROW are emergent, and possess similar varying hydrologic conditions and physical settings. Most emergent wetlands are characterized as Type 2 or 3, seasonally flooded and one wetland is characterized as a permanently flooded wetland resource possessing a water column of an unknown depth. Consequently, there would be temporary impacts to water quality, water dependant wildlife habitat, and herpetofauna during construction activities. Vegetation would be cleared from the ground surface and could cause impacts such as losses in the ability to bind and retain sediments, sheet erosion during seasonal rain events, and reduced flood flow attenuation functions. The introduction of unconsolidated sediments into the permanently flooded wetlands would increase the turbidity of the water, which might result in decreased photosynthetic activity by plants and phytoplankton, which would affect invertebrates downstream.

There are four crossings of “other” waters of the United States associated with Natural Gas Pipeline Alternative 2, including two crossings of Swan River, and crossings of the Prairie River and an unnamed perennial stream between Big Diamond and Little Diamond Lakes. The total length of the water crossings is estimated at 313 linear feet. Wetland habitats associated with the water crossings that would be affected include 2.18 acres of temporary impacts in the temporary ROW and 1.53 acres of permanent wetland impacts in the permanent ROW (Table 4.7-6).

The Prairie River and Swan River are both protected waters listed on the MNDNR PWI. Based on field observations, a large portion of the Prairie River and Swan River waterways, and adjacent areas, have been altered and impacted by past human related activities. Consequently, many of the historic water resource functions provided by the rivers have been altered or reduced. For example, portions of the Prairie River either lack large vegetated riparian zones or have riparian zones with reduced or limited functional capacities. Impaired functions can be characterized as reduced flood flow attenuation, sedimentation and stabilization, shoreline erosion control, water quality, and wildlife habitat functions.

West Range Natural Gas Pipeline Alternative 3

Natural Gas Pipeline Alternative 3 originates west of Grand Rapids and trends eastward before turning north to northwest towards the West Range Site. Wetlands within the Natural Gas Pipeline Alternative 3 corridor consist of 6 wetland basins delineated during the 2005 field surveys and 18 wetland basins identified by NWI mapping that have not been field-verified. The proposed 100-foot (30 meter) temporary ROW, contains 12.82 acres of wetland resources potentially affected by the pipeline, whereas the permanent 70-foot ROW, would total 9.12 acres of wetland losses (Table 4.7-5).

As with Natural Gas Pipeline Alternatives 1 and 2, wetland resources within Natural Gas Pipeline Alternative 3 are characterized as emergent, and possess similar varying hydrologic conditions and physical settings. Consequently, there would be temporary impacts to water quality, water dependant wildlife habitat, and herpetofauna during construction activities. Vegetation would be cleared from the ground surface and would cause impacts such as losses in the ability to bind and retain sediments, sheet erosion during seasonal rain events, and reduced flood flow attenuation functions. The introduction of unconsolidated sediments into the permanently flooded wetlands would increase the turbidity of the water, which might result in decreased photosynthetic activity by plants and phytoplankton, which would affect invertebrates downstream.

There are four water crossings associated with Natural Gas Pipeline Alternative 3, including the Prairie River, a tributary of the Prairie River, a perennial stream that drains to Holman Lake, and a perennial stream between Big Diamond and Little Diamond Lakes. The total length of waterway crossings is 236 linear feet. Wetlands adjacent to the water crossings that would be impacted by the emergence of the pipeline would total 2.32 acres in the temporary ROW and 1.62 acres in the permanent ROW (Table 4.7-6).

As with Natural Gas Pipeline Alternatives 1 and 2, a large portion of the waterway associated with Prairie River and Swan River waterways, and adjacent areas, appear to have been altered and impacted by past human related activities based on field observations. The Prairie River and the perennial stream draining to Holman Lake are both listed as protected waters in the MNDNR PWI.

West Range Process Water Supply Pipelines

Segment 1 - Lind Pit to Canisteo Pit

Process Water Supply Pipeline Segment 1 would be constructed from the Lind Pit to the Canisteo Pit. This alignment was not evaluated for wetlands during the 2005 field surveys because of site access restrictions. Therefore, potential wetland impacts were determined by reviewing the NWI maps for the alignment. The NWI map indicates there are no wetland resources associated with the Lind Pit to Canisteo Pit water supply pipeline (Table 4.7-5). The NWI map also indicates there are no waterway crossings associated with the Process Water Supply Pipeline Segment 1 (Table 4.7-6). However, field verification would be required to confirm the absence of potential wetlands and other waters.

Segment 2 - Canisteo Pit to West Range Site

Wetland resources within the proposed Process Water Supply Pipeline Segment 2 corridor consist of four wetland basins delineated during the 2005 field surveys. Process Water Supply Pipeline Segment 2 would be constructed from the Canisteo Pit to the proposed Mesaba Generating Station. The 150-foot wide temporary ROW would affect a total of 5.48 acres of wetlands. Potential permanent wetland losses within the 100-foot permanent ROW would be 3.73 acres (Table 4.7-5). Wetland type 3/6/8 would experience the greatest amount of disturbance (4.20 acres of temporary impacts in the temporary ROW and 2.81 acres of permanent impacts in the permanent ROW). There are no waterway crossings associated with Process Water Supply Pipeline Segment 2.

Segment 3 - Gross-Marble Pit to Canisteo Pit

Wetland resources within the proposed Process Water Supply Pipeline Segment 3 corridor consist of eight wetland basins delineated during the 2005 field surveys and four basins identified by NWI mapping that have not been field investigated. Process Water Supply Pipeline Segment 3 would be constructed between the Gross-Marble Pit and the Canisteo Pit. The alignment would have a temporary impact to 6.17 acres of wetlands in the 150-foot wide temporary ROW and would have a permanent impact on 3.79 acres in the 100-foot wide permanent ROW of lost wetland areas. A summary of the wetland types and impacts is provided in Table 4.7-5.

Wetland types within the ROW vary from flooded emergent wetlands to temporarily flooded scrub-shrub wetlands to saturated seasonally flooded forested wetlands. Type 6 shrub swamp wetlands and type 7 (wooded swamp) wetlands are the most common wetland resources within the alignment and would be the cover type most affected by Process Water Supply Pipeline 3. There are no waterway crossings associated with Process Water Supply Pipeline Segment 3 (Table 4.7-6).

West Range Cooling Tower Blowdown Outfall 1

Wetlands within the proposed corridor for Cooling Tower Blowdown Outfall 1 include one wetland basin that was delineated during the 2005 field surveys and two wetland basins identified by NWI mapping that have not been field delineated.

The pipeline for Cooling Tower Blowdown Outfall 1 would be constructed from the proposed West Range Mesaba Generating Station to the Canisteo Mine Pit. This alignment would have a temporary impact to 20.38 acres of wetlands in the 150-foot wide temporary ROW, and a permanent impact to 13.60 acres in the 100-foot wide permanent ROW of lost wetland areas. Table 4.7-5 summarizes the wetland types and impacts associated with this alignment. The greatest wetland impact would be to shrub swamp and bog wetlands. No streams, rivers, or other waters would be crossed for the pipeline (Table 4.7-6).

West Range Cooling Tower Blowdown Outfall 2

Wetlands within the proposed corridor for Cooling Tower Blowdown Outfall 2 include three wetland basins delineated during the 2005 field surveys and one wetland basin identified by NWI mapping that has not been field investigated. The pipeline would be constructed from the facility to Holman Lake. This alignment would have a temporary impact to 5.86 acres of wetlands in the 150-foot wide temporary ROW, and a permanent impact to 4.07 acres in the 100-foot wide permanent ROW of lost wetland areas (Table 4.7-5).

Wetland types within the ROW vary from permanently flooded emergent wetlands to temporarily flooded scrub-shrub wetlands to saturated, or seasonally flooded forested wetlands (Type 3/6/8). Type 6 shrub-swamp wetlands are the most common wetland cover type present and would experience the greatest impacts from pipeline construction.

Cooling Tower Blowdown Outfall 2 would impact wetlands and waterways through the use of open-cut trenching construction methods. Two water crossings would be associated with the pipeline, a perennial stream between Little Diamond Lake and the CMP and a perennial stream that drains to Holman Lake. Impacts to waterways and Holman Lake could be in the form of increased water temperatures discharged by the facility. In addition to increased thermal temperatures, water quality could be impaired by the introduction of suspended sediments created by construction activities and deposited into wetland resources, which would ultimately affect aquatic life. However, emergent vegetation forming the wetland fringe of Holman Lake and areas upstream should be able to naturally mitigate the thermal changes.

The perennial stream draining Little Diamond Lake and the perennial stream draining to Holman Lake are both listed as protected waters in the MNDNR PWI. The total length of waterway crossings is 6 linear feet over water, and totals 50 linear feet in the adjacent wetlands. Impacts to adjacent wetlands due to the water crossings were based on a 150-foot temporary ROW (0.17 acres of temporary wetland impacts) and 100-foot permanent ROW (0.11 acres of permanent wetland impacts) (Table 4.7-6).

West Range Potable Water and Sewer Pipelines

Wetlands within the proposed Potable Water and Sewer Pipelines corridor include four wetland basins delineated during the 2005 field surveys. This alignment includes a total of 4.48 acres of temporary wetland impacts in the 100-foot wide temporary ROW, and 1.79 acres of permanent wetland losses within the 40-foot wide permanent ROW (Table 4.7-5).

The most common wetland resources affected by the Potable Water and Sewer Pipelines would be to wetland type 3/6/8. Collectively, water resources within this wetland basin can be characterized as a wetland mosaic containing a high degree of vegetative interspersion vertically and horizontally, which could be capable of providing average to above average wetland functions. A field investigation would be required to qualitatively determine the magnitude of wetland capacity provided by the wetland resources. There is no waterway crossing associated with the Potable Water and Sewer Pipelines (Table 4.7-6).

West Range Railroad Alternative 1A

Wetland impacts for the West Range Railroad Alternative 1A were assessed based on the 100-foot permanent ROW and a temporary ROW that varies between 80 to 450 feet. The railroad alternatives are the only utility or transportation corridors that have designed engineering construction limits established. Consequently, all wetland impacts within the permanent and temporary ROW 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. Wetlands affected by West Range Railroad Alternative 1A would include a total of 11 wetland basins delineated during the 2005 field surveys. In the temporary ROW, permanent wetland losses would total 26.45 acres. Approximately 77.08 acres of permanent wetland losses would occur in the permanent ROW; of this, an estimated 64.85 acres of Type 7 (wooded swamp) wetlands would be within the center loop of the rail spur for Alternative 1A. Therefore, permanent wetland losses could be as much as 103.53 acres. However, the impacts for the rail loop could be reduced upon completion of final design specifications associated with the rail corridor. A summary of the wetland types and proposed impacts is provided in Table 4.7-7. The most common wetland resource affected by Railroad Alternative 1A would be to Type 7, wooded swamp, wetlands. There are no waterway crossings associated with West Range Railroad Alternative 1A (Table 4.7-8).

Table 4.7-7. Wetland Impacts - Rail Line Alternatives (West Range Site)

Alignment	Wetland Classification	Permanent Wetland Impacts Within Construction Limits (acres)	Permanent Wetland Impacts Within ROW (acres)
Rail Line Alternative 1A	Type 3 (shallow marsh)	0.14	0.11
	Type 3/6 (shallow marsh, shrub swamp complex)	0.68	0.47
	Type 3/7/8 (shallow marsh, wooded swamp, bog complex)	0.58	0.35

Table 4.7-7. Wetland Impacts - Rail Line Alternatives (West Range Site)

Alignment	Wetland Classification	Permanent Wetland Impacts Within Construction Limits (acres)	Permanent Wetland Impacts Within ROW (acres)
	Type 3/6/8 (shallow marsh, shrub swamp, bog complex)	1.52	0.63
	Type 6 (shrub swamp)	4.03	2.89
	Type 6/7 (shrub swamp, wooded swamp complex)	0.09	0
	Type 7 (wooded swamp)	19.41	72.63
Total		**26.45**	**77.08**
Rail Line Alternative 1B	Type 3 (shallow marsh)	0.14	0.11
	Type 3/6 (shallow marsh, shrub swamp complex)	0.19	0.23
	Type 3/7 (shallow marsh, wooded swamp complex)	0.01	0
	Type 5 (shallow open water)	0.86	0.11
	Type 5/6/7 (shallow open water, shrub swamp, wooded swamp complex)	1.11	1.05
	Type 6 (shrub swamp)	2.77	2.58
	Type 6/7 (shrub swamp, wooded swamp complex)	0.72	0.13
	Type 6/8 (shrub swamp, bog complex)	1.84	1.87
	Type 7 (wooded swamp)	10.47	58.15
Total		**18.11**	**64.23**

Source: Excelsior, 2006b

**Table 4.7-8. Rail Line Alternatives –
Impacts to Wetlands Adjacent to Surface Water Crossings (West Range Site)**

Alignment	Number of Crossings	Total Length of Crossings (linear feet)	Permanent Impacts to Wetlands Adjacent to Crossings (acres)
Rail Line Alternative 1A	0	N/A	N/A
Rail Line Alternative 1B	0	N/A	N/A

Source: Excelsior, 2006b

West Range Rail Line Alternative 1B

Wetland impacts for the West Range Railroad Alternative 1B were based on the 100-foot permanent ROW to be established for the railroad bed and a temporary ROW with a temporary construction limit that varies between 60 to 760 feet. All wetland impacts within the permanent ROW and the temporary ROW would be considered permanent because grading requirements would permanently alter the wetland hydrology and plant communities. Changes in topographic contours would be required in the ROWs to establish the appropriate grade and to maintain the structural integrity of areas adjacent to the railroad bed.

Wetlands within the West Range Railroad Alternative 1B alignment totaled 18 wetland basins, as delineated during the 2005 field surveys. Permanent wetland losses within the temporary construction corridor would be approximately 18.11 acres and permanent wetland losses within the permanent ROW would be 64.23 acres (approximately 52.23 acres of Type 7 wetlands would be impacted within the center loop). Therefore, permanent wetland losses could be as much as 82.34 acres. However, these impacts may be reduced upon completion of the final design specifications within the center loop. A summary of wetland types and proposed impacts is provided in Table 4.7-7.

West Range Roads

Wetlands within the proposed road corridors include 10 wetland basins delineated during the 2005 field surveys and 4 wetland basins identified by NWI mapping that have not been field investigated. Roads that would serve the facility would have a temporary impact to a total of 9.72 acres of wetlands in the 200-foot temporary ROW and would have a permanent impact of 5.67 acres of lost wetlands for the 120-foot permanent ROW (Table 4.7-9).

Because Excelsior has included both road alignments (Access Roads 1 and 2) within its plan for highway access to the power plant at the West Range Site, the impacts of road construction addressed in this EIS are the combined impacts for both roads. Although Access Road 1 would consist of the realignment of CR 7 by Itasca County as a separate action, it is considered a connected action by DOE in this EIS to ensure that all potential impacts from the access roads are addressed. In the event that the realignment of CR 7 by Itasca County would not proceed, the effect of constructing only Access Road 2 from the power plant to the existing alignment of CR 7 would likely reduce the wetland impacts described in Table 4.7-9 by a roughly proportional amount.

Table 4.7-9. Wetland Impacts – Access Roads (West Range Site)

Wetland Classification	Wetland Impacts (acres)	
	Temporary ROW	Permanent ROW
Types 1/2/3/5	0	0
Type 3/6/8 (shallow marsh, shrub swamp, bog complex)	5.84	3.44
Type 4 (deep marsh)	0.60	0.43
Type 6 (shrub swamp)	0.69	0.42
Type 6/7 (shrub swamp, wooded swamp complex)	0.50	0.36
Type 7 (wooded swamp)	1.35	0.58
Type 8 (bog)	0.74	0.44
Total	**9.72**	**5.67**

Note: Impacts within Temporary ROWs include impacts in Permanent ROWs.
Source: Excelsior, 2006b

Wetland types within the ROW vary from saturated emergent wetlands to temporarily seasonally flooded scrub-shrub wetlands, and to saturated, or seasonally flooded forested wetlands (Types 3, 4, 6, 7, and 8). Type 7 wetlands are the most common type present within the proposed alignment; consequently, Type 7 wetlands represent the wetland class most affected by the roads. Wetland functions affected by the roadways would include wildlife habitat displacement through habitat fragmentation, potential loss of flood flow attenuation, and sediment stabilization as well as a potential decrease in water quality. However, the amount of habitat lost would be small when compared to the wetlands that would be left undisturbed, especially when considering the temporary ROW would eventually revert to the conditions existing prior to the disturbance. There are no waterway crossings associated with the West Range Roads (Table 4.7-10).

Table 4.7-10. Wetland Impacts Adjacent to Surface Water Crossings - Access Roads (West Range Site)

	Number of Crossings	Total Length of Crossings (linear feet)	Wetland Impacts (acres)[1]	
			Temporary ROW	Permanent ROW
Access Roads	0	N/A	0	0

Note: [1]The wetland impacts shown are the same wetland impacts presented in the previous tables (i.e., they are not additional wetland impacts).
Note: Impacts within Temporary ROWs include impacts in Permanent ROWs.
Source: Excelsior, 2006b

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 above in Section 4.7.2.

4.7.4.1 Impacts of Construction

Mesaba Generating Station

Table 4.7-11 summarizes the wetland types and potential wetland impacts caused by the placement of the power plant at the East Range Site. Descriptions of the wetland resources found within the East Range Mesaba Generating Station footprint and buffer land are provided in Section 3.7. Phase I of the project would impact 11.91 acres in lost wetlands. Development of Phase II would cause approximately 3.7 acres of wetland losses. The total wetland acreage lost as a result of the development of the East Range power plant footprint would total 15.61 acres.

Table 4.7-11. Wetland Impacts (East Range Site)

Wetland Classification	Proposed Impact Area (acres)		
	Phase I	Phase II	Total
Type 2 (wet meadow)	0	0.003	0.003
Type 7 (wooded swamp)	5.53	0	5.53

Table 4.7-11. Wetland Impacts (East Range Site)

Wetland Classification	Proposed Impact Area (acres)		
	Phase I	Phase II	Total
Type 2/3/4/6/7/8	6.38	3.70	10.08
Type 6 (shrub swamp)	0	0	0
Total	**11.91**	**3.70**	**15.61**

Source: Excelsior, 2006b

East Range Utility and Transportation Corridors

The following sections discuss the impacts to wetlands that would be anticipated from the construction of the proposed utility and transportation corridor alternatives to support the East Range Mesaba Generating Station.

East Range HVTL Alternative 1

The HVTL alternative routes would primarily follow existing 100-foot HVTL ROWs. Under Alternative 1, an additional 30 feet of new ROW would be required along the existing 37L/39L ROW. There is also one area within Alternative 1 that would require establishing a new 100-foot ROW for the HVTL. The new ROW would consist of an approximately 2-mile long corridor extending from the East Range Mesaba Generating Station to the Syl Laskin SE Substation.

HVTL Alternative 1 would not impact any of the wetlands delineated during the 2004 or 2005 field seasons. However, the NWI map shows HVTL Alternative 1 would impact wetland resources in areas that were not field delineated due to site access restrictions. A total of 0.05 acres of wetlands would be permanently lost. This is based on an alignment with 73 power poles being placed every 650 feet (Table 4.7-12).

Table 4.7-12. Wetland Impacts - HVTL Alternatives (East Range Site)

Corridor/Alignment	Wetland Classification	Estimated Number of Poles	Total Area (acres)
HVTL Alternative 1	Types 1, 3, 4 (seasonally flooded basin or flat, shallow marsh, deep marsh complex)	0	0
	Type 2 (wet meadow)	3	0.0019
	Type 5 (shallow open water)	1	0.0006
	Type 6 (shrub swamp)	33	0.0211
	Type 7 (wooded swamp)	5	0.0030
	Type 8 (bog)	30	0.0189
Total		**73**	**0.05**

Table 4.7-12. Wetland Impacts - HVTL Alternatives (East Range Site)

Corridor/Alignment	Wetland Classification	Estimated Number of Poles	Total Area (acres)
HVTL Alternative 2	Types 1, 3, 4 (seasonally flooded basin or flat, shallow marsh, deep marsh complex)	0	0
	Type 2 (wet meadow)	1	0.0006
	Type 5 (shallow open water)	3	0.0019
	Type 6 (shrub swamp)	19	0.0123
	Type 7 (wooded swamp)	13	0.0084
	Type 8 (bog)	30	0.0194
Total		**66**	**0.04**

NOTE: Wetland impacts in this table are associated with the placement of utility poles in wetland areas.
Source: Excelsior, 2006b

Typically, clearing of vegetation would be anticipated throughout the corridor, including wetland areas. However, because this is an existing corridor free of trees and shrubs, vegetation clearing would occur only in areas where new ROW would be established. A total of 29.22 acres of wetlands would have secondary permanent impacts due to tree and shrub clearing (Table 4.7-13), which would result in conversions of wetland type.

Table 4.7-13. Tree and Shrub Clearing in Wetlands - HVTL Alternatives (East Range Site)

Corridor/Alignment	Wetland Classification	Total Area of Tree and Shrub Clearing (acres)
HVTL Alternative 1	Types 2, 3, 5, Riverine (wet meadow, shallow marsh, shallow open water complex)	0
	Type 6 (shrub swamp)	10.39
	Type 7 (wooded swamp)	2.65
	Type 8 (bog)	11.70
Total		**29.22**
HVTL Alternative 2	Types 1, 2, 3, 5, Riverine	
	Type 6 (shrub swamp)	10.39
	Type 7 (wooded swamp)	4.49
	Type 8 (bog)	12.09
Total		**26.97**

Source: Excelsior, 2006b

There are 21 aerial crossings of streams and "other waters" of the United States associated with HVTL Alternative 1. The total length of water crossings for HVTL Alternative 1 is estimated to be 1,194 linear feet (Table 4.7-14). Because the HVTLs would be suspended from tower to tower, there would be no direct impacts resulting from the crossings and impacts to vegetation and soils would be avoided.

Table 4.7-14. Surface Water Crossings - HVTL Alternatives (East Range Site)

Corridor/Alignment	Number of Crossings	Total Length of Crossings (linear feet)	Permanent ROW Wetland Impacts Adjacent to Crossings (acres)
HVTL Alternative 1	21	1,194	0
HVTL Alternative 2	20	1,760	0

Source: Excelsior, 2006b

East Range HVTL Alternative 2

As with HVTL Alternative 1, this proposed route would not impact wetlands delineated during the 2004 or 2005 field seasons. HVTL Alternative 2 alignment would impact wetlands shown on NWI mapping in areas that were not field-verified due to access restrictions.

The majority of proposed HVTL Alternative 2 would be within an existing 100-foot power utility ROW. An additional 30 feet of new ROW would be acquired to parallel the existing 38L ROW. There are also two areas within Alternative 2 that would require the establishment of a new ROW. Similar to HVTL Alternative 1, a new 2-mile section of 100-foot ROW from the East Range Mesaba Generating Station facility to the Syl Laskin SE Substation would be required. The other area of new ROW would be a 150-foot wide corridor extending approximately 7,500 linear feet west of Eveleth and southward to the Thunderbird Mine Substation.

A total of 0.04 acres of wetlands would be permanently lost. This is based on an alignment with 66 power poles being placed every 530 feet (Table 4.7-12). No tree or shrub clearing would be required in the areas of existing HVTLs because the ROW is currently maintained free of trees and shrubs. Where HVTL Alternative 2 would be placed within new ROW, the total tree and shrub clearing in wetlands would result in 26.97 acres of secondary permanent wetland impacts (Table 4.7-13), which would result in conversions of wetland type.

There are 20 aerial crossings of waterways and "other waters" of the United States associated with HVTL Alternative 2 and placement of the electrical transmission towers. The total length of water crossings for HVTL Alternative 2 is estimated at 1,760 linear feet (Table 4.7-14). Because the HVTLs would be suspended from tower to tower, there would be no direct impacts resulting from the crossings and impacts to vegetation and soils would be avoided.

East Range Natural Gas Pipeline Alternative 1

Natural Gas Pipeline Alternative 1 would temporarily impact 67.29 acres in the temporary ROW and would permanent losses of 46.81 acres of wetlands in the permanent ROW (Table 4.7-15).

Table 4.7-15. Wetland Impacts - Utility Pipelines (East Range Site)

Pipeline	Wetland Classification	Wetland Impacts (acres)	
		Temporary ROW	**Permanent ROW**
Natural Gas Pipeline Alternative 1	Types 1, 3, 4 (seasonally flooded basin or flat, shallow marsh, deep marsh complex)	0	0
	Type 2 (wet meadow)	5.10	3.46
	Type 5 (shallow open water)	0.96	0.68
	Type 6 (shrub swamp)	25.05	17.58
	Type 7 (wooded swamp)	9.34	6.37
	Type 8 (bog)	26.59	18.54
	Riverine	0.25	0.18
Total		**67.29**	**46.81**
Process Water Supply Pipeline – Area 2WX to Station Footprint	Types 1, 2, 4,5,6	0	0
	Type 3 (shallow marsh)	0.38	0.21
	Type 7 (wooded swamp)	0.75	0.49
	Type 8 (bog)	0.32	0.17
Total		**1.45**	**0.87**
Process Water Supply Pipeline – Area 2WX to Area 2W	N/A	0	0
Process Water Supply Pipeline – Area 2W to Area 2E	N/A	0	0
Process Water Supply Pipeline – Area 3 to Area 2E	Type 4 (deep marsh)	0.41	0.23
Process Water Supply Pipeline – Knox Mine to Area 2WX	N/A	0	0
Process Water Supply Pipeline – Area 6 and Stephens Mine to Area 2WX	Type 6 (shrub swamp)	0.45	0.26
Process Water Supply Pipeline – Area 9 South to Area 6	Type 5 (shallow open water)	0.54	0.29
Process Water Supply Pipeline – Area 9 North (Donora Mine) to Area 6	N/A	0	0
Potable Water and Sewer Pipelines	Type 5 (shallow open water)	0	0

Note: Impacts within Temporary ROWs include impacts in Permanent ROWs.
Source: Excelsior, 2006b

The proposed East Range Natural Gas Pipeline Alternative 1 would not affect wetlands delineated during the 2004 and 2005 field surveys. However, NWI mapping shows that wetlands occur along portions of the corridor where the easement holder did not grant access. The wetland types that exist along the pipeline corridor are emergent, scrub-shrub, deep-water marsh, saturated forested wetlands and bogs. The most common wetland resources to be affected by Natural Gas Pipeline Alternative 1 would be bogs (Type 8), which would have a temporary impact on a total of 26.59 acres in the temporary ROW and a permanent loss of 18.54 acres of wetlands in the permanent ROW. The second most common wetland resource that would be impacted would be shrub-swamp wetlands (Type 6), which total 25.05 acres of temporary impacts in the temporary ROW and 17.58 acres of permanent losses in the permanent ROW. Approximately 0.96 acres of temporary impacts and 0.68 acres of permanent losses would occur to Type 5 wetlands. The permanent impacts to Type 5 wetlands would be the permanent loss of potential waterfowl habitat and the introduction of construction-related unconsolidated sediments into the water column, which would increase turbidity, result in decreased photosynthetic activity, and potentially affect aquatic invertebrate communities and submerged aquatic vegetation. The permanent impacts to Type 5 wetlands would also result in a decreased wildlife habitat functional capacity because of the overall decrease in the size of the wetland. However, because of the abundant water resources in the region, wildlife would be able to utilize habitat provided by nearby wetlands. Impacts to Type 2 wetlands could result in the temporary displacement of ground nesting avian species.

The Natural Gas Pipeline Alternative 1 would cross approximately 792 linear feet of waterways and "other waters." Wetland impacts in the temporary ROW bordering stream crossings totals 21.12 acres and 14.78 acres in the permanent ROW (Table 4.7-16). Colby Lake and 12 streams, waterways or other waters impacted by Natural Gas Pipeline Alternative 1 are protected waters by the MNDNR.

East Range Process Water Supply Pipelines

Area 2WX to Station Footprint

This proposed pipeline would not impact wetlands delineated during the 2004 and 2005 field surveys. Potential wetland impacts estimated were based on NWI mapping for areas where access to the ROW was restricted. Wetland impacts within this Process Water Supply Pipeline alignment would have a temporary impact on 1.45 acres in the temporary ROW, and a permanent loss of 0.87 acres in the permanent ROW (Table 4.7-15). The wetland types associated with the pipeline include shallow inland freshwater marsh, a wooded swamp, and a bog. There are no waterways or "other waters" crossed by the Process Water Supply Pipeline – Area 2WX to Station Footprint (Table 4.7-16).

Area 2WX to Area 2W

The proposed Process Water Supply Pipeline would not impact any of the wetlands delineated during the 2004 and 2005 field surveys. No other wetland areas identified by the NWI mapping are within the pipeline corridor; therefore, wetland impacts for this alternative would not be expected (Table 4.7-14). There are no stream crossings associated with the Process Water Supply Pipeline – Area 2WX to Area 2W (Table 4.7-16).

Area 2W to Area 2E

The proposed pipeline does not impact any of the wetlands delineated during the 2004 and 2005 field surveys. No other wetland areas identified by NWI mapping are within the pipeline corridor; therefore, wetland impacts for this alternative would not be anticipated (Table 4.7-14). There are no stream crossings associated with the Process Water Supply Pipeline – Area 2W to Area 2E (Table 4.7-16).

Area 3 to Area 2E

The proposed pipeline would not impact wetlands delineated during the 2004 and 2005 field surveys. However, NWI mapping shows potential wetlands (in restricted access areas) that could be affected by the pipeline. Wetland impacts would total 0.41 acres of temporary impacts in the temporary ROW and 0.23 acres or permanent wetland losses in the permanent ROW (Table 4.7-15). The wetland resource affected is characterized as a deep freshwater inland marsh. Almost one-half of the wetland would be impacted and would result in the permanent loss of potential waterfowl habitat. However, transient waterfowl and water dependant avifauna could still use the water resource as temporary habitat. In addition to potential wildlife habitat lost, other wetland functions impaired or lost include sediment stabilization and retention, flood flow attenuation, and water quality. There are no stream crossings associated with Process Water Supply Pipeline–Area 3 to Area 2E (Table 4.7-16).

Table 4.7-16. Wetland Impacts Adjacent to Surface Water Crossings - Utility Pipelines (East Range Site)

Pipeline	Number of Crossings	Total Length of Crossings (linear feet)	Wetland Impacts (acres)[1]	
			Temporary ROW	Permanent ROW
Natural Gas Pipeline Alternative 1	19	792	21.12	14.78
Process Water Supply Pipeline – Area 2WX to Station Footprint	0	N/A	0	0
Process Water Supply Pipeline – Area 2WX to Area 2W	0	N/A	0	0
Process Water Supply Pipeline – Area 2W to Area 2E	0	N/A	0	0
East Range Process Water Supply Pipeline – Area 3 to Area 2E	0	N/A	0	0
Process Water Supply Pipeline – Know Mine to Area 2WX	0	N/A	0	0
Process Water Supply Pipeline – Area 6 and Stephens Mine to Area 2WX	2	33	0.93	0.62
Process Water Supply Pipeline – Area 9 South to Area 6	1	3	0	0
Process Water Supply Pipeline – Area 9 North (Donora Mine) to Area 6	1	3	0	0
Potable Water and Sewer Pipelines	1	460	0	0

Note: [1]The wetland impacts shown are the same wetland impacts presented in the previous tables (i.e., they are not additional wetland impacts).
Note: Impacts within Temporary ROWs include impacts in Permanent ROWs.
Source: Excelsior, 2006b

Knox Mine to Area 2WX

This proposed pipeline would not impact any of the wetlands delineated during the 2004 and 2005 field surveys. No other wetland areas identified by NWI mapping are within the proposed pipeline corridor; therefore, wetland impacts for this alternative would not be anticipated (Table 4.7-15). There are no stream crossings associated with the Process Water Supply Pipeline – Knox Mine to Area 2WX (Table 4.7-16).

Area 6 and Stephens Mine to Area 2WX

This proposed pipeline does not impact wetlands delineated during the 2004 and 2005 field surveys. However, NWI mapping shows potential wetlands (in restricted access areas) that could be affected by the pipeline. Approximately 0.45 acres of temporary wetland impacts in the temporary ROW and 0.26 acres of permanent wetland losses in the permanent ROW would occur for this alignment (Table 4.7-15).

The East Range Process Water Supply Pipeline–Area 6 and Stephens Mine to Area 2WX corridor would be placed under streams through open-cut trenching. There are two stream crossings associated with this alternative. The total length of stream crossings is 33 linear feet and the length of wetland crossings, including the streams, totals 270 linear feet. Wetlands impacted as a result of the stream crossings are based on a 150-foot temporary ROW and a 100-foot permanent ROW. Wetland habitats adjacent to the stream crossings that would be affected include 0.93 acres of temporary impacts in the temporary ROW and 0.62 acres of permanent losses in the permanent ROW (Table 4.7-16).

Area 9 South to Area 6

The proposed pipeline would not impact wetlands delineated during the 2004 and 2005 field surveys. However, NWI mapping shows potential wetlands that could be affected by the pipeline in areas where access was restricted and the wetlands could not be delineated. Wetland impacts in the temporary ROW total 0.54 acres and 0.29 acres permanently lost in the permanent ROW. A summary of wetlands and proposed impacts is provided Table 4.7-15.

The East Range Process Water Supply Pipeline–Area 9 South to Area 6 would be placed in wetlands and below streams through open-cut trenching. One stream crossing is associated with this alternative, which would be 3 linear feet over water. No wetlands are shown on the NWI maps adjacent to the stream crossing; therefore no impacts to wetlands would be expected (Table 4.7-16).

Area 9 North (Donora Mine) to Area 6

This proposed pipeline would not impact wetlands delineated during the 2004 and 2005 field surveys. The pipeline would not impact wetlands that are shown on NWI mapping in locations that were not field delineated. Therefore, wetlands would not likely be impacted by the proposed pipeline (Table 4.7-15). However, a field reconnaissance would be required to confirm the absence of wetland resources along this corridor.

The East Range Process Water Supply Pipeline–Area 9 North (Donora Mine) to Area 6 corridor would impact waterways through open-cut trenching. There are no wetlands mapped by the NWI adjacent to this crossing; therefore, impacts to adjacent wetlands due to stream crossings would be avoided. The total length of the stream crossing is 3 linear feet over water (Table 4.7-16).

East Range Potable Water and Sewer Pipelines

The proposed potable water and sewer pipelines would not impact any of the wetlands delineated during the 2004 and 2005 field surveys or any NWI-mapped wetlands (Table 4.7-15). Construction of the potable water and sewer pipelines would require crossing approximately 460 linear feet of Colby Lake. Construction of the pipelines would be performed through directional drilling or microtunneling underneath the lake; therefore, no permanent impacts to the lake are expected. There are no wetlands adjacent to Colby Lake at the point of crossing; therefore, no wetland impacts would be anticipated (Table 4.7-16).

The pipelines could potentially affect waterfowl habitat and wildlife habitat along the littoral zone of Colby Lake where the pipelines would daylight on either side of the lake. Sediments related to construction activities would temporarily degrade water quality through increased turbidity and disturbance to the littoral wetland fringe would also contribute to temporary water quality degradation.

Railroad Alternative 1

Wetland impacts for the East Range Railroad Alternative 1 were assessed based on the 100-foot permanent ROW to be established for the railroad bed and a temporary ROW that is based on construction limits that vary in width between 75 to 490 feet for this alternative. The railroad alternatives are the only utility or transportation corridors that have designed engineering construction limits established. Consequently, all wetland impacts within the permanent and temporary ROW 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. Wetlands within Railroad Alternative 1 include a total of three wetland basins delineated during the 2004 and 2005 field surveys. Permanent wetland losses within the temporary ROW (construction limits) were estimated to be 17.21 acres. Permanent wetland losses in the permanent ROW, including the center of the rail loop are estimated at 58.59 acres (Table 4.7-17). Therefore, permanent wetland losses could be as much as 75.8 acres. Approximately 47.91 acres of wetlands would be impacted within the center loop. However, the impacts for the rail loop may be reduced upon completion of final design specifications for the rail corridor.

Table 4.7-17. Wetland Impacts - Rail Line Alternatives (East Range Site)

Alignment	Wetland Classification	Permanent Wetland Impacts Within Construction Limits (acres)	Permanent Wetland Impacts Within Permanent ROW (acres)
Railroad Alternative 1	Type 2 (wet meadow)	0.06	0.06
	Type 2/3/4/6/7/8	16.40	57.68
	Type 6 (shrub swamp)	0.75	0.85
Total		**17.21**	**58.59**
Railroad Alternative 2	Type 2 (wet meadow)	0.06	0.06
	Type 3/7/8 (shallow marsh, wooded swamp, bog complex)	4.46	5.67
	Type 6 (shrub swamp)	0.75	0.85
	Type 7 (wooded swamp)	7.82	3.96
	Type 7/8 (wooded swamp, bog complex)	5.26	2.83
Total		**18.35**	**13.37**

Source: Excelsior, 2006b

Wetland resources within the ROW vary from permanently flooded and temporarily flooded emergent, to saturated scrub-shrub wetlands and saturated forested wetlands. The peripheral edge of the emergent wetlands is generally monotypic stands of cattail interspersed with persistent and non-persistent herbaceous plants. The emergent wetlands are bordered by forested wetlands that could be characterized as a wetland complex possessing a moderate to high functional capacity. Elevated roots in combination with moderate stem densities provide a moderate opportunity for the wetland system to provide flood attenuation functions. The forested wetland also contains a moderate to high wildlife habitat functional capacity as noted by the cover type interspersion vertically as well as horizontally.

The Railroad Alternative 1 corridor would require crossing approximately six linear feet of streams and other waters of the United States, including a tributary to Colby Lake. Permanent wetland losses within the construction limits of Railroad Alternative 1 adjacent to stream crossings would total 14.98 acres (Table 4.7-18). Permanent impacts from construction in the streambed for the center loop would be minimized by the use of culverts under the railroad bed. Maximum wetland impacts are based on the entire center loop being impacted, which would have the greatest effect on avifauna that is dependent on that area for nesting habitat and shelter. Direct impacts to the stream within the center loop would be avoided or minimized to the maximum extent feasible during construction. Wetland impacts shown are based upon wetlands adjacent to streams being crossed within the established construction limits. Temporary impacts to the stream could include decreased water quality from waterborne sediments. Unconsolidated sediments could cover the channel substrate, and affect the nesting habitat for small non-game fish and also result in armoring of the stream channel substrate, which would impact aquatic macroinvertebrates.

Table 4.7-18. Rail Line Alternatives – Impacts to Wetlands Adjacent to Surface Water Crossings (East Range Site)

Alignment	Number of Crossings	Total Length of Crossings (linear feet)	Permanent Impacts to Wetlands Adjacent to Crossings (acres)
Rail Line Alternative 1	2	6	14.98
Rail Line Alternative 2	2	6	6.30

Source: Excelsior, 2006b

Railroad Alternative 2

Wetland impacts for the East Range Railroad Alternative 2 were assessed on the 100-foot permanent rail line ROW and a temporary ROW that would have construction limits varying between 60 to 500 feet.

Wetlands within the East Range Railroad Alternative 2 include a total of five wetland basins delineated during the 2004 and 2005 field surveys. Permanent wetland losses in the temporary ROW are estimated at 18.35 acres, and 13.37 acres within the permanent ROW. Therefore, permanent wetland losses could be as much as 31.72 acres. There is no center loop associated with Railroad Alternative 2. A summary of wetland types and proposed impacts is provided in Table 4.7-17. The most common wetland type affected by the Proposed Action would be Type 7, forested swamp. Forested areas in the vicinity of the rail alignment consist of boreal conifers, such as white cedar, black spruce, white spruce and American larch. Deciduous trees also occur within the boreal conifer forest as discrete components within an evergreen forest. The forested areas displayed shallow elevated roots as a biotic response to anaerobic and saturated conditions, which could be suggestive of a shallow ground water table. The elevated root structures provide substrates for microbes to facilitate a biochemical process, which aides in the transformation and volitization of compounds such as nitrogen, sulfur, and carbon transformations (Mitsch and Gosselink, 2000). Examples of functions provided by wetland areas affected by the rail line ROW include sediment stabilization, flood flow attenuation, wildlife habitat, and water quality and fisheries habitat for non-game species. Also, the high degree of vegetative cover type interspersion provides an environmental setting capable of supporting a diverse wildlife habitat community. However, silvicultural practices in the areas bordering the wetland habitats, including the clear cutting of wetland forests, has contributed to a slight degradation to the wetlands and an overall slight decrease in the functional capacity of the wetland complex. Type 7 wetlands, wooded swamps, would be the wetland resource that would experience the greatest impacts, further reducing the functional capacity of the existing wetlands.

Railroad Alternative 2 would cross approximately 6 linear feet of streams and other waters, including Colby Lake and Wyman Creek. The wetland impacts due to crossings of streams and other water bodies are shown in Table 4.7-18. Wetland impacts would occur adjacent to streams being crossed within the established construction limits. Approximately 6.30 acres of wetlands adjacent to stream crossings would be impacted due to grading of the railroad bed for Railroad Alternative 2. This would include 2.59 acres that would be maintained in the corridor's permanent ROW. The rail line would have temporary and permanent impacts to the wetland and stream functions. Removal of vegetation in areas bordering the stream can affect several wetland functions. For example, rooted vascular emergent plants in or bordering the stream channels provide non-game fish refuge from predators and can also function as a nursery for fish fry. In addition to providing refuge and functioning as nurseries, vegetation bordering the stream channels help filter water born sediments entering streams and is a producer of detritus, which becomes a major food source for primary consumers (Bartoldus et al., 1994). Vegetation hanging over the stream channel not only functions as a source of detritus for aquatic fauna, but helps regulate the temperature of the surface waters, and lowers the biological oxygen demand in slow flowing streams. Railroad Alternative 2 would permanently replace a portion of the stream bank with the rail line ROW; resulting in the loss of wildlife habitat, decreased water quality functions, and sediment stabilization and retention functions. Sediment discharges during the construction of the rail line ROW would also result in a temporary decrease in water quality to the resources located down stream of the affected area.

East Range Access Roads

Wetlands within the proposed road corridors include three basins that were delineated during the 2004 and 2005 field surveys. Roads that would serve the facility would have a temporary impact to a total of 5.53 acres of wetlands in the temporary ROW and a permanent wetland losses of 3.23 acres for the permanent ROW (Table 4.7-19).

Table 4.7-19. Wetland Impacts – Access Roads (East Range Site)

Wetland Classification	Wetland Impacts (acres)	
	Temporary ROW	Permanent ROW
Type 6 (shrub swamp)	0.96	0.47
Type 7 (wooded swamp)	4.57	2.76
Total	**5.53**	**3.23**

Note: Impacts within Temporary ROWs include impacts in Permanent ROWs.
Source: Excelsior, 2006b

Wetland functions affected by the roadways would include wildlife habitat displacement through habitat fragmentation, potential loss of flood flow attenuation, and sediment stabilization as well as a potential decrease in water quality. However, the amount of habitat lost would be small when compared to the wetlands that would be left undisturbed, especially when considering the temporary ROW would eventually revert to the conditions existing prior to the disturbance. There are no stream crossings associated with the roadway alternatives (Table 4.7-20).

Table 4.7-20. Wetland Impacts Adjacent to Surface Water Crossings – Access Roads (East Range Site)

Pipeline	Number of Crossings	Total Length of Crossings (linear feet)	Wetland Impacts (acres)[1]	
			Temporary ROW	Permanent ROW
Access Roads	0	N/A	0	0

Note: [1]The wetland impacts shown are the same wetland impacts presented in the previous tables (i.e., they are not additional wetland impacts).
Note: Impacts within Temporary ROWs include impacts in Permanent ROWs.
Source: Excelsior, 2006b

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 to be 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

Tables 4.7-21 and 4.7-22 summarize the estimated total wetland impacts in the temporary and permanent ROWs for the West and East Range Sites and their associated utility and transportation corridors.

Table 4.7-21. Summary of Total Temporary and Permanent ROW Wetland Impacts for West Range Site and Associated Utility and Transportation Corridors

Project Alternative	Total Wetland Impacts (acres)		
	Temporary ROW		Permanent ROW
	Temporary Impacts in ROW	Permanent Impacts in ROW	Permanent Impacts in ROW
IGCC Power Station	n/a [1]	n/a [1]	30.96
HVTL Alternative 1	n/a [1]	n/a [1]	0.01 [2]
HVTL Alternative 1A	n/a [1]	n/a [1]	0.01 [2]
HVTL Phase II	n/a [1]	n/a [1]	0.03 [2]
Gas Pipeline 1	24.69	0	17.47
Gas Pipeline 2	28.86	0	18.13
Gas Pipeline 3	12.82	0	9.12
Cooling Tower Blowdown Outfall 1 (IGCC Power Station to Canisteo Pit)	20.38	0	13.60
Cooling Tower Blowdown Outfall 2 (IGCC Power Station to Holman Lake)	5.86	0	4.07
Process Water Segment 1 (Lind Pit to Canisteo Pit)	0	0	0
Process Water Segment 2 (Canisteo Pit to West Range Site)	5.48	0	3.73
Process Water Segment 3 (Gross-Marble Pit to Canisteo Pit)	6.17	0	3.79
Railroad Alternative 1A and Center Loop	0 [3]	26.45 [3]	77.08 (includes 64.85 within center loop) [4]
Railroad Alternative 1B and Center Loop	0 [3]	18.11 [3]	64.23 (includes 52.23 within center loop) [4]
Potable Water and Sewer Pipelines	4.48	0	1.79
Roads	9.72	0	5.67
Estimated Range of Total Permanent Wetland Impacts [5]			**89.3 – 181.2**

[1] Temporary construction areas for the Mesaba Generating Station or temporary ROW for the HVTL corridors are not defined for the project area; therefore temporary wetland impacts are not anticipated for these project alternatives.
[2] Permanent impacts in the permanent ROW for HVTL is limited to placement of new power poles.
[3] Impacts in railroad temporary ROW are permanent impacts due to grading in the construction limits, which should be included with total permanent wetland impacts for mitigation purposes.
[4] The impacts for the rail loops could be reduced upon completion of final design specifications associated with the rail corridor.
[5] The range of impact values represents the differing total acreages that could result, which is dependent upon the project alternatives that are ultimately selected and the configuration of the interior of the selected rail line center loop (the low range assumes no center loop impacts and the high range assumes complete center loop impacts).

Source: Excelsior, 2006b

Table 4.7-22. Summary of Total Temporary and Permanent ROW Wetland Impacts for East Range Site and Associated Utility and Transportation Corridors

Project Alternative	Total Wetland Impacts (Acres)		
	Temporary ROW		Permanent ROW
	Temporary Impacts in ROW	Permanent Impacts in ROW	Permanent Impacts in ROW
IGCC Power Station	n/a [1]	n/a [1]	15.61
HVTL Alternative 1	n/a [1]	n/a [1]	0.05 [2]
HVTL Alternative 2	n/a [1]	n/a [1]	0.04 [2]
Natural Gas Pipeline Alternative 1	67.29	0	46.81
Process Water Supply Pipeline (Area 2WX to Footprint)	1.45	0	0.87
Process Water Supply Pipeline (Area 2WX to Area 2W)	0	0	0
Process Water Supply Pipeline (Area 2W to Area 2E)	0	0	0
Process Water Supply Pipeline (Area 3 to Area 2E)	0.41	0	0.23
Process Water Supply Pipeline (Knox Mine to Area 2WX)	0	0	0
Process Water Supply Pipeline (Area 6 and Stephens Mine to Area 2WX)	0.45	0	0.26
Process Water Supply Pipeline (Area 9 South to Area 6)	0.54	0	0.29
Process Water Supply Pipeline [Area 9 North (Donora Mine) to Area 6]	0	0	0
Railroad Alternative 1 and Center Loop	0 [3]	17.21 [3]	58.59 (includes 47.91 within center loop) [4]
Railroad Alternative 2 (no center loop)	0 [3]	18.35 [3]	13.37 (no center loop)
Potable Water and Sewer Pipelines	0	0	0
Roads	5.53	0	3.23
Estimated Range of Total Permanent Wetland Impacts [5]			**99.1 – 143.2**

[1] Temporary construction areas for the Mesaba Generating Station or temporary ROW for the HVTL corridors are not defined for the project area; therefore temporary wetland impacts are not anticipated for these project alternatives.
[2] Permanent impacts in the permanent ROW for HVTL is limited to placement of new power poles.
[3] Impacts in railroad temporary ROW are permanent impacts due to grading in the construction limits, which should be included with total permanent wetland impacts for mitigation purposes.
[4] The impacts for the rail loops could be reduced upon completion of final design specifications associated with the rail corridor.
[5] The range of impact values represents the differing total acreages that could result, which is dependent upon the project alternatives that are ultimately selected and the configuration of the interior of the selected rail line center loop (the low range assumes no center loop impacts and the high range assumes complete center loop impacts).

Source: Excelsior, 2006b

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 (BWSR) and the USACE – St. Paul District, wetland impacts are generally evaluated on the bases of acreage impacted and wetland function. For isolated versus non-isolated wetlands, the 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 impacted, 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 EIS and permitting processes.

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 be in the form of direct replacement or through the purchase of credits through an approved wetland bank (see Appendix F2 for additional discussion). Wetland mitigation would follow USACE and BWSR requirements and guidance and include addressing the provisions of the 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 and BWSR wetland mitigation policy, wetland replacement options would be explored in the following sequence:

- Step 1: Project-specific wetland replacement options (on-site or adjacent to the project site) 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 sub-watershed, watershed, or county 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 within the MNDNR-defined eco-region, neighboring watersheds or counties, or within a geographic area that is as close as possible to the project would be investigated (Excelsior, 2006b).

Both sites are within the area defined by the WCA as having "greater than 80 percent pre-settlement wetlands remaining." Wetland replacement must occur within the "greater than 80 percent" region as a last option to consider if the required wetland replacement cannot be accomplished with the previous three steps. This implies that, unless special circumstances and conditions are met and approved by the WCA LGU and USACE, wetland replacement cannot occur in the areas with "50 to 80 percent pre-settlement wetlands remaining" or areas with "less than 50 percent pre-settlement wetlands remaining" that extend through central and southern Minnesota, respectively. Wetland Replacement Ratios under the rules of WCA are anticipated to be 1:1 given the project location, but could be higher through special conditions established by the USACE and WCA local government unit. The USACE has recently been implementing replacement requirements of 1.5:1 (Excelsior, 2006b).

The WCA defines two forms of wetland replacement credit in Minnesota: New Wetland Credit (NWC) and Public Value Credit (PVC). NWC means wetland replacement credit that can be used for any portion of wetland replacement. PVC 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 BWSR. Wetland replacement would likely include a combination of both NWC and PVC to meet all replacement requirements of WCA and the USACE. As described above, it is anticipated that the USACE would require wetland replacement at a ratio of 1.5:1, which would exceed the WCA replacement requirements (Excelsior, 2006b).

Establishing NWC or PVC 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 in the WCA rules and through BWSR and USACE guidance and policies. Generally, one acre of NWC is valued equally to every one acre of impacted wetland, and PVC is valued at 0.5 acre for every one acre of impacted wetland. However, due to updated USACE guidance it is anticipated that mitigation requirements may be at a minimum ratio of 1.5:1. For these reasons, the value of NWC and PVC would need to be negotiated between the USACE and BWSR 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 developed to date, but are anticipated to begin after final site selection has occurred and the site design has been finalized. Proposed wetland replacement 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).

Wetland agency consultation to date has been limited thus far to the Minnesota Environmental Quality Board (EQB) notification process, agency contacts or requests for wetland information and data resources, and through a series of informal interagency meetings to familiarize key agency staff with project concepts and agenda. The MNDNR Division of Lands and Minerals has indicated that it may become the designated local government unit administering the WCA, but that has not yet been formally determined. The wetland permitting process would not begin until the site selection has been finalized. These agencies are expected to provide formal comments and guidance on the environmental affects for the project (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 supporting documentation (Appendix F1). Wetland permitting and formal agency consultation would begin after the site alternative and associated transportation and utility corridors are selected. In general, wetland permitting could be initiated after 80 percent or more of the final design has been completed. 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.
- Itasca County Soil and Water Conservation District (SWCD) –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).

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.

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. Site-specific impacts are described in Section 4.8.3. 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 (Vegetation)

At either the West Range Site or the East Range Site, construction of the Mesaba Generating Station would cause loss of vegetation. Vegetation types that may be affected by construction at the West Range and East Range Sites and corridors are described in Section 3.8.1.

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 impact 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.

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 flora 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 end result could be creation of a structurally impaired, low quality habitat that benefits 1 or 2 faunal species instead of a highly diverse plant community benefiting a greater diversity of wildlife.

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. The areas most susceptible to invasive species would include locations where land disturbances would result in bare ground, such as utility ROWs devoid of vegetation for an extended time period.

Fauna (Wildlife)

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 mortality and disrupt wildlife (mammals, birds, reptiles, and amphibians) movement through the West Range or East Range Sites. Wildlife species that may be affected by construction are described in Section 3.8.1 for the West Range and East Range Sites and corridors. Direct impacts on terrestrial habitats, shown in Tables 4.8-1 through 4.8-30, 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, and reptiles that either inhabit one of the sites or use a site transiently for food and shelter. Besides habitat loss and fragmentation, vegetative clearing would create increased amounts of forest edge along newly established utility corridors and surrounding the power plant footprint. 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 abundant in the region, and the placement of the Mesaba Generating Station would cause the elimination of a small fraction of the total habitat in the vicinity of either the West Range Site or the East Range Site. The potential impacts on wildlife travel corridors have been evaluated in a cumulative impacts analysis in Section 5.2 that takes into consideration the effects of the Mesaba Energy Project in conjunction with other potential projects in the Iron Range area.

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 and turkey, which use the transition zones between differing vegetative cover types for food or as 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 nest eggs. Similarly, parasitic avifauna, such as the cow bird (*Molothrus ater*) or swallows (*Tachycineta spp.*), can impact 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.

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.

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 impacted 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 two-mile radius of each site's boundary. The MNDNR NHIS database does show five bald eagle nesting areas within a one-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 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 alignments, as described in Sections 4.7.3 and 4.7.4, respectively, for the West Range and East Range, 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. Aquatic communities in the West Range and East Range are described in Section 3.8.2.

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 could not be implemented, 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 biological 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 coffer dams, 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.

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 anticipated 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* – 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 may affect this species. In response to Section 7 formal consultation, USFWS will prepare a biological opinion to document project impacts on the listed species, provide a determination as to whether the project would jeopardize the continued existence of the listed species, and may also provide conservation recommendations and an incidental take statement. The biological opinion will be available for inclusion in the Final EIS.

Since Canada lynx is 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 towards the southwest periphery of lynx's range. Therefore, a biological opinion would likely be required for the Canada lynx 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. Minnesota protected plant species and potential habitats, which potentially occur at respective sites, are discussed in Sections 4.8.3 and 4.8.4.

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. 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, and similar habitat types are abundant in the region. 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 have been evaluated in a cumulative impacts analysis in Section 5.2 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 in the vicinity of 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.

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 both the effluent and 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).

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 Canisteo Mine Pit 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.

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. 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.

4.8.3.1 IGCC Power Plant Footprint and Buffer Land

Flora

A description of vegetation types found at the West Range Site is included in Section 3.8.1.1. Northern mesic hardwood forest, the most common vegetative cover at the site, would incur the highest acreage of impact from the construction of the Mesaba Generating Station at the West Range Site. A total of 136.89 acres of this habitat would be cleared. Northern wet-mesic boreal forest and aspen forest would require less clearing with 16.11 and 1.64 acres, respectively. Table 4.8-1 summarizes the potential impacts to vegetative communities resulting from construction of the Mesaba Generating Station at the West Range Site.

Table 4.8-1. Summary of Terrestrial Floral Communities and Proposed Impacts Associated with the Mesaba IGCC Power Plant Footprint and Buffer Land (West Range Site)

Terrestrial Community	Areas within Mesaba IGCC Power Plant Buffer Land (acres)	Areas Impacted by Mesaba IGCC Power Plant Footprint (acres)		
		Phase I	Phase II	Total Acres
Northern mesic hardwood forest (Red oak-sugar maple-basswood-(bluebead lily) forest – MNDNR Code MHn35b)	518.9	72.5	64.4	136.9
Northern wet-mesic boreal hardwood-conifer forest (Aspen-birch-red maple forest – MNDNR Code MHn44a)	335.2	0	16.1	16.1
Aspen Forest	137.3	1.6	0	1.6
Old Field	24.6	0	0	0
Total	1,016.0	74.1	80.5	154.6

Source: MNDNR, 2003

The impacts of construction on vegetation at the West Range Site generally would be as described in Section 4.8.2. 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 abundant 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. The potential introduction of non-native or invasive flora would be minimized as described for common impacts in Section 4.8.2.

Fauna

Wildlife species likely to inhabit the West Range Site are described in Section 3.8.1.1. 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 abundant in the region, and the placement of the Mesaba Generating Station would cause the elimination of a small fraction of the total habitat in the vicinity of the West Range Site. Refer also to the discussion of cumulative impacts on wildlife habitat in Section 5.2.

Aquatic Communities

There are no surface waters within the West Range Site boundaries; therefore, no direct impacts to aquatic species would occur from construction of the Mesaba Generating Station at the West Range Site.

The impacts of plant operations on aquatic communities have been described in Section 4.8.2.2. Potential impacts that may result from the construction and operation of supporting infrastructure (e.g., natural gas pipelines, process water pipelines) are discussed in Section 4.8.3.2.

Protected Species

As described in Section 4.8.2, the potential for adverse effects on the Canada lynx will be the subject of a biological opinion to be completed by USFWS for inclusion in the Final EIS. Because USFWS considers the vulnerability of the Canada lynx to vehicle collisions as the greater challenge, the realignment of CR 7 by Itasca County could potentially affect this species more than other aspects of the construction and operation of the Mesaba Generating Station.

As discussed in Section 3.8.3.2, no MNDNR NHIS occurrences of threatened, endangered or other species of concern occur within the West Range Site. There are 8 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 Table 3.8-5). One plant species, moonwort (*Botrychium* sp.), is listed as occurring within a one-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. 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 abundant 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 impacted 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

HVTL Alternative 1 (West Range Site)

Flora

The area of an existing HVTL alignment 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 anticipated for installation of HVTL Alternative 1.

A total of 95.54 acres of terrestrial habitats would be within the proposed alignment for the remaining area proposed for HVTL Alternative 1. Of this area, about 92.79 acres would be anticipated to be cleared of trees and shrubs. Deciduous and regeneration/young forest are the most common vegetative communities/habitats within the corridor proposed for HVTL Alternative 1. An estimated 41.34 acres of deciduous forest and 26.37 acres of regeneration/young forest would be cleared to establish the ROW for the HVTL. In the future, the ROW would be mowed or brushed as needed to manage re-emerging trees and shrubs. Table 4.8-2 summarizes the potential impacts to vegetative communities associated with HVTL Alternative 1.

Table 4.8-2. Terrestrial Floral Communities and Impacts to Vegetation from HVTL Alternative 1 (West Range Site)

Terrestrial Community[1]	Area within Alignment (acres)	Area of Tree/Shrub Clearing (acres)
Coniferous Forest	8.0	8.0
Deciduous Forest	41.3	41.3
Grassland	2.8	0
Mixed Wood Forest	12.7	12.7
Regeneration/Young Forest	26.4	26.4
Shrubby Grassland	4.4	4.4
Total	95.5	92.8

[1]Plant community descriptions from MNDNR, 2006d.

Aquatic Communities

There would be multiple surface water crossings associated with HVTL Alternative 1 as described in Section 4.7.3; 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

There are seven known occurrences of state-listed species within one mile of HVTL Alternative 1 (see Table 3.8-6). Records for the state-listed endangered orchid species, the tubercled-rein orchid, indicate it occurs within one mile of HVTL Alternative 1 within mine spoil areas (not its usual habitat). There are no mine spoil areas that are within the alignment for HVTL Alternative 1. Although there is wet meadow habitat (the orchid's usual habitat) within HVTL Alternative 1, because of the rarity of this orchid in the state, the probability is low for encountering this species in wet meadow habitat within the HVTL Alternative 1; however, it is not completely without possibility.

The remaining records of state-listed species observed within one 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.

Coordination with MNDNR would occur to determine if a plant survey would be warranted for the tubercled-rein orchid along HVTL Alternative 1. Coordination would be held with the MNDNR to determine potential effects on the state-listed species or their habitats within or near HVTL Alternative 1.

HVTL Alternative 1A (West Range Site)

Flora

Similar to HVTL Alignment 1, the area of the existing HVTL alignment that extends from the West Range Site boundary south to US 169 is classified by the LandSat-Based Land Use-Land Cover (Raster) data as "other rural developments." In this area, no additional land clearing (beyond what is already cleared for the existing ROW) would be anticipated for installation of HVTL Alternative 1A.

The remaining area proposed as the West Range HVTL Alternative 1A would total 84.42 acres of terrestrial habitats. Of this area, a total of 72.2 acres would be anticipated to be cleared of trees and shrubs. Deciduous and regeneration/young forest are the most common vegetative communities/habitats within the corridor proposed for HVTL Alternative 1. An estimated 40.1 acres of deciduous forest and 15.4 acres of regeneration/young forest would be cleared to establish the ROW for the HVTL. In the future, the ROW would be mowed or brushed as needed to manage re-emerging trees and shrubs. Table 4.8-3 summarizes the potential impacts to vegetative communities associated with HVTL Alternative 1A.

Table 4.8-3. Terrestrial Floral Communities and Impacts for the Proposed HVTL Alternative 1A (West Range Site)

Terrestrial Community[1]	Area within Alignment (acres)	Area of Tree/Shrub Clearing (acres)
Coniferous Forest	5.5	5.5
Deciduous Forest	40.1	40.1
Grassland	12.2	0
Mixed Wood Forest	9.4	9.4
Regeneration/Young Forest	15.4	15.4
Shrubby Grassland	1.8	1.8
Total	84.4	72.2

[1]Plant community descriptions from MNDNR, 2006d.

Aquatic Communities

There would be multiple surface water crossings associated with HVTL Alternative 1A as described in Section 4.7.3; however, the HVTLs would be suspended 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

There are seven known occurrences of state-listed species within one mile of HVTL Alternative 1A (see Table 3.8-6). Of greatest potential concern are records for the state-listed endangered orchid species, the tubercled-rein orchid, which is known to occur in fringe wetland habitats such as wet meadows dominated by native graminoids and sedges. Known records for the tubercled-rein orchid near HVTL Alternative 1A are within mine spoil areas, and it is not fully understood how this species was recruited into these highly disturbed areas. There are no mine spoil areas that are within the alignment for HVTL

Alternative 1A. Because of the rarity of *P. flava* var. *herbiola* in the state, the probability is low for encountering this species in wet meadows within the HVTL Alternative 1; however, it is not completely without possibility.

The remaining records of state-listed species observed within one mile of HVTL Alternative 1A 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 1A.

Coordination with MNDNR would be completed to determine if a plant survey would be warranted for the tubercled-rein orchid along HVTL Alternative 1A. Coordination would also be held with the MNDNR to determine potential effects on the state-listed species or their habitats within or near HVTL Alternative 1A.

HVTL Phase II (West Range Site)

Flora

The area of the existing HVTL alignment that extends eastward from the West Range Site and then south toward US 169, has been cleared of tree and shrub vegetation for establishment and maintenance of an existing ROW. Although the LandSat-Based Land Use-Land Cover (Raster) data classify the areas within the Phase II 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 anticipated for the installation of HVTLs during Phase II. In the future, the ROW would be mowed or brushed as needed to manage re-emerging trees and shrubs. Table 4.8-4 summarizes the potential impacts to vegetative communities associated with HVTL for Phase II.

Table 4.8-4. Terrestrial Floral Communities and Impacts for the Proposed HVTL Phase 2 (West Range Site)

Terrestrial Community[1]	Areas within Alignment (acres)	Areas of Tree/Shrub Clearing (acres)[2]
Coniferous Forest	9.4	0
Deciduous Forest	68.0	0
Grassland	67.1	0
Mixed Wood Forest	28.0	0
Regeneration/Young Forest	22.7	0
Shrubby Grassland	0.6	0
Total	195.8	0

[1]Plant community descriptions from MNDNR,2006b
[2]Although the LandSat-Based Land Use-Land Cover (Raster) data classify the areas within the Phase II ROW as a mix of terrestrial and wetland habitats, and other developed uses, aerial photographs show that it is clear of trees and shrubs.

Aquatic Communities

There would be multiple surface water crossings associated with HVTLs for Phase II as described in Section 4.7.3; 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 communities would be expected. An unnamed Designated Trout Stream located 2,500 feet east of HVTL Phase II Alternative would not be crossed by the HVTL; therefore, no impact would be expected to occur for this stream.

Protected Species

There are 12 known occurrences of state-listed species within one mile of HVTLs proposed for Phase II, which are detailed in Table 3.8-6. Of greatest potential concern are records for the state-listed endangered orchid species, the tubercled-rein orchid, that have colonized mine spoil areas. Typical habitat consists of wet meadow habitats dominated by native graminoids and sedges. The known record for the tubercled-rein orchid near HVTL Phase II is within a mine spoil area. There are no mine spoil areas or wet meadow habitat within the alignment for HVTL Phase II.

There are two known occurrences of pale moonwart (*B. pallidum* – state listed as endangered) within one 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 one 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 moonwart.

Natural Gas Pipeline Alternative 1 (West Range Site)

Flora

The proposed alignment for Natural Gas Pipeline Alternative 1 includes a total of 122.64 acres of terrestrial habitats in the temporary ROW and 84.79 acres of terrestrial habitat in the permanent ROW. Of these areas, a total of 102.30 acres in the temporary ROW and 70.59 acres in the permanent ROW would be anticipated to be cleared of trees and shrubs for installation of the natural gas pipeline. Vegetation clearing in the temporary ROW would be considered a temporary impact while clearing in the permanent ROW would be considered permanent.

Deciduous, mixed wood, and regeneration/young forests are the most common vegetative habitats that would be cleared for the natural gas pipeline alignment. The grassland habitats (20.34 acres in the temporary ROW and 14.20 acres in the permanent ROW) would not likely be cleared of trees and shrubs, although these habitats would be used for access and staging of construction equipment for pipeline installation. In the future, the ROW would be mowed or brushed as needed to manage re-emerging trees and shrubs. Table 4.8-5 summarizes the potential impacts to vegetative communities associated with Natural Gas Pipeline Alternative 1.

Table 4.8-5. Terrestrial Floral Communities and Impacts for the Proposed Natural Gas Pipeline Alternative 1 (West Range Site)

Terrestrial Community[1]	Area within Gas Pipeline 1 (acres)		Proposed Tree/Shrub Clearing Impacts (acres)	
	Temporary ROW	Permanent ROW	Temporary ROW	Permanent ROW
Coniferous Forest	11.5	8.1	11.5	8.1
Deciduous Forest	31.2	21.1	31.2	21.1
Grassland	20.3	14.2	0	0
Mixed Wood Forest	25.8	17.8	25.8	17.8
Regeneration/Young Forest	23.2	16.2	23.2	16.2
Shrubby Grassland	10.5	7.4	10.5	7.4
Total	122.6	84.8	102.3	70.6

[1]Plant community descriptions from MNDNR, 2006d.

Aquatic Communities

Surface water crossings associated with Natural Gas Pipeline Alternative 1 are described in Section 4.7.3. Wherever practicable, the gas pipeline would be directionally drilled beneath surface waters to a distance of approximately 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 species within one mile of Natural Gas Pipeline Alternative 1 (see Table 3.8-6). One species, is a state-listed endangered species, the remaining records of state-listed species within one mile of Natural Gas Pipeline Alternative 1 are listed as species of special concern or non-status. Records for the state-listed endangered orchid species, the tubercled-rein orchid, indicate it has colonized in disturbed mine spoil areas near Natural Gas Pipeline Alternative 1. There are no mine spoil areas within the alignment for Natural Gas Pipeline Alternative 1. Due to the rarity of *P. flava* var. *herbiola* in the state, the probability is low for encountering this species in wet meadow habitat within Natural Gas Pipeline Alternative 1; however, it is not completely without possibility.

Coordination with MNDNR would be completed to determine if a plant survey would be warranted for the tubercled-rein orchid along HVTL Alternative 1A. Coordination would also be held with the MNDNR to determine potential effects on the state-listed species or their habitats within or near Natural Gas Pipeline Alternative 1, particularly for the state-listed endangered tubercled-rein orchid.

Natural Gas Pipeline Alternative 2 (West Range Site)

Flora

The proposed alignment for Natural Gas Pipeline Alternative 2 includes a total of 113.69 acres of terrestrial habitats in the temporary ROW and 77.91 acres of terrestrial habitats in the permanent ROW. Of these areas, a total of 63.76 acres in the temporary ROW and 42.65 acres in the permanent ROW would be cleared of trees and shrubs for installation of the natural gas pipeline. Vegetation clearing in the temporary ROW would be considered a temporary impact while clearing in the permanent ROW would be considered permanent.

Deciduous, mixed wood, and regeneration/young forests would be the most common vegetative habitats cleared for the natural gas pipeline alignment. The grassland habitats (49.93 acres in the temporary ROW and 35.26 acres in the permanent ROW) would be used for access and staging of construction equipment as the pipeline is installed. In the future, the ROW would be mowed or brushed as needed to manage re-emerging trees and shrubs. Table 4.8-6 summarizes the potential impacts to vegetative communities associated with Natural Gas Pipeline Alternative 2.

Table 4.8-6. Terrestrial Floral Communities and Proposed Impacts within West Range Natural Gas Pipeline Alternative 2 (West Range Site)

Terrestrial Community[1]	Area within Gas Pipeline 2 (acres)		Proposed Tree/Shrub Clearing Impacts (acres)	
	Temporary ROW	Permanent ROW	Temporary ROW	Permanent ROW
Coniferous Forest	7.6	5.3	7.6	5.3
Deciduous Forest	17.3	11.1	17.3	11.1
Grassland	49.9	35.3	0	0
Mixed Wood Forest	13.7	8.8	13.7	8.8
Regeneration/Young Forest	20.1	13.8	20.1	13.8

Table 4.8-6. Terrestrial Floral Communities and Proposed Impacts within West Range Natural Gas Pipeline Alternative 2 (West Range Site)

Terrestrial Community[1]	Area within Gas Pipeline 2 (acres)		Proposed Tree/Shrub Clearing Impacts (acres)	
	Temporary ROW	Permanent ROW	Temporary ROW	Permanent ROW
Shrubby Grassland	5.2	3.6	5.2	3.6
Total	113.7	77.9	63.8	42.7

[1]Plant community descriptions from MNDNR, 2006d.

Aquatic Communities

Surface water crossings associated with Natural Gas Pipeline Alternative 2 are described in Section 4.7.3. Wherever practicable, the gas pipeline would be directionally drilled beneath surface waters to a distance of approximately 100 feet beyond the aquatic community, which would minimize the potential for impacts on aquatic resources.

Protected Species

There are three known occurrences of one state-listed species within one mile of Natural Gas Pipeline Alternative 2, which are detailed in Table 3.8-6. These three records are for the state-listed endangered orchid species, the tubercled-rein orchid, that has colonized in disturbed mine spoil areas. Typical habitat for this species is within fringe wetland habitats such as wet meadow habitats dominated by native graminoids and sedges. However, the known records for this species near Natural Gas Pipeline Alternative 2 are within mine spoil areas. There are no mine spoil areas within the alignment for Natural Gas Pipeline Alternative 2.

Because of the rarity of *P. flava* var. *herbiola* in the state, the probability is low for encountering this species in wet meadow habitat within Natural Gas Pipeline Alternative 2; however, it is not completely without possibility. For these reasons, coordination with MNDNR would be completed to determine the potential effects on *P. flava* var. *herbiola* or its habitat within Natural Gas Pipeline Alternative 2.

Natural Gas Pipeline Alternative 3 (West Range Site)

Flora

The proposed alignment for Natural Gas Pipeline Alternative 3 includes a total of 88.17 acres of terrestrial habitats in the temporary ROW and 60.06 acres of terrestrial habitats in the permanent ROW. Of these areas, a total 62.90 acres in the temporary ROW and 42.66 acres in the permanent ROW are anticipated to be cleared of trees and shrubs for installation of the natural gas pipeline. Vegetation clearing in the temporary ROW would be considered a temporary impact and would to revert to the cover type preceding the disturbance, while clearing in the permanent ROW would be considered permanent conversion to grassland habitat.

Deciduous forest is the most common vegetative habitat that would be cleared for the natural gas pipeline alignment. The grassland habitats (25.27 acres in the temporary ROW and 17.40 acres in the permanent ROW) would be used for access and staging of construction equipment as the pipeline is installed. In the future, the ROW would be mowed/brushed as needed to manage re-emerging trees and shrubs. Table 4.8-7 summarizes the potential impacts to vegetative communities associated with Natural Gas Pipeline Alternative 3.

Table 4.8-7. Terrestrial Floral Communities and Impacts for the Proposed Natural Gas Pipeline Alternative 3 (West Range Site)

Terrestrial Community[1]	Area within Gas Pipeline Alternative 3 (acres)		Proposed Tree/Shrub Clearing Impacts (acres)	
	Temporary ROW	Permanent ROW	Temporary ROW	Permanent ROW
Coniferous Forest	6.7	4.7	6.7	4.7
Deciduous Forest	26.4	17.5	26.4	17.5
Grassland	25.3	17.4	0	0
Mixed Wood Forest	12.7	8.7	12.7	8.7
Regeneration/Young Forest	10.0	7.0	10.0	7.0
Shrubby Grassland	7.1	4.9	7.1	4.9
Total	88.2	60.1	62.9	42.7

[1]Plant community descriptions from MNDNR, 2006d.

Aquatic Communities

Surface water crossings associated with Natural Gas Pipeline Alternative 3 are described in Section 4.7.3. Wherever practicable the gas pipeline would be directionally drilled beneath surface waters to a distance of approximately 100 feet beyond the aquatic community, which would minimize the potential for impacts on aquatic resources.

Protected Species

There are no known occurrences of state-listed protected or otherwise rare species within one mile of Natural Gas Pipeline Alternative 3; therefore, impacts to these resources or their habitats would not be anticipated for this alternative.

Process Water Supply Pipeline Segment 1 (Lind Pit to Canisteo Pit) (West Range Site)

Flora

The proposed alignment for Process Water Supply Pipeline Segment 1 includes a total of 2.6 acres of terrestrial habitats in the temporary ROW and 1.69 acres of terrestrial habitats in the permanent ROW. Vegetation clearing in the temporary ROW would be considered a temporary impact and would to revert to the cover type preceding the disturbance, while clearing in the permanent ROW would be considered permanent conversion of grassland.

These habitats are classified by the LandSat-Based Land Use-Land Cover (Raster) data as deciduous forest, all of which would be cleared of trees and shrubs for construction of the Process Water Supply Pipeline. In the future, the ROW would be mowed/brushed as needed to manage re-emerging trees and shrubs. Table 4.8-8 summarizes the potential impacts to vegetative communities associated with Process Water Supply Pipeline Segment 1.

Table 4.8-8. Terrestrial Floral Communities and Impacts for the Proposed Process Water Supply Pipeline Segment 1 (Lind Pit to Canisteo Pit) (West Range Site)

Terrestrial Community[1]	Area within Process Water Supply Pipeline Segment 1 (acres)		Proposed Tree/Shrub Clearing Impacts (acres)	
	Temporary ROW	Permanent ROW	Temporary ROW	Permanent ROW
Coniferous Forest	0	0	0	0
Deciduous Forest	2.6	1.7	2.6	1.7
Grassland	0	0	0	0
Mixed Wood Forest	0	0	0	0
Regeneration/Young Forest	0	0	0	0
Shrubby Grassland	0	0	0	0
Total	2.6	1.7	2.6	1.7

[1]Plant community descriptions from MNDNR, 2006d.

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 species within one mile of Process Water Supply Pipeline Segment 1 (Lind Pit to Canisteo Pit), which are detailed in Table 3.8-6. 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 impacted due to construction activities.

Although impacts to species of special concern or non-status species and their habitats are not regulated 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 coordination with MNDNR would be completed 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*.

Process Water Supply Pipeline Segment 2 (Canisteo Pit to West Range Site) (West Range Site)

Flora

The proposed alignment for Process Water Supply Pipeline Segment 2 includes a total of 26.46 acres of terrestrial habitats in the temporary ROW and 17.57 acres of terrestrial habitats in the permanent ROW. These areas would be cleared of trees and shrubs in both the temporary and permanent ROW for installation of the Process Water Supply Pipeline. Vegetation clearing in the temporary ROW would be considered a temporary impact and the area would revert to the vegetative cover type preceding the disturbance, while clearing in the permanent ROW would result in a permanent habitat conversion to grassland and provide different wildlife habitat functions and values.

Deciduous forest is the most common vegetative habitat that would be cleared for the Process Water Supply Pipeline alignment. There are no grassland or shrubby grassland habitats identified within the temporary or permanent ROW. In the future, the ROW would be mowed/brushed as needed to manage re-emerging trees and shrubs. Table 4.8-9 summarizes the potential impacts to vegetative communities associated with Process Water Supply Pipeline Segment 2.

Table 4.8-9. Terrestrial Floral Communities and Impacts for the Proposed Process Water Supply Pipeline Segment 2 (Canisteo Pit to West Range Site) (West Range Site)

Terrestrial Community[1]	Area within Process Water Supply Pipeline Segment 2 (acres)		Proposed Tree/Shrub Clearing Impacts (acres)	
	Temporary ROW	Permanent ROW	Temporary ROW	Permanent ROW
Coniferous Forest	0.1	0.1	0.1	0.1
Deciduous Forest	18.5	12.4	18.5	12.4
Grassland	0	0	0	0
Mixed Wood Forest	7.5	4.9	7.5	4.9
Regeneration/Young Forest	0.3	0.2	0.3	0.2
Shrubby Grassland	0	0	0	0
Total	26.5	17.6	26.5	17.6

[1]Plant community descriptions from MNDNR, 2006d.

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 4.5.3.1, 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.

Protected Species

There are no known occurrences of state-listed protected or otherwise rare species within one mile of Process Water Supply Pipeline Segment 2 (Canisteo Pit West Range Site); therefore, impacts to these resources or their habitats are not anticipated for this alternative.

Process Water Supply Pipeline Segment 3 (Gross-Marble Pit to Canisteo Pit) (West Range Site)

Flora

The proposed alignment for Process Water Supply Pipeline Segment 3 includes a total of 51.22 acres of terrestrial habitats in the temporary ROW and 34.23 acres of terrestrial habitats in the permanent ROW. These areas would be cleared of trees and shrubs in both the temporary and permanent ROW for installation of the Process Water Supply Pipeline. Vegetation clearing in the temporary ROW would be considered a temporary impact and would revert to the vegetative cover type preceding the disturbance.

Clearing in the permanent ROW would result in a permanent habitat conversion to grassland and provide different wildlife habitat functions and values.

Deciduous forest is the most common vegetative habitat that would be cleared for the Process Water Supply Pipeline alignment. There are no grassland or shrubby grassland habitats identified within the temporary or permanent ROW. In the future, the ROW would be mowed/brushed as needed to manage re-emerging trees and shrubs. Table 4.8-10 summarizes the potential impacts to vegetative communities associated with Process Water Supply Pipeline Segment 3.

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 one mile of Process Water Supply Pipeline Segment 3 (Gross-Marble Pit to Canisteo Pit), which is detailed in Table 3.8-6. 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 if a plant survey is warranted.

Table 4.8-10. Terrestrial Floral Communities and Impacts for the Proposed Process Water Supply Pipeline Segment 3 (Gross-Marble Pit to Canisteo Pit) (West Range Site)

Terrestrial Community[1]	Area within Process Water Supply Pipeline Segment 3 (acres)		Proposed Tree/Shrub Clearing Impacts (acres)	
	Temporary ROW	Permanent ROW	Temporary ROW	Permanent ROW
Coniferous Forest	2.5	2.0	2.5	2.0
Deciduous Forest	37.3	25.0	37.3	25.0
Grassland	0	0	0	0
Mixed Wood Forest	9.1	5.7	9.1	5.7
Regeneration/Young Forest	2.3	1.6	2.3	1.6
Shrubby Grassland	0	0	0	0
Total	51.2	34.2	51.2	34.2

[1]Plant community descriptions from MNDNR, 2006d.

Cooling Tower Blowdown Outfall 2 (Mesaba IGCC Power Plant Footprint to Holman Lake) (West Range Site)

Flora

The proposed alignment for Cooling Tower Blowdown Outfall 2 pipeline includes a total of 37.23 acres of terrestrial habitats in the temporary ROW and 24.62 acres of terrestrial habitats in the permanent ROW. These areas would be cleared of trees and shrubs in both the temporary and permanent ROW for installation of the blowdown pipeline. Vegetation clearing in the temporary ROW would be considered a temporary impact and vegetation would revert to the vegetative cover type preceding the disturbance. Clearing in the permanent ROW would result in a permanent habitat conversion to grassland and provide different wildlife habitat functions and values. Deciduous forest is the most common vegetative habitat that would be cleared for the blowdown pipeline alignment. There is no grassland or shrubby grassland habitats identified within the temporary or permanent ROW. In the future, the ROW would be mowed/brushed as needed to manage re-emerging trees and shrubs. Table 4.8-11 summarizes the potential impacts to vegetative communities associated with pipeline alignment.

Aquatic Communities

The construction of Cooling Tower Blowdown Outfall 2 pipeline would cause some temporary, impacts to fisheries or other aquatic fauna where it would cross perennial streams draining Little Diamond Lake and draining into Holman Lake as described in Section 4.7.3.

Table 4.8-11. Terrestrial Floral Communities and Impacts for the Proposed Cooling Tower Blowdown Outfall 2 (Mesaba IGCC Power Plant Footprint to Holman Lake) (West Range Site)

Terrestrial Community[1]	Area within Pipeline Alignment (acres)		Proposed Tree/Shrub Clearing Impacts (acres)	
	Temporary ROW	Permanent ROW	Temporary ROW	Permanent ROW
Coniferous Forest	0.4	0.2	0.4	0.2
Deciduous Forest	27.0	18.1	27.0	18.1
Grassland	0	0	0	0
Mixed Wood Forest	9.6	6.2	9.6	6.2
Regeneration/Young Forest	0.2	0.1	0.2	0.1
Shrubby Grassland	0	0	0	0
Total	37.2	24.6	37.2	24.6

[1]Plant community descriptions from MNDNR, 2006d.

Protected Species

There are no known occurrences of state-listed protected or otherwise rare species within one mile of Cooling Tower Blowdown Outfall 2 pipeline (Mesaba IGCC Power Plant Footprint to Holman Lake); therefore, impacts to these resources or their habitats are not anticipated for this alignment.

Cooling Tower Blowdown Outfall 1 (Mesaba IGCC Power Plant Footprint to Canisteo Mine Pit) (West Range Site)

Flora

The proposed alignment for Cooling Tower Blowdown Outfall 1 pipeline includes a total of 24.46 acres of terrestrial habitats in the temporary ROW and 16.40 acres of terrestrial habitats in the permanent ROW. Of these areas, a total of 15.66 acres in the temporary ROW and 10.31 acres in the permanent ROW would be cleared of trees and shrubs for installation of the blowdown pipeline. Vegetation clearing in the temporary ROW would be considered a temporary impact and vegetation would to revert to the vegetative cover type preceding the disturbance. Clearing in the permanent ROW would result in a permanent habitat conversion to grassland and provide different wildlife habitat functions and values. Deciduous and regeneration/young forests are the most common vegetative habitats that would be cleared for the blowdown pipeline alignment. There are no shrubby grassland habitats identified within the temporary or permanent ROWs. The grassland habitats (8.80 acres in the temporary ROW and 6.09 acres in the permanent ROW) could be used for access and staging of construction equipment as the pipeline is installed. In the future, the ROW would be mowed/brushed as needed to manage re-emerging trees and shrubs. Table 4.8-12 summarizes the potential impacts to vegetative communities associated with the pipeline alignment.

Table 4.8-12. Terrestrial Floral Communities and Impacts for the Proposed Cooling Tower Blowdown Outfall 1 (Mesaba IGCC Power Plant Footprint to Canisteo Pit) (West Range Site)

Terrestrial Community[1]	Area within Pipeline Alignment (acres)		Proposed Tree/Shrub Clearing Impacts (acres)	
	Temporary ROW	Permanent ROW	Temporary ROW	Permanent ROW
Coniferous Forest	0.3	0.2	0.3	0.2
Deciduous Forest	6.2	3.9	6.2	3.9
Grassland	8.8	6.1	0	0
Mixed Wood Forest	1.2	0.8	1.2	0.8
Regeneration/Young Forest	8.0	5.3	8.0	5.3
Shrubby Grassland	0	0	0	0
Total	24.5	16.4	15.7	10.3

[1]Plant community descriptions from MNDNR, 2006d.

Aquatic Communities

There are no surface water crossings that would be associated with Cooling Tower Blowdown Outfall 1 pipeline; therefore, no impacts to aquatic communities would be expected during construction. The construction and operation of the pipeline is expected to have minimal impact on lake trout in Canisteo Pit.

Protected Species

There are no known occurrences of state-listed protected or otherwise rare species within one mile of Cooling Tower Blowdown Outfall 1 pipeline (Mesaba IGCC Power Plant Footprint to Canisteo Pit); therefore, impacts to these resources or their habitats are not anticipated for this alignment.

Potable Water and Sewer Pipelines (West Range Site)

Flora

The proposed alignment for the Potable Water and Sewer Pipelines includes a total of 20.30 acres of terrestrial habitats in the temporary ROW and 7.89 acres of terrestrial habitats in the permanent ROW. In these areas, a total of 18.53 acres in the temporary ROW and 7.25 acres in the permanent ROW would be cleared of trees and shrubs for installation of the pipelines. Vegetation clearing in the temporary ROW would be considered a temporary impact and would to revert to the vegetative cover type preceding the disturbance. Clearing in the permanent ROW would result in a permanent habitat conversion to grassland and provide different wildlife habitat functions and values. Deciduous forest is the most common vegetative habitat that would be cleared for the Potable Water and Sewer Pipelines alignment. The grassland habitats 1.77 acres in the temporary ROW and 0.64 acres in the permanent ROW would be used for access and staging of construction equipment as the pipelines are installed. In the future, the ROW would be mowed/brushed as needed to manage re-emerging trees and shrubs. Table 4.8-13 summarizes the potential impacts to vegetative communities associated with the Potable Water and Sewer Pipelines.

Table 4.8-13. Terrestrial Floral Communities and Impacts for the Proposed Potable Water and Sewer Pipelines (West Range Site)

Terrestrial Community[1]	Area within Potable Water and Sewer Pipelines (acres)		Proposed Tree/Shrub Clearing Impacts (acres)	
	Temporary ROW	Permanent ROW	Temporary ROW	Permanent ROW
Coniferous Forest	0.1	0.03	0.1	0.03
Deciduous Forest	13.5	5.3	13.5	5.3
Grassland	1.8	0.6	0	0
Mixed Wood Forest	4.8	1.8	4.8	1.8
Regeneration/Young Forest	0.2	0.1	0.2	0.1
Shrubby Grassland	0	0	0	0
Total	20.3	7.2	18.5	7.2

[1]Plant community descriptions from MNDNR, 2006d.

Aquatic Communities

There are no surface water crossings that would be associated with the Potable Water and Sewer Pipelines; therefore, no impacts to aquatic communities would be expected as a result of the construction or operation of these structures.

Protected Species

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

West Range Rail Line Alternative 1A and Center Loop

Flora

The proposed alignment for Rail Line Alternative 1A includes a total of 108.59 acres of terrestrial habitats in the construction limits (temporary ROW) and 53.39 acres of terrestrial habitats in the permanent ROW. The center loop for Rail Line Alternative 1A includes 50.19 acres of habitat within the construction limits and permanent ROW. These areas for the rail line and center loop are anticipated to be cleared and permanently impacted for construction of the rail line. Upon final design of the center loop, some areas of habitat clearing may be avoided depending on the final design specifications for this area. Table 4.8-14 summarizes the potential impacts to vegetative communities associated with Rail Line Alternative 1A.

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

There are no known occurrences of state-listed protected or otherwise rare species within one mile of Rail Line Alternative 1A; therefore, impacts to these resources or their habitats would not be anticipated for this alternative.

Table 4.8-14. Terrestrial Floral Communities and Impacts for the Proposed Rail Line Alternative 1A (West Range Site)

Terrestrial Community[1]	Area within Rail Line Alternative 1A (acres)		Proposed Vegetation Clearing Impacts (acres)	
	Construction Limits[2]	Permanent ROW	Construction Limits[2]	Permanent ROW
Rail Line				
Coniferous Forest	5.1	2.1	5.1	2.1
Deciduous Forest	69.1	32.8	69.1	32.8
Grassland	0.5	0.6	0.5	0.6
Mixed Wood Forest	33.2	17.7	33.2	17.7
Regeneration/Young Forest	0.6	0.3	0.6	0.3
Shrubby Grassland	0	0	0	0
Rail Line Total	108.5	53.4	108.5	53.4
Center Loop[3]				
Coniferous Forest	14.7		14.7	
Deciduous Forest	9.6		9.6	
Grassland	0		0	
Mixed Wood Forest	25.9		25.9	
Regeneration/Young Forest	0		0	
Shrubby Grassland	0		0	
Center Loop Total	50.2		50.2	

[1]Plant community descriptions from MNDNR, 2006d.
[2]All habitats within construction limits would be impacted due to necessary grading for construction of rail bed.
[3]Construction Limits and Permanent ROW for the Center Loop are equal.

Rail Line Alternative 1B and Center Loop (West Range Site)

Flora

The proposed alignment for Rail Line Alternative 1B includes a total of 131.78 acres of terrestrial habitats in the construction limits (temporary ROW) and 54.53 acres of terrestrial habitats in the permanent ROW. The center loop for Rail Line Alternative 1B includes 62.04 acres of habitat within the construction limits and permanent ROW. Areas for the rail line and center loop are anticipated to be cleared and permanently impacted for construction of the rail line. Upon final design of the center loop, some areas of habitat clearing may be avoided depending on the final design specifications for this area. Table 4.8-15 summarizes the potential impacts to vegetative communities associated with Rail Line Alternative 1B.

Table 4.8-15. Terrestrial Floral Communities and Impacts for the Proposed Rail Line Alternative 1B (West Range Site)

Terrestrial Community[1]	Area within Rail Line Alternative 1B (acres)		Proposed Vegetation Clearing Impacts (acres)	
	Construction Limits[2]	Permanent ROW	Construction Limits[2]	Permanent ROW
Rail Line				
Coniferous Forest	5.4	3.6	5.4	3.6
Deciduous Forest	99.8	38.8	99.8	38.8
Grassland	0	0.1	0	0.1
Mixed Wood Forest	24.7	11.8	24.7	11.8
Regeneration/Young Forest	1.9	0.2	1.9	0.2
Shrubby Grassland	0	0	0	0
Rail Line Total	131.8	54.5	131.8	54.5
Center Loop[3]				
Coniferous Forest	10.8		10.8	
Deciduous Forest	32.3		32.3	
Grassland	0		0	
Mixed Wood Forest	18.0		19.0	
Regeneration/Young Forest	0		0	
Shrubby Grassland	0		0	
Center Loop Total	62.0		62.0	

[1]Plant community descriptions from MNDNR, 2006d.
[2]All habitats within construction limits would be impacted due to necessary grading for construction of rail bed.
[3]Construction Limits and Permanent ROW for the Center Loop are equal.

Aquatic Communities

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

Protected Species

There are no known occurrences of state-listed protected or otherwise rare species within one mile of Rail Line Alternative 1B; therefore, impacts to these resources or their habitats would not be anticipated for this alternative.

Road Alignments (West Range Site)

Flora

The proposed alignments for the roads include a total of 89.88 acres of terrestrial habitats in the temporary ROW and 53.68 acres of terrestrial habitats in the permanent ROW. These areas would be cleared of trees and shrubs for construction of the roads. Vegetation clearing in the temporary ROW would be considered a temporary impact while clearing in the permanent ROW would be considered permanent.

Deciduous forest is the most common vegetative habitat that would be cleared and permanently impacted for the road alignments. There are no shrubby grassland habitats identified within the road alignments. The grassland habitats (3.12 acres in the temporary ROW and 1.81 acres in the permanent ROW) are not anticipated to be cleared of trees and shrubs, but these habitats in the temporary ROW would be used for access and staging of construction equipment and areas in the permanent ROW would be converted to road bed. Table 4.8-16 summarizes the potential impacts to vegetative communities associated with the Road Alignments.

Because Excelsior has included both road alignments (Access Roads 1 and 2) within its plan for highway access to the power plant at the West Range Site, the impacts of road construction addressed in this EIS are the combined impacts for both roads. Although Access Road 1 would consist of the realignment of CR 7 by Itasca County as a separate action, it is considered a connected action by DOE in this EIS to ensure that all potential impacts from the access roads are addressed. In the event that the realignment of CR 7 by Itasca County would not proceed, the effect of constructing only Access Road 2 from the power plant to the existing alignment of CR 7 would reduce the impacts on floral communities to approximately 25 to 30 percent of the total acreage in Table 4.8-16. This reduction in impacts would be the greatest for forested communities.

Table 4.8-16. Terrestrial Floral Communities and Impacts for the Proposed Road Alignments (West Range Site)

Terrestrial Community[1]	Area within Road Alignments (acres)		Proposed Vegetation Clearing Impacts (acres)	
	Temporary ROW	Permanent ROW	Temporary ROW	Permanent ROW
Coniferous Forest	6.7	3.9	6.7	3.9
Deciduous Forest	59.7	36.2	59.7	36.2
Grassland	3.1	1.8	3.1	1.8
Mixed Wood Forest	15.4	8.7	15.4	8.7
Regeneration/Young Forest	5.1	3.0	5.0	3.0
Shrubby Grassland	0	0	0	0
Total	89.9	53.7	89.9	53.7

[1]Plant community descriptions from MNDNR, 2006d.

Aquatic Communities

There are no surface water crossings that would be associated with the road alignments; therefore, no impacts to aquatic communities would be expected.

Protected Species

There are no known occurrences of state-listed protected or otherwise rare species within one mile of the proposed Road Alignments; therefore, impacts to these resources or their habitats would not be anticipated for these roadways. The potential impacts on the Canada lynx caused by the realignment of CR 7 would be the subject of a biological opinion to be prepared by USFWS (see Section 4.8.2.2).

4.8.4 Impacts on East Range Site and Corridors

4.8.4.1 IGCC Power Plant Footprint and Buffer Land

Flora

A description of vegetation types found at the East Range Site is included in Section 3.8.1.2. The terrestrial vegetative habitat within the Mesaba Generating Station footprint at the East Range Site can be classified as northern mesic mixed forest (aspen-birch forest, balsam fir subtype). Construction for the Mesaba Generating Station footprint, would impact 167.04 acres of northern mesic mixed forest (aspen-birch forest, balsam fir subtype). The Proposed Action would affect 82.44 acres during Phase I construction and 84.60 acres during Phase II construction. Grading at the site would occur during construction, permanently altering topography within construction limits. Table 4.8-17 summarizes impacts on the terrestrial vegetative community for each phase of construction.

Table 4.8-17. Summary of Terrestrial Floral Communities and Proposed Impacts for the Mesaba IGCC Power Plant Footprint and Buffer Land (East Range Site)

Terrestrial Community	Areas within Mesaba IGCC Power Plant Buffer Land (acres)	Areas Impacted by Mesaba IGCC Power Plant Footprint (acres)		
		Phase I	Phase II	Total Acres
Northern mesic mixed forest (aspen-birch forest, balsam fir subtype) – (MNDNR Code FDn43b1)	478.3	82.4	84.6	167.0
Total	478.3	82.4	84.6	167.0

Source: MNDNR, 2003

The impacts of construction on vegetation at the East Range Site generally would be as described in Section 4.8.2. 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 abundant 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. The potential introduction of non-native or invasive flora would be minimized as described in for common impacts in Section 4.8.2.

Fauna

Wildlife species likely to inhabit the East Range Site are described in Section 3.8.1.2. 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 abundant in the region, and the placement of the Mesaba Generating Station would cause the elimination of a small fraction of the total habitat in the vicinity of the East Range Site. Refer also to the discussion of cumulative impacts on wildlife habitat in Section 5.2.

Aquatic Communities

There are no surface waterways that would be affected during construction of the East Range Site; therefore, no impacts to aquatic communities would be expected as a result of the construction and operation of the plant at the East Range Site.

Protected Species

No MNDNR NHIS occurrences of threatened, endangered, or otherwise rare species are 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 two miles from the East Range Site boundary. Therefore, no impacts to any state-listed species would be expected to occur.

4.8.4.2 East Range Site Transmission, Pipeline, and Transportation Corridors

HVTL Alternative 1 (East Range Site)

Flora

HVTL Alternative 1 would be constructed alongside an existing utility ROW that has already been cleared of tree and shrub vegetation for maintenance of the ROW. The new construction would require clearing of an additional 30 feet on one side of the existing ROW. Impacts to terrestrial communities within the HVTL Alternative 1 ROW are based upon review and interpretation of 2003 FSA aerial photographs using the LandSat-Based Land Use-Land Cover (Raster) data classifications as a guide. A total of 261.90 acres of existing ROW is classified as “other rural developments” by this LandSat model, and has already been cleared of tree and shrub vegetation for establishment and maintenance of the existing ROW.

The proposed alignment for HVTL Alternative 1 includes a total of 99.8 acres of terrestrial habitats. A total of 89.4 acres are anticipated to be cleared of trees and shrubs and converted into grassland. Mixed wood forest and shrubby grassland are the most common vegetative habitats that would be cleared for the HVTL Alternative 1 alignment. The 23.0 acres of grassland habitats are not anticipated to be cleared of trees and shrubs, although these habitats may be used for access and staging of construction equipment as the HVTL is installed. Table 4.8-18 describes the terrestrial plant communities identified by the aerial photograph interpretation. In the future, the ROW would be mowed/brushed as needed to manage re-emerging trees and shrubs.

Table 4.8-18. Terrestrial Floral Communities and Impacts for the Proposed HVTL Alternative 1 (East Range Site)

Terrestrial Community[1]	Areas within Alignment (acres)	Areas of Tree/Shrub Clearing (acres)
Coniferous Forest	4.0	4.0
Deciduous Forest	0	0
Grassland	10.4	0
Mixed Wood Forest	50.3	50.3
Regeneration/Young Forest	12.1	12.1
Shrubby Grassland	23.0	23.0
Total	99.8	89.4

[1]Plant community descriptions from MNDNR, 2006d.

Aquatic Communities

There would be several surface water crossings associated with HVTL Alternative 1 as described in Section 4.7.4; 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

There are 18 known occurrences of state-listed species within one mile of HVTL Alternative 1, which are detailed in Table 3.8-7. 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 one mile of HVTL Alternative 1 are listed as species of special concern or non-status species. Although impacts to these species or 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 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 (East Range Site)

Flora

HVTL Alternative 2 would be constructed almost entirely alongside an existing utility ROW that has been cleared of tree and shrub vegetation for maintenance. The new construction would require clearing of an additional 30 feet on one side of the existing ROW. There is a 1.5-mile section for this alternative that would be established as new HVTL corridor. Impacts to terrestrial communities within the HVTL Alternative 2 ROW are based upon review and interpretation of the 2003 FSA aerial photographs using the LandSat-Based Land Use-Land Cover (Raster) data classifications. A total of 225.28 acres of existing ROW is classified as “other rural developments” by this LandSat model, and has already been cleared of tree and shrub vegetation for establishment and maintenance of the existing ROW. There are no terrestrial habitats in the 1.5-mile section of newly proposed ROW, as the majority of this new section is classified as “gravel pits and open mines,” with small portions of the area being classified as wetlands or roads/railroads.

The proposed alignment for HVTL Alternative 2 includes a total of 92.6 acres of terrestrial habitats. A total of 85.7 acres are anticipated to be cleared of trees and shrubs and converted to grassland. Mixed wood forest, shrubby grassland, and regeneration/young forests are the most common vegetative habitats that would be cleared for the HVTL Alternative 2 alignment. The 20.8 acres of grassland habitats may be used for access and staging of construction equipment as the HVTL is installed. The following table describes the terrestrial plant communities identified by the aerial photograph review and interpretation based upon the LandSat imagery. In the future, the ROW would be mowed/brushed as needed to manage re-emerging trees and shrubs. Table 4.8-19 summarizes the potential impacts to vegetative communities associated with HVTL Alternative 2.

Aquatic Communities

There would be multiple surface water crossings associated with HVTL Alternative 2 as described in Section 4.7.4; however, the HVTLs would be suspended over the waterways and the alignments would be designed to avoid placement of towers within surface waters. Therefore, no impacts to aquatic communities would be expected.

Table 4.8-19. Terrestrial Floral Communities and Impacts for the Proposed HVTL Alternative 2 (East Range Site)

Terrestrial Community[1]	Areas within Alignment (acres)	Areas of Tree/Shrub Clearing (acres)
Coniferous Forest	2.5	2.5
Deciduous Forest	2.4	2.4
Grassland	6.9	0
Mixed Wood Forest	44.5	44.5
Regeneration/Young Forest	15.5	15.5
Shrubby Grassland	20.8	20.8
Total	92.6	85.7

[1]Plant community descriptions from MNDNR, 2006d.

Protected Species

There are 16 known occurrences of state-listed species within one mile of HVTL Alternative 2, which are detailed in Table 3.8-7. 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 one mile of HVTL Alternative 2 are listed as species of special concern or non-status species. Though impacts to these species or 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, 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 Alternative 1 (East Range Site)

Flora

The proposed alignment for East Range Natural Gas Pipeline Alternative 1 includes a total of 312.11 acres of terrestrial habitats in the temporary ROW and 218.68 acres of terrestrial habitats in the permanent ROW. Of these areas, a total of 265.99 acres in the temporary ROW and 186.71 acres in the permanent ROW are anticipated to be cleared of trees and shrubs for installation of the natural gas pipeline. Vegetation clearing in the temporary ROW would be considered a temporary impact while clearing in the permanent ROW would be considered permanent and convert to grassland.

Mixed wood forest, regeneration/young forest, and shrubby grassland are the most common vegetative habitats affected by the natural gas pipeline alignment. The grassland habitats (46.12 acres in the temporary ROW and 31.97 acres in the permanent ROW) would be used for access and staging of construction equipment as the pipeline is installed. In the future, the ROW would be mowed/brushed as needed to manage re-emerging trees and shrubs. Table 4.8-20 summarizes the potential impacts to vegetative communities associated with Natural Gas Pipeline Alternative 1.

Table 4.8-20. Terrestrial Floral Communities and Impacts for the Natural Gas Pipeline Alternative 1 (East Range Site)

Terrestrial Community[1]	Area within Natural Gas Pipeline Alternative 1 (acres)		Proposed Tree/Shrub Clearing Impacts (acres)	
	Temporary ROW	Permanent ROW	Temporary ROW	Permanent ROW
Coniferous Forest	7.6	5.6	7.6	5.6
Deciduous Forest	5.0	3.5	5.0	3.5
Grassland	46.1	32.0	0	0
Mixed Wood Forest	120.7	84.5	120.7	84.5
Regeneration/Young Forest	53.8	38.2	53.8	38.2
Shrubby Grassland	78.9	54.8	78.9	54.8
Total	312.1	218.7	266.0	186.7

[1]Plant community descriptions from MNDNR, 2006d.

Aquatic Communities

Surface water crossings associated with Natural Gas Pipeline Alternative 1 are described in Section 4.7.4. Wherever practicable, the gas pipeline would be directionally drilled beneath surface waters to a distance of approximately 100 feet beyond the aquatic community, which would minimize the potential for impacts on aquatic resources.

Protected Species

There are 12 known occurrences of state-listed species within one mile of Natural Gas Pipeline Alternative 1, detailed in Table 3.8-7. 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 is chosen as the preferred site, 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 one mile of Natural Gas Pipeline 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 Natural Gas Pipeline Alternative 1.

Process Water Supply Pipeline – Area 2WX to Footprint (East Range Site)

Flora

The proposed alignment for East Range Process Water Supply Pipeline – Area 2WX to Footprint includes a total of 14.77 acres of terrestrial habitats in the temporary ROW and 9.78 acres of terrestrial habitats in the permanent ROW. Vegetation clearing in the temporary ROW would be considered a temporary impact while clearing in the permanent ROW would be considered permanent and would convert to grassland.

Regeneration/young forest, deciduous forest, and mixed wood forest are the vegetative cover types in this corridor identified by the LandSat imagery. These areas are anticipated to be cleared of trees and shrubs for installation of this pipeline. In the future, the ROW would be mowed/brushed as needed to manage re-emerging trees and shrubs. Table 4.8-21 summarizes the potential impacts to vegetative communities associated with Process Water Supply Pipeline – Area 2WX to Footprint.

Table 4.8-21. Terrestrial Floral Communities and Impacts for the Proposed Process Water Supply Pipeline – Area 2WX to Footprint (East Range Site)

Terrestrial Community[1]	Area within Process Water Supply Pipeline – Area 2WX to Footprint (acres)		Proposed Tree/Shrub Clearing Impacts (acres)	
	Temporary ROW	Permanent ROW	Temporary ROW	Permanent ROW
Coniferous Forest	0	0	0	0
Deciduous Forest	3.4	2.2	3.4	2.2
Grassland	0	0	0	0
Mixed Wood Forest	1.9	1.2	1.9	1.2
Regeneration/Young Forest	9.5	6.4	9.5	6.4
Shrubby Grassland	0	0	0	0
Total	14.8	9.8	14.8	9.8

[1]Plant community descriptions from MNDNR, 2006d.

Aquatic Communities

There are no surface water crossings that would be associated with Process Water Supply Pipeline – Area 2WX to Footprint; therefore, no impacts to aquatic communities would be expected as a result of the construction or operation of these structures.

Protected Species

There are no known occurrences of state-listed protected or otherwise rare species within one mile of Process Water Supply Pipeline – Area 2WX to Footprint, therefore, impacts to these resources or their habitats are not anticipated for this alternative.

Process Water Supply Pipeline – Area 2WX to Area 2W (East Range Site)

Flora

The proposed alignment for East Range Process Water Supply Pipeline – Area 2WX to Area 2W includes a total of 0.68 acres of terrestrial habitats in the temporary ROW and 0.35 acres of terrestrial habitats in the permanent ROW. Vegetation clearing in the temporary ROW is a temporary impact and would to revert to the dominant vegetative cover type preceding the disturbance, while clearing in the permanent ROW would result in a permanent habitat conversion to grassland and provide different wildlife habitat functions and values.

Mixed wood forest and shrubby grassland are the habitat types affected by the Proposed Action. These areas are anticipated to be cleared of trees and shrubs for installation of this pipeline. In the future, the ROW would be mowed/brushed as needed to manage re-emerging trees and shrubs. Table 4.8-22 summarizes the potential impacts to vegetative communities associated with Process Water Supply Pipeline – Area 2WX to Area 2W.

Table 4.8-22. Terrestrial Floral Communities and Impacts for the Proposed Process Water Supply Pipeline – Area 2WX to Area 2W (East Range Site)

Terrestrial Community[1]	Area within Process Water Supply Pipeline – Area 2WX to Area 2W (acres)		Proposed Tree/Shrub Clearing Impacts (acres)	
	Temporary ROW	Permanent ROW	Temporary ROW	Permanent ROW
Coniferous Forest	0	0	0	0
Deciduous Forest	0	0	0	0
Grassland	0	0	0	0
Mixed Wood Forest	0.1	0.02	0.1	0.02
Regeneration/Young Forest	0	0	0	0
Shrubby Grassland	0.6	0.3	0.6	0.3
Total	0.7	0.3	0.7	0.3

[1]Plant community descriptions from MNDNR, 2006d.

Aquatic Communities

There are no surface water crossings that would be associated with Process Water Supply Pipeline – Area 2WX to Area 2W; therefore, no impacts to aquatic communities would be expected.

Protected Species

There are no known occurrences of state-listed protected or otherwise rare species within one mile of Process Water Supply Pipeline – Area 2WX to Area 2W; therefore, impacts to these resources or their habitats are not anticipated for this alternative.

Process Water Supply Pipeline – Area 2W to Area 2E (East Range Site)

Flora

The proposed alignment for East Range Process Water Supply Pipeline – Area 2WX to Area 2E includes only land classified as gravel pits and open mines and does not include any terrestrial floral habitats.

Aquatic Communities

There are no surface water crossings that would be associated with Process Water Supply Pipeline – Area 2W to Area 2E; therefore, no impacts to aquatic communities would be expected as a result of these structures.

Protected Species

There are no known occurrences of state-listed protected or otherwise rare species within one mile of Process Water Supply Pipeline – Area 2W to Area 2E; therefore, impacts to these resources or their habitats are not anticipated for this alternative.

Process Water Supply Pipeline – Area 3 to Area 2E (East Range Site)

Flora

The proposed alignment for East Range Process Water Supply Pipeline – Area 3 to Area 2E includes only land classified as gravel pits and open mines and does not include any terrestrial floral habitats.

Aquatic Communities

There are no surface water crossings that would be associated with Process Water Supply Pipeline – Area 3 to Area 2E; therefore, no impacts to aquatic communities would be expected.

Protected Species

There are no known occurrences of state-listed protected or otherwise rare species within one mile of Process Water Supply Pipeline – Area 3 to Area 2E; therefore, impacts to these resources or their habitats are not anticipated for this alternative.

East Range Process Water Supply Pipeline – Knox Mine to Area 2WX

Flora

The proposed alignment for East Range Process Water Supply Pipeline – Knox Mine to Area 2WX includes a total of 1.49 acres of terrestrial habitats in the temporary ROW and 0.89 acres of terrestrial habitats in the permanent ROW. Vegetation clearing in the temporary ROW would be considered a temporary impact and the area would revert to the vegetative cover type preceding the disturbance, while clearing in the permanent ROW would result in a permanent habitat conversion to grassland and provide different wildlife habitat functions and values.

Regeneration/young forest and mixed wood forest are the only two terrestrial habitats identified by the LandSat imagery. These areas are anticipated to be cleared of trees and shrubs for installation of this pipeline. In the future, the ROW would be mowed/brushed as needed to manage re-emerging trees and shrubs. Table 4.8-23 summarizes the potential impacts to vegetative communities associated with Process Water Supply Pipeline – Knox Mine to Area 2WX.

Table 4.8-23. Terrestrial Floral Communities and Impacts for the Proposed Process Water Supply Pipeline – Knox Mine to Area 2WX (East Range Site)

Terrestrial Community[1]	Area within Process Water Supply Pipeline – Knox Mine to Area 2WX (acres)		Proposed Tree/Shrub Clearing Impacts (acres)	
	Temporary ROW	Permanent ROW	Temporary ROW	Permanent ROW
Coniferous Forest	0	0	0	0
Deciduous Forest	0	0	0	0
Grassland	0	0	0	0
Mixed Wood Forest	0.1	0.03	0.1	0.03
Regeneration/Young Forest	1.4	0.9	1.4	0.9
Shrubby Grassland	0	0	0	0
Total	1.5	0.9	1.5	0.9

[1]Plant community descriptions from MNDNR, 2006d.

Aquatic Communities

There are no surface water crossings that would be associated with Process Water Supply Pipeline – Knox Mine to Area 2WX; therefore, no impacts to aquatic communities would be expected.

Protected Species

There are no known occurrences of state-listed protected or otherwise rare species within one mile of Process Water Supply Pipeline – Knox Mine to Area 2WX; therefore, impacts to these resources or their habitats would not be anticipated for this alternative.

Process Water Supply Pipeline – Area 6 and Stephens Mine to Area 2WX (East Range Site)

Flora

The proposed alignment for East Range Site Process Water Supply Pipeline – Area 6 and Stephens Mine to Area 2WX includes a total of 28.09 acres of terrestrial habitats in the temporary ROW and 18.63 acres of terrestrial habitats in the permanent ROW. Of these areas, a total of 27.67 acres in the temporary ROW and 18.36 acres in the permanent ROW are anticipated to be cleared of trees and shrubs for installation of the pipeline. Vegetation clearing in the temporary ROW would be considered a temporary impact and, upon completion of the construction activities, would to revert to the dominant vegetative cover type preceding the disturbance, while clearing in the permanent ROW would result in a permanent habitat conversion to grassland and provide different wildlife habitat functions and values.

Mixed wood forest, shrubby grassland, and regeneration/young forest are the most common vegetative habitats that would be cleared for this alignment. The grassland habitats (0.42 acres in the temporary ROW and 0.27 acres in the permanent ROW) could be used for access and staging of construction equipment as the pipeline is installed. In the future, the ROW would be mowed/brushed as needed to manage re-emerging trees and shrubs. Table 4.8-24 summarizes the potential impacts to vegetative communities associated with Process Water Supply Pipeline – Area 6 and Stephens Mine to Area 2WX.

Table 4.8-24. Terrestrial Floral Communities and Impacts for the Proposed Process Water Supply Pipeline – Area 6 and Stephens Mine to Area 2WX (East Range Site)

Terrestrial Community[1]	Area within Process Water Supply Pipeline – Area 6 and Stephens Mine to Area 2WX (acres)		Proposed Tree/Shrub Clearing Impacts (acres)	
	Temporary ROW	Permanent ROW	Temporary ROW	Permanent ROW
Coniferous Forest	0	0	0	0
Deciduous Forest	1.8	1.2	1.8	1.2
Grassland	0.4	0.3	0	0
Mixed Wood Forest	10.2	6.7	10.2	6.7
Regeneration/Young Forest	7.2	4.8	7.2	4.8
Shrubby Grassland	8.6	5.7	8.6	5.7
Total	28.1	18.6	27.7	18.4

[1]Plant community descriptions from MNDNR, 2006d.

Aquatic Communities

East Range Process Water Supply Pipeline – Area 6 and Stephens Mine to Area 2WX would cross two streams as described in Section 4.7.4. Construction of the pipeline is proposed to be conducted through the use of open cut trenching. This construction method can be timed to coincide with low water levels, and accomplished using coffer dams, bypass flumes, diversionary channels, or other short-term BMPs allowing work to be done in a dry channel. These construction methods would provide for minimally invasive construction methods to complete the type of crossing needed. The cross sections and contours of the waters, including wetlands would be restored to their original grade and planted or seeded with native vegetation after construction to ensure continued water quality functions and adequate fauna movement. 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 known occurrences of state-listed protected or otherwise rare species within one mile of Process Water Supply Pipeline – Area 6 and Stephens Mine to Area 2WX; therefore, impacts to these resources or their habitats are not anticipated for this alternative.

Process Water Supply Pipeline – Area 9 South to Area 6 (East Range Site)

Flora

The proposed alignment for East Range Process Water Supply Pipeline – Area 9 South to Area 6 includes a total of 5.45 acres of terrestrial habitat in the temporary ROW and 3.61 acres of terrestrial habitat in the permanent ROW. The habitat is entirely comprised of mixed wood forest, which is anticipated to be cleared of trees and shrubs for installation of this pipeline. Vegetation clearing in the temporary ROW would be considered a temporary impact and, upon completion of the construction activities, would to revert to the dominant vegetative cover type preceding the disturbance, while clearing in the permanent ROW would result in a permanent habitat conversion to grassland and provide different wildlife habitat functions and values.

In the future, the ROW would be mowed/brushed as needed to manage re-emerging trees and shrubs. Table 4.8-25 summarizes the potential impacts to vegetative communities associated with Process Water Supply Pipeline – Area 9 South to Area 6.

Aquatic Communities

The East Range Site Process Water Supply Pipeline – Area 9 South to Area 6 would cross one stream as described in Section 4.7.4. Construction of the pipeline is proposed to be conducted through the use of open cut trenching. This construction method can be timed to coincide with low water levels, and accomplished using coffer dams, bypass flumes, diversionary channels, or other short-term BMPs allowing work to be done in a dry channel. These construction methods would provide for minimally invasive construction methods to complete the type of crossing needed. The cross sections and contours of the waters, including wetlands would be restored to their original grade and planted or seeded with native vegetation after construction to ensure continued water quality functions and adequate fauna movement. 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 known occurrences of state-listed protected or otherwise rare species within one mile of Process Water Supply Pipeline – Area 9 South to Area 6; therefore, impacts to these resources or their habitats are not anticipated for this alternative.

Process Water Supply Pipeline – Area 9 North (Donora Mine) to Area 6 (East Range Site)

Flora

The proposed alignment for East Range Process Water Supply Pipeline – Area 9 North (Donora Mine) to Area 6 includes a total of 1.99 acres of terrestrial habitat in the temporary ROW and 1.42 acres of terrestrial habitat in the permanent ROW. The habitat is entirely comprised of mixed wood forest, which is anticipated to be cleared of trees and shrubs for installation of this pipeline. Vegetation clearing in the temporary ROW would be considered a temporary impact and, upon completion of the construction activities, would to revert to the dominant vegetative cover type preceding the disturbance, while clearing in the permanent ROW would result in a permanent habitat conversion to grassland and provide different wildlife habitat functions and values.

Table 4.8-25. Terrestrial Floral Communities and Impacts for the Proposed Process Water Supply Pipeline – Area 9 South to Area 6 (East Range Site)

Terrestrial Community[1]	Area within Process Water Supply Pipeline – Area 9 South to Area 6 (acres)		Proposed Tree/Shrub Clearing Impacts (acres)	
	Temporary ROW	Permanent ROW	Temporary ROW	Permanent ROW
Coniferous Forest	0	0	0	0
Deciduous Forest	0	0	0	0
Grassland	0	0	0	0
Mixed Wood Forest	5.5	3.6	5.5	3.6
Regeneration/Young Forest	0	0	0	0
Shrubby Grassland	0	0	0	0
Total	5.5	3.6	5.5	3.6

[1]Plant community descriptions from MNDNR, 2006d.

In the future, the ROW would be mowed/brushed as needed to manage re-emerging trees and shrubs. Table 4.8-26 summarizes the potential impacts to vegetative communities associated with Process Water Supply Pipeline – Area 9 North (Donora Mine) to Area 6.

Aquatic Communities

East Range Process Water Supply Pipeline – Area 9 North (Donora Mine) to Area 6 would cross one stream as described in Section 4.7.4. Construction of the pipeline is proposed to be conducted through the use of open cut trenching. This construction method can be timed to coincide with low water levels, and accomplished using coffer dams, bypass flumes, diversionary channels, or other short-term BMPs allowing work to be done in a dry channel. These construction methods would provide for minimally invasive construction methods to complete the type of crossing needed. The cross sections and contours of the waters, including wetlands would be restored to their original grade and planted or seeded with native vegetation after construction to ensure continued water quality functions and adequate fauna movement. 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.

Table 4.8-26. Terrestrial Floral Communities and Impacts for the Proposed Process Water Supply Pipeline – Area 9 North (Donora Mine) to Area 6 (East Range Site)

Terrestrial Community[1]	Area within Process Water Supply Pipeline – Area 9 North (Donora Mine) to Area 6 (acres)		Proposed Tree/Shrub Clearing Impacts (acres)	
	Temporary ROW	Permanent ROW	Temporary ROW	Permanent ROW
Coniferous Forest	0	0	0	0
Deciduous Forest	0	0	0	0
Grassland	0	0	0	0
Mixed Wood Forest	2.0	1.4	2.0	1.4

Table 4.8-26. Terrestrial Floral Communities and Impacts for the Proposed Process Water Supply Pipeline – Area 9 North (Donora Mine) to Area 6 (East Range Site)

Terrestrial Community[1]	Area within Process Water Supply Pipeline – Area 9 North (Donora Mine) to Area 6 (acres)		Proposed Tree/Shrub Clearing Impacts (acres)	
	Temporary ROW	Permanent ROW	Temporary ROW	Permanent ROW
Regeneration/Young Forest	0	0	0	0
Shrubby Grassland	0	0	0	0
Total	2.0	1.4	2.0	1.4

[1]Plant community descriptions from MNDNR, 2006d.

Protected Species

There are no known occurrences of state-listed protected or otherwise rare species within one mile of Process Water Supply Pipeline – Area 9 North (Donora Mine) to Area 6; therefore, impacts to these resources or their habitats are not anticipated for this alternative.

Potable Water and Sewer Pipelines (East Range Site)

Flora

The proposed alignment for the Potable Water and Sewer Pipelines includes a total of 15.54 acres of terrestrial habitats in the temporary ROW and 6.13 acres of terrestrial habitats in the permanent ROW. Of these areas, a total of 13.70 acres in the temporary ROW and 5.41 acres in the permanent ROW are anticipated to be cleared of trees and shrubs for installation of the pipeline. Vegetation clearing in the temporary ROW would revert to the dominant vegetative cover type that existed prior to the disturbance, while clearing of vegetation in the permanent ROW would result in a permanent habitat conversion to grassland and provide different wildlife habitat functions and values. Mixed wood forest is the most common vegetative habitat that would be cleared for the potable water and sewer pipelines alignment. The grassland habitats 1.84 acres in the temporary ROW and 0.72 acres in the permanent ROW) would be used for access and staging of construction equipment as the pipelines are installed. In the future, the ROW would be mowed/brushed as needed to manage re-emerging trees and shrubs. Table 4.8-27 summarizes the potential impacts to vegetative communities associated with the Potable Water and Sewer Pipelines.

Table 4.8-27. Terrestrial Floral Communities and Impacts for the Proposed Potable Water and Sewer Pipelines (East Range Site)

Terrestrial Community[1]	Area within Potable Water and Sewer Pipelines (acres)		Proposed Tree/Shrub Clearing Impacts (acres)	
	Temporary ROW	Permanent ROW	Temporary ROW	Permanent ROW
Coniferous Forest	0	0	0	0
Deciduous Forest	0.6	0.2	0.6	0.2
Grassland	1.8	0.7	0	0
Mixed Wood Forest	11.2	4.4	11.2	4.4
Regeneration/Young Forest	1.9	0.8	1.9	0.8

Table 4.8-27. Terrestrial Floral Communities and Impacts for the Proposed Potable Water and Sewer Pipelines (East Range Site)

Terrestrial Community[1]	Area within Potable Water and Sewer Pipelines (acres)		Proposed Tree/Shrub Clearing Impacts (acres)	
	Temporary ROW	Permanent ROW	Temporary ROW	Permanent ROW
Shrubby Grassland	0	0	0	0
Total	15.5	6.1	13.7	5.4

[1]Plant community descriptions from MNDNR, 2006d.

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 approximately 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. Silt fencing, diversion dams, cofferdams hay bales and other BMPs would be implemented to minimize impact to wetlands and other waters of the United States. The disturbed areas would be restored to its original grade where feasible, stabilized, seeded and planted with plants native to the region.

Protected Species

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

Rail Line Alternative 1 (East Range Site)

Flora

The proposed alignment for Rail Line Alternative 1 includes a total of 75.10 acres of terrestrial habitats in the construction limits (temporary ROW) and 38.64 acres of terrestrial habitats in the permanent ROW. All of these areas are anticipated to be permanently impacted and cleared of trees and shrubs for installation of the railroad bed. Mixed wood forest and shrubby grassland are the most common vegetative habitats that would be cleared for this rail alignment. In the future, the ROW would be mowed/brushed as needed to manage re-emerging trees and shrubs.

The center loop for Rail Line Alternative 1 includes a total of 103.58 acres of terrestrial habitats. Mixed wood forest and shrubby grassland are the most common vegetative habitats affected by the center loop. Depending on the final design specifications for the center loop, some areas of habitat clearing may not be impacted and would continue to exist in its current form. Table 4.8-28 summarizes the potential impacts to vegetative communities associated with Rail Line Alternative 1.

Aquatic Communities

The construction of Rail Line Alternative 1 would require crossing two streams which could directly impact fisheries and aquatic life. Fish mortality could occur by temporary alteration of fish passage, and result in incidental mortality, and indirectly impact fisheries and aquatic life through habitat fragmentation and conversion. Uncontrolled sedimentation could enter the streams and result in increased turbidity, increase biological demand and armor the substrate of the stream channels. Armoring of the stream channels could impact the benthic community, and have indirect impacts on the aquatic fauna that are dependant on macroinvertebrates as a food resource. The removal of the riparian vegetation could also result in a temporary loss of habitat and shading, thereby resulting in increased water temperatures.

Table 4.8-28. Terrestrial Floral Communities Impacts for the Proposed Rail Line Alternative (East Range Site)

Terrestrial Community[1]	Area within Rail Line Alternative 1 (acres)		Proposed Vegetation Clearing Impacts (acres)	
	Construction Limits[2]	Permanent ROW	Construction Limits[2]	Permanent ROW
Rail Line				
Coniferous Forest	0	0	0	0
Deciduous Forest	0	0	0	0
Grassland	0	0	0	0
Mixed Wood Forest	37.2	22.1	37.2	22.1
Regeneration/Young Forest	0	0	0	0
Shrubby Grassland	20.7	5.8	20.7	5.8
Surveyed Wetlands	17.2	10.7	17.2	10.7
Rail Line Total	75.1	38.6	75.1	38.6
Center Loop				
Terrestrial Community[1]	**Area within Rail Line Alternative 1 (acres)**		**Proposed Vegetation Clearing Impacts (acres)**	
Coniferous Forest	0		0	
Deciduous Forest	0		0	
Grassland	0		0	
Mixed Wood Forest	30.4		30.4	
Regeneration/Young Forest	0		0	
Shrubby Grassland	25.2		25.2	
Surveyed Wetlands	47.9		47.9	
Center Loop Total	103.6		103.6	

[1]Plant community descriptions from MNDNR, 2006d.
[2]All habitats within construction limits would be impacted due to necessary grading for construction of rail bed.

Upon the completion of construction, continued fish passage would be assured through the installation of culverts and the bridging of water courses. 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

There are no known occurrences of state-listed protected or otherwise rare species within one mile of Rail Line Alternative 1; therefore, impacts to these resources or their habitats are not anticipated for this alternative.

Rail Line Alternative 2 (East Range Site)

Flora

The proposed alignment for Rail Line Alternative 2 includes a total of 72.05 acres of terrestrial habitats in the construction limits (temporary ROW) and 40.76 acres of terrestrial habitats in the permanent ROW. All of these areas are anticipated to be permanently impacted and cleared of trees and shrubs for installation of the railroad bed. Mixed wood forest and shrubby grassland are the most common vegetative habitats that would be cleared for this railroad alignment. In the future, the ROW would be mowed/brushed as needed to manage re-emerging trees and shrubs. There is no center loop associated with East Range Rail Line Alternative 2. Table 4.8-29 summarizes the potential impacts to vegetative communities associated with Rail Line Alternative 2.

Aquatic Communities

The construction of Rail Line Alternative 2 would require one stream crossing and would directly impact fisheries and aquatic fauna by temporarily altering fish passage and causing incidental mortality, and indirectly impact fisheries and aquatic fauna through habitat fragmentation and conversion. The impacts would be comparable to those described for Rail Line Alternative 1.

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

Table 4.8-29. Terrestrial Floral Communities and Impacts for the Proposed Rail Line Alternative 2 (East Range Site)

Terrestrial Community[1]	Area within Rail Line Alternative 2 (acres)		Proposed Vegetation Clearing Impacts (acres)	
	Construction Limits[2]	Permanent ROW	Construction Limits[2]	Permanent ROW
Coniferous Forest	0	0	0	0
Deciduous Forest	0	0	0	0
Grassland	0	0	0	0
Mixed Wood Forest	35.2	21.8	35.2	21.8
Regeneration/Young Forest	0.7	0.8	0.7	0.8
Shrubby Grassland	17.8	4.8	17.8	4.8
Surveyed Wetlands	18.4	13.4	18.4	13.4
Total	72.1	40.8	72.1	40.8

[1]Plant community descriptions from MNDNR, 2006d.
[2]All habitats within construction limits would be impacted due to necessary grading for construction of rail bed.

Protected Species

There are no known occurrences of state-listed protected or otherwise rare species within one mile of Rail Line Alternative 2; therefore, impacts to these resources or their habitats are not anticipated for this alternative.

Road Alignments (East Range Site)

Flora

The proposed alignment for the East Range roads includes a total of 46.95 acres of terrestrial habitats in the temporary ROW and 28.03 acres of terrestrial habitats in the permanent ROW. All of these areas are anticipated to be cleared of trees and shrubs for construction of the roads. Mixed forest, deciduous forest, and regeneration/young forest are the most common vegetative habitats that would be cleared for the road ROW. Vegetation clearing in the temporary ROW would be considered a temporary impact and, upon completion of the construction activities, would to revert to the dominant vegetative cover type preceding the disturbance, while clearing in the permanent ROW would result in a permanent habitat conversion and provide different wildlife habitat functions and values. Table 4.8-30 summarizes the potential impacts to vegetative communities associated with the proposed road alignments.

Table 4.8-30. Terrestrial Floral Communities and Impacts for the Proposed Road Alignments (East Range Site)

Terrestrial Community[1]	Area within Road Alignments (acres)		Proposed Vegetation Clearing Impacts (acres)	
	Temporary ROW	Permanent ROW	Temporary ROW	Permanent ROW
Coniferous Forest	2.4	1.5	2.4	1.5
Deciduous Forest	8.0	4.8	8.0	4.8
Grassland	0	0	0	0
Mixed Wood Forest	21.8	12.8	21.8	12.8
Regeneration/Young Forest	6.2	3.8	6.2	3.8
Shrubby Grassland	3.1	1.9	3.1	1.9
Surveyed Wetlands	5.5	3.2	5.5	3.2
Total	46.9	28.0	46.9	28.0

[1]Plant community descriptions from MNDNR, 2006d.

Aquatic Communities

There are no surface water crossings that would be associated with the East Range Road Alignments; therefore, no impacts to aquatic communities would be expected as a result of the construction or operation of these structures.

Protected Species

There are no known occurrences of state-listed protected or otherwise rare species within one mile of the Road Alignments; therefore, impacts to these resources or their habitats are not anticipated for this alternative.

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

<table>
<tr><th>Basis for Impact</th><th>No Action</th><th colspan="2">Common Impacts of Proposed Action</th></tr>
<tr><td rowspan="4">Cause, directly or indirectly, the loss, displacement, isolation or alteration (irreparable or irreversible) of vegetation and/or wildlife; aquatic habitat; aquatic communities; or, Federally or state-listed protected species and habitat.</td><td rowspan="4">The No Action Alternative would not cause any of the adverse consequences noted in the impact criteria.</td><td colspan="2">• Impacts to wildlife (for specific species see Section 3.8) would include mortality, disruptions in movement patterns, and habitat fragmentation/conversion.
• Impacts to Federally listed protected species (i.e., Canada lynx) could be the same as mentioned for wildlife; however, USFWS consultation is expected to identify methods to mitigate potential impacts.
• Impacts to vegetation communities in temporary ROWs will be reestablished to their previously existing conditions following the completion of construction, unless otherwise noted. Therefore, specific areas of temporary impacts are not noted here, but can be found earlier in this section.</td></tr>
<tr><th>West Range Site</th><th>East Range Site</th></tr>
<tr><td>Power Plant Footprint
• 154.64 acres of vegetation communities permanently lost. 8 state listed plant species (17 occurrences) in general area of site, but no occurrences within the buffer land boundary. Therefore, it is possible, but unlikely, that these species could be affected by construction.</td><td>Power Plant Footprint
• 167.04 acres of vegetation communities permanently lost.</td></tr>
<tr><td>Rail Alignment
• For Alt 1A, 53.39 acres (without the center loop) (103.58 acres with the center loop) of vegetation communities permanently lost.
• For Alt 1B, 54.53 acres (without the center loop) (1116.57 acres with center loop) of vegetation communities permanently lost.</td><td>Rail Alignment
• For Alt 1, 142.22 acres of vegetation communities permanently lost. Two stream crossings could cause direct mortality to aquatic biota, habitat fragmentation/conversion, increased water temperature, and increased sedimentation (causing loss in macroinvertebrate communities).
• For Alt 2, 40.76 acres of vegetation communities permanently lost. One stream crossing could cause direct mortality to aquatic biota, habitat fragmentation/conversion, increased water temperature, and increased sedimentation (causing loss in macroinvertebrate communities).</td></tr>
</table>

Basis for Impact	No Action	Common Impacts of Proposed Action	
		Access Roads • 53.68 acres of vegetation communities permanently lost.	**Access Roads** • 28.03 acres of vegetation communities permanently lost.
		Process Water Supply Pipelines • 53.49 acres of vegetation communities permanently lost. Five state listed plant species occurrences within one mile of proposed pipeline. Therefore, it is possible, but unlikely, that these species (usually found in different habitat types) could be affected by construction.	**Process Water Supply Pipelines** • 34.41 acres of vegetation communities permanently lost. Four stream crossings could temporarily cause increased sedimentation (causing loss in macroinvertebrate communities), and increased biological oxygen demand during construction.
		Process Wastewater Pipelines • For Alt 1, 24.62 acres of vegetation communities permanently lost. Aquatic communities at stream crossing could temporarily experience increased sedimentation (causing loss in macroinvertebrate communities) and increased biological oxygen demand during construction. • For Alt 2, 10.31 acres of vegetation communities permanently lost.	**Process Wastewater Pipelines** • NA. No process wastewater pipelines expected at East Range.
		Potable Water and Sanitary Sewer Pipelines • 7.25 acres of vegetation communities permanently lost.	**Potable Water and Sanitary Sewer Pipelines** • 5.41 acres of vegetation communities permanently lost.

Basis for Impact	No Action	Common Impacts of Proposed Action	
		Natural Gas Pipelines • For Alt 1, 70.59 acres of vegetation communities permanently lost. Nine state listed plant species occurrences within one mile of proposed pipeline. Therefore, it is possible, but unlikely, that these species (usually found in different habitat types) could be affected by construction. • For Alt 2, 42.65 acres of vegetation communities permanently lost. Three state listed plant species occurrences within one mile of proposed pipeline. Therefore, it is possible, but unlikely, that these species (usually found in different habitat types) could be affected by construction. • For Alt 3, 42.66 acres of vegetation communities permanently lost.	**Natural Gas Pipelines** • For Alt 1, 186.71 acres of vegetation communities permanently lost. 12 state listed plant species occurrences within one mile of proposed pipeline. Therefore, it is possible that construction could affect these species.
		HVTL Corridors • For HVTL Alt 1, 92.79 acres of tree and shrub clearing resulting in habitat conversion as long as the ROW is maintained. Seven state listed plant species occurrences within one mile of proposed HVTL, which could be affected during construction and operation. • For HVTL Alt 1A, 72.2 acres of tree and shrub clearing resulting in habitat conversion as long as the ROW is maintained. Seven state listed plant species occurrences within one mile of proposed HVTL, which could be affected during construction and operation. • For HVTL Phase 2, no tree or shrub clearing would be required; 12 state listed plant species occurrences within one mile of proposed HVTL, which could be affected during construction and operation.	**HVTL Corridors** • For HVTL Alt 1, 89.4 acres of tree and shrub clearing resulting in habitat conversion as long as the ROW is maintained. 18 state listed plant species occurrences within one mile of proposed HVTL, which could be affected during construction and operation. • For HVTL Alt 2, 85.7 acres of tree and shrub clearing resulting in habitat conversion as long as the ROW is maintained. 16 state listed plant species occurrences within one mile of proposed HVTL, which could be affected during construction and operation.

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 Flora and Fauna

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 anticipated 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 anticipated. No tree mitigation would occur nor would any mitigation for impacts to terrestrial vegetative communities, because these are abundant throughout the region.

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 4.7.7 describes in detail the compensatory mitigation that is anticipated 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 and agreed to prepare and issue a biological opinion for the Canada lynx at the West Range Site to be included in the Final EIS. In the event that the East Range Site would be selected for the Proposed Action, additional consultation between DOE and USFWS would be required and a biological opinion for the East Range Site may be necessary. If required by USFWS, mitigation for protected species could include a wide variety of options ranging from passive measures, such as construction timing outside of critical breeding periods, to more aggressive measures, such as complete avoidance of impacts.

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.

4.9 CULTURAL RESOURCES

4.9.1 Approach to Impacts Analysis

4.9.1.1 Region of Influence

The region of influence for cultural resources impacts consists of the area of potential effect (APE) used in cultural resource assessments. The cultural resources APE encompasses two types of cultural resources, archaeological and historical. 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 IGCC buffer lands 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:

- Potential loss, isolation, or substantial alteration of an archaeological resource eligible for listing on the National Register;
- Introduction of visual, audible or atmospheric elements that would adversely affect a historic resource eligible for listing on the National Register;
- 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 were performed on the West Range and East Range Sites and their proposed transportation, HVTL, and pipeline corridors. 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 National Register of Historic Places (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. A Phase I archaeology survey was conducted for area with high archaeological potential on the East Range and West Range sites using the cultural assessment archaeological model. No archaeological resources were identified. If previously unknown archaeological resources are uncovered during construction activities, construction would be stopped, a qualified archaeologist would be called on site to determine the significance of the resource, and the local Tribal Historic Preservation Offices (THPOs) would be notified. The appropriate response would be initiated in consultation with the SHPO and interested Native American tribes, and compliance would be maintained with all applicable resource-related requirements.

Initial consultation letters were sent in September 2005 from the Department of Energy (DOE) to all Federally recognized tribes who have expressed a cultural and historical interest in Minnesota. Follow-up letters were sent out in May 2006. DOE received responses from the THPOs of the Keweenaw Bay Indian Community, Flandreau Santee Sioux Tribe, the Lac Vieux Desert Band of Lake Superior Chippewa Indians, the Mille Lacs Band of the Ojibwe Indians, the 1854 Authority, and the Leech Lake Band of the Ojibwe Indians. The responses (see Appendix E) indicated that no known tribal cultural interests are located in the vicinity of the West Range or East Range sites. However, the THPOs each requested that they be notified for additional comment should Native American artifacts or human remains be uncovered, or if the scope of the project significantly changes. Section 4.12, Environmental Justice, also discusses the legal concerns of area Native American tribes.

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. In the summer of 2006, the SHPO indicated concern for potential adverse impacts upon the Longyear historic site located within the East Range site. DOE spoke with the city administrator for the City of Hoyt Lakes, the responsible party for the historic Longyear site and trail. The city administrator indicated that adverse access or visual impacts to the Longyear historic site would not be expected. DOE's determination of no adverse effect in accordance with Section 106 of the National Historic Preservation Act was forwarded to the SHPO. 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, archaeological and cultural resources has occurred.

Depending on the location of historic properties in relation to the IGCC power plant, views of the towers, plumes, and HVTL structures have the potential to affect scenic views of historical resources 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.

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 IGCC power plant and corridors during operations and repairs. Facility operations would be conducted in compliance with applicable cultural resource laws, regulations, policies and procedures.

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 to determine the potential for Native American artifacts 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.

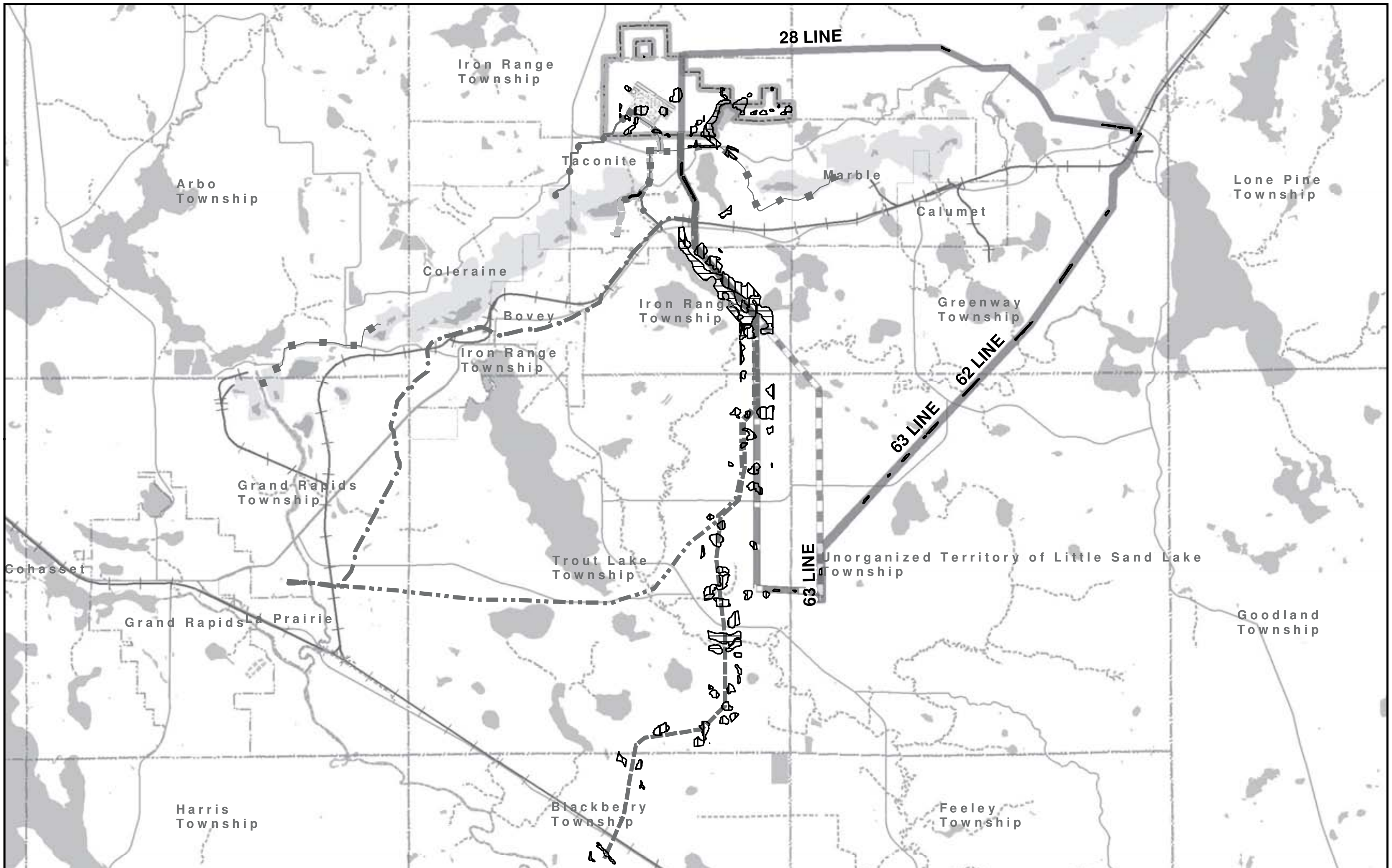
Table 4.9-1 provides the results of the 2005 archaeological assessment model at the West Range Site. Approximately 385 acres of the assessment study area were found to have high archaeological potential. The Mesaba Generating Station and buffer land accounted for 55 acres that surround Dunning Lake. 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 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; Cooling Tower Blowdown Outfalls 1 and 2; and Rail Alignment Alternative 1B 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.



U.S. Department of Energy National Energy Technology Lab	**Legend**	***Figure 4.9-1***
Mesaba Energy Project Draft EIS	**Archaeological Potential**: Medium Potential; High Potential; Streams; Surface Water; Mine Pits — West Range Site; Plant Layout; Municipal Boundaries; Civil Township Boundaries; Existing Roads; Existing Railroads — Proposed Process Water Lines; Proposed Blow Down Alternatives; HVTL Alt 1; HVTL Alt 1A; HVTL Phase 2; Potable Water; Gravity Sewer — Gas Alt 1; Gas Alt 2; Gas Alt 3	***Archaeological Model for West Range Corridor*** Itasca County - South Coordinate System Miles 0 1 2 N W E S

The cultural resources assessment study 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 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 assessments. 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. Although the survey report is not yet final, the survey did not uncover any previously unknown resources within the site boundaries. DOE will review the results of the survey with the SHPO and make a determination as to the potential for any adverse effect on resources.

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. DOE intends to enter into an agreement with SHPO and other appropriate parties to ensure that: 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 within land that was either 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.

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 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 West Range Site

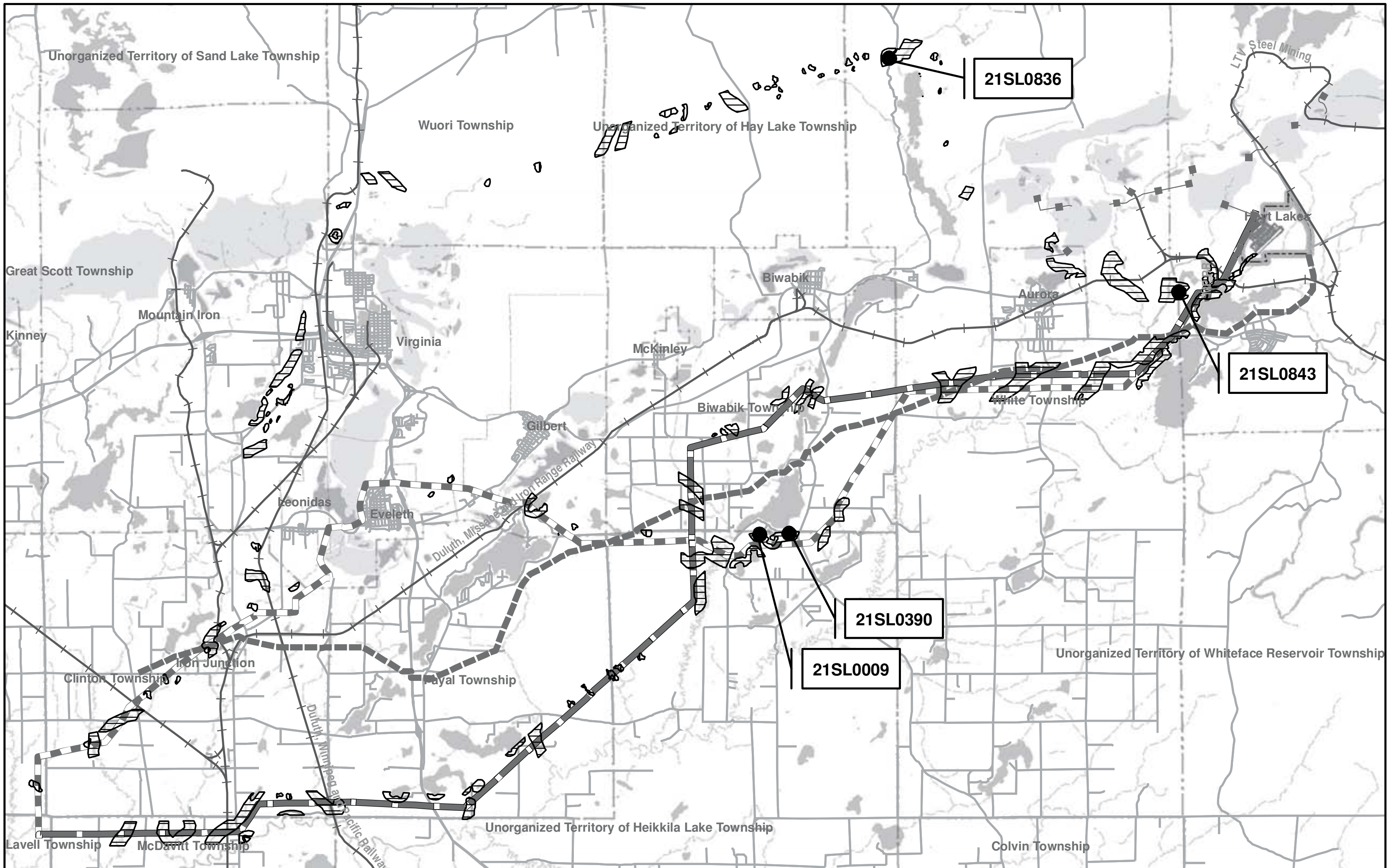
	Total Project Acreage	Total High Potential Areas (acres)	Percentage of Total Project Area	Total Moderate Potential Areas (acres)	Percentage of Total Surveyed Project Area
Total Surveyed Area	30,471	385	16%	457	1.5%

Source: 106 Group, 2005b

Two confirmed archaeological sites are located within the APE of the Alternative 2 HVTL corridor, as shown on Figure 4.9-2. Sites 21SL0009 and 21SL0390 are located approximately 0.25 miles from the 39L along HVTL Alternative 2. 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 HVTL (38L) 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 ROI.

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 Eveleth Recreation Building are located within the town of Eveleth, which is crossed by the 39L of the Alternative 2 HVTL corridor. The eligible Duluth, Winnipeg and Pacific Railway Company would also be crossed by HVTL lines south of the IGCC power plant. 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).



U.S. Department of Energy

National Energy Technology Lab

Mesaba Energy Project

Draft EIS

Legend

- Confirmed Archaeological Site

Archaeological Potential

- Medium Potential
- High Potential
- Streams
- Existing Roads
- Existing Railroads
- East Range Site
- Plant Layout
- Municipal Boundaries
- Civil Township Boundaries
- Surface Water
- Mine Pits
- Proposed Water and Sewer Lines
- Proposed Process Water Lines
- HVTL Alt 1
- HVTL Alt 2
- Gas Alt 1

Figure 4.9-2

Archaeological Model for East Range Corridor

St. Louis County - Central Coordinate System

N W E S

0 1 2 Miles

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 assessments. 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 that there would be no terrain disturbance at the Longyear historic site. Prior to construction, the East Range corridors would need additional surveying at the locations with a high and medium potential for archaeological sensitivity. SHPO also recommended additional evaluation of the Two Harbors to Tower Junction segment of the DM&IR railroad, located directly east of the power plant site, to assess the potential for industrial archaeology resources. 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.

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. DOE intends to enter into an agreement with SHPO and other appropriate parties that will ensure the following: 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 IGCC power plant 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 to be equivalent to a “No Build” Alternative. The implementation of the No Action Alternative would not impact archaeological or historic resources. 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
Cause loss, isolation or alteration of an archaeological resource.	No archaeological resources disturbed.	No documented archaeological sites within APE.	Two archaeological sites identified within the APE of HVTL Alternative 2, but outside of the construction ROW.
Cause the introduction of visual, audible or atmospheric elements near a NRHP-eligible historic resource.	No new structures would be built.	Two railroad spurs eligible for NRHP identified within visual APE, neither found on project property.	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.	No known Native American cultural resources within APE.
Cause the introduction of visual, audible or atmospheric elements near Native American Cultural resource.	No new structures would be built.	No known Native American cultural resources within 1 mile of power plant footprint.	No known Native American cultural resources within 1 mile of power plant footprint.

INTENTIONALLY LEFT BLANK

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. Staging and lay-down areas of up to several acres may be required for storing equipment, pipe, and other materials, which would be acquired through negotiations with affected landowners.

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 4400.3350 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 4400.3450, 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 4415. 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.

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 (FR) and Rural Residential (RR) Districts. The residential properties on the north shore of Big Diamond Lake and southeast shore of Dunning Lake are zoned as RR 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.

Preferred Alignment 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 1A, while approximately eight residences are located within 0.5 mile of Alternative Alignment 1B. The proposed realignment of CR 7 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 and the access road to the station footprint. 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 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 FR 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 FR 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 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, 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.

4.10.4.1 Impacts of Construction

The proposed Mesaba Generating Station footprint on the East Range Site is located on 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 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 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 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 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 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 1,260-acre site, currently undeveloped, ~50 residential properties within 1 mi of station (closest, 0.71 mi) buffered by ~0.5 mi of dense woodlands. Rail Alignment Alternative 1A within 0.5 mi of 16 residences (closest, 400 ft). Alternative 1B within 0.5 mi of 8 residences (closest, 2,000 ft). CR 7 realignment and site access road within 0.5 mi of 22 residences (closest within 300 ft). Process water pipelines within 0.5 mi of 104 residences (4 within 500 ft). Process effluent pipelines 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). 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). 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).	Generating station on 810-acre site, currently undeveloped, no residential properties within 1 mi of station (closest, 1.28 mi) buffered by ~0.5 mi of dense woodlands. No residences within 0.5 mi of either rail alignment alternative (closest, ~1 mi). No residences within 0.5 mi of site access road (closest, >1 mi). 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 on existing ROW within 0.5 mi of 856 residences (46 within 300 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).
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.

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.

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 at 1,555 jobs and a peak during Phase II in year 2011 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 (DEED) workforce data (DEED, 2006a) for the Arrowhead Region indicates that in 2005, the regional labor force was 169,200 with 160,500 employed. DEED 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. 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 when both phases of the generating station would be under 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	1,491	962	865	3,318
2011	1,617	1,100	955	3,672
2012	900	573	520	1,993
2013	167	147	108	422

Source: BBER, 2006

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. 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 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.

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.

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 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.

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 the preferred rail alignment (Alternative 1A); one of these residences would be located within 500 feet. 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. At least five residences along Diamond Lake Road north of Big Diamond Lake would be adversely affected by the relocation of CR 7. 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. Because most nearby residences are located on Twin Lakes Road, it is unlikely that residential properties along the proposed new HVTL corridors would experience substantial reductions in property values. Furthermore, local property owners would be compensated for the granting of easements. 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.

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. 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.

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.	No residences within 3,000 feet of power plant footprint. Three residences within 1,000 feet of Rail Alignment Alternative 1A. No residences within 1,000 feet of Rail Alignment Alternative 1B.	No residences within 3,000 feet of power plant footprint. No residences within 1,000 feet of rail alignment alternatives.
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.
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 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 13.9 grams per year from all existing sources, while the highest deposition attributable to the Mesaba power plant would be approximately 1.4 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.

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

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).

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

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 II, the station would also 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 the generating station would stimulate the creation of nearly 250 additional jobs throughout the Arrowhead Region beginning in 2015.

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. 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

The operation of the Mesaba Generating Station would not conflict with regional plans for recreation. 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). 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). 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). 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. Section 4.5 describes the potential impacts of process water discharges on the water quality of 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.

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 would 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.

INTENTIONALLY LEFT BLANK

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 water, sewer, HVTL, and natural gas utility lines and corridors.

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 (HVTLs)

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 [GO] 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 IGCC Power Plant 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.

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 7,500 gallons per day for Phase I and II. 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. 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 biological oxygen demand (BOD), 220 to 270 milligrams per liter total suspended solids (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 606 $MWe_{(net)}$ 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 IGCC Power Plant. 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 IGCC Power Plant, 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 IGCC Power Plant 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).

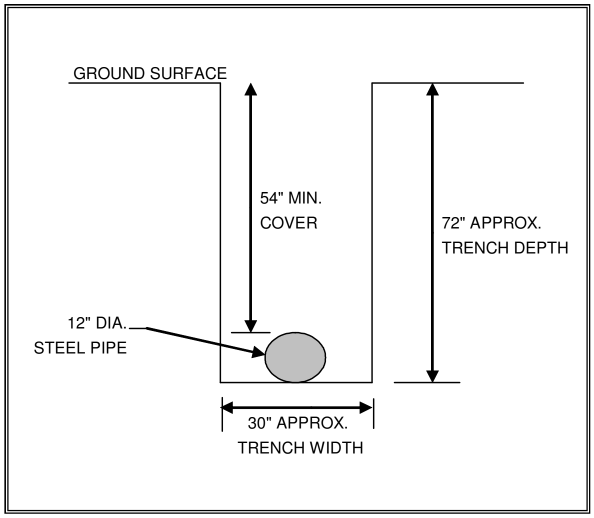


Figure 4.14-1. Typical Cross Section, Natural Gas Pipeline Open Trench Installation

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 IGCC Power Plant 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 options and alternative routes are shown in Figure 4.14-2 and described in Tables 4.14-1 and 4.14-2.

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

Route	Option A1 Preferred	Option A – Alternative	Option B– Preferred	Option 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 WRA-2A, utilizes the 28L and 62L corridors)			Single 345-kV Phase II Alternative	Single 345-kV Phase II Alternate

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 one 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 buffer land 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 buffer land. 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. The preferred route for the double-circuit 230-kV HVTLs for Phase I would be the same as route WRA-1. 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. Phase II would utilize the "1A" route for a single circuit 230-kV HVTL. The alternate route for Phase II would follow route WRB-2A which combines segments from two existing HVTL corridors over 18 miles. These corridors are presently occupied by 115-kV HVTL structures owned by MP. Excelsior would use delta configuration 345-kV structures with an underbuild feature that will carry the existing 115-kV HVTLs below the arms holding the 345-kV conductors (Excelsior, 2006b).

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

The alternate route would be somewhat similar to preferred Plant B route, except that the Phase I route for the 230-kV double circuit HVTLs would follow route WRA-1A. The structures and new ROW requirements would be comparable to those described for WRB-1.

The preferred route for Phase II would be WRB-1, with an alternate of WRB-2A.

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.

> 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.

Network Upgrades

Based on analysis by the Midwest Independent Transmission System Operator (MISO), there are several transmission infrastructure upgrades that would be necessary to interconnect Phase I to the Blackberry Substation. Table 4.14-2 provides a listing of the necessary infrastructure.

Table 4.14-2. Recommended Network Upgrades

Location	Facilities
Boswell-Riverton	Add new Boswell-Riverton 230-kV line. This line incorporates a new route from Boswell, south of Hill City. The route from Hill City to Riverton would use the 11L right-of-way. This route would be approximately 73 miles in length.
Boswell 230-kV Substation	Add new 230-kV bus position for new Boswell-Riverton 230 kV line
Riverton 230-kV Substation	Add new 230-kV bus position for new Boswell-Riverton 230 kV line
Hill City 230-kV Substation	Add new 230-kV substation at Hill City
Nashwauk 115-kV Substation	Replace 4 – 115-kV circuit breakers.

Source: MISO System Impact Study for the Mesaba Energy Project

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)

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 IGCC Power Plant, 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 IGCC Power Plant.

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 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.

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 Coleraine-Bovey-Taconite wastewater collection and treatment system. 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 the 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 inflow and infiltration (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 amount of I/I entering the Taconite collection system can cause the natural pond system to overflow, releasing untreated wastewater into nearby surface waters.

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. However, 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.

4.14.3.4 Natural Gas

Natural gas would be supplied through a direct connection to the GLG Pipeline located approximately 15 miles due south of the West Range Site and/or from NNG's tapping point located in La Prairie, Minnesota, approximately 12 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 4.14-3). The 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.

Table 4.14-3. 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 preferred 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 (Figure 2.3-8).

The preferred alternative would utilize both the existing 39L/37L and 38L corridors. The 39L/37L corridor would be expanded by 30 feet on one side. The 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 second alternative would be nearly the same as the preferred alternative. 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.

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)

The first 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 through on-site septic tanks coupled to a leach field. The 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 33 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. This collection system would need to be redesigned or repaired regardless of the outcome of this project. The Taconite potable water system would need to be expanded to accommodate the project and anticipated future growth. This planned expansion has been recently 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.

Basis for Impact	No Action	West Range	East Range
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.

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 (HCM) 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

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 during the spring of 2008 and end in the fall of 2011. Phase II construction is expected to take place in 2011 and operation is expected to begin in 2014. 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 mid-2009 through mid-2010.

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 proposed project is expected to generate the same number of daily trips for the West Range and East Range, at approximately 2,600 trips per day (for year 2008) and 380 trips per day (for year 2028) (this includes some material transport which is discussed below).

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 because a majority of the required material (e.g., coal) would be shipped via the rail line.

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 Powder River Basin (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.

4.15.3 Impacts on West Range Site and Corridors

4.15.3.1 Impacts of Construction (West Range)

Site Access

Through discussions with Excelsior, Itasca County intends to construct, own, and operate a new alignment of CR 7 to better serve local traffic patterns and the additional traffic related to the Mesaba Energy Project and the Minnesota Steel Industries, LLC project (another large project undergoing environmental review, located approximately 10 miles east of the West Range Site) (Excelsior, 2006a). This new alignment of CR 7, referred to as Access Road 1 (or new CR 7), would be constructed off of CR 7 and would be utilized for construction worker daily access and trucked material deliveries to the West Range Site (see Figure 2.3-2).

Itasca County proposes to extend the existing CR 7 east at the point where southbound traffic on CR 7 now makes a final turn to the south approximately 1 mile north of the existing intersection of CR 7 and US 169. The current stretch of CR 7 between US 169 and the point referenced immediately above would meet the new CR 7 (i.e., Access Road 1) in a "T" intersection.

Access Road 1 would be a new two-lane roadway with shoulders, 17,000 feet in length, beginning at a new access point on US 169, approximately 7,000 feet east of CR 7 (see Figure 2.3-2). The new road would cross underneath the adjacent rail line and proceed north, then curve west between Big Diamond and Dunning Lakes before terminating as it connects with CR 7, just southwest of the plant site. Entrance to the plant would be served by a new 4,900-foot paved driveway (Access Road 2), approximately 32 feet wide, connecting the plant site with Access Road 1.

Heavy construction traffic would access the construction site from US 169, approximately 1.4 miles east of CR 7. As discussed in Section 3.15, the intersection US 169 and CR 7 is currently plagued with slope-stability and vehicle-approach visibility issues. Heavy equipment traffic associated with the Phase I and II developments would be moving too slowly from a dead stop at the existing intersection and traffic coming from either direction on US 169 moving at highway speeds could have difficulty slowing down in time to avoid accidents with slow moving vehicles. The new Access Road 1 would provide a safer and more stable road to the West Range Site.

Another benefit provided by the proposed Access Road 1 is that it would give local residents north of the project site a new route alternative when traveling east on US 169. It would also reduce traffic volumes on the southerly portion of CR 7 because it is expected that most traffic to the site would utilize US 169 to access the new CR 7 (Access Road 1) to avoid the problematic intersection of US 169 and CR 7. In addition, the new roadway would have a better intersection with US 169 than CR 7, including longer sight distance and flatter grades. All alignments, horizontal curves, and clear zones for Access Road 1 would be designed for 55 miles per hour.

The County would seek to move the CR 7 designation to Access Road 1 and include it as part of the County's State Aid system. This would put all future maintenance of the road under the County's responsibility. The section of existing CR 7 between the plant and US 169 would remain in place as either a lower level county road or turned back to the City of Taconite as a city street.

The proposed Access Road 1 is expected to be in place prior to peak construction activities and therefore, it is anticipated that safety hazards associated with increased traffic volumes at the intersection of CR 7 and US 169 would be minimized.

If construction of Access Road 1 is delayed, construction traffic would be required to access the site through use of the existing CR 7. Access Road 2 would be extended to the existing CR 7 from the construction site until Access Road 1 is completed. If Access Road 1 is never constructed, 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 lists the improvements as recommended by the conceptual plan (assuming the new CR 7 would not be constructed) (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 2) would be constructed.

Rail access into the West Range Site would be from existing BNSF and CN tracks. There are three rail alignment alternatives for the West Range Site. 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.

Traffic Volumes and Level of Service (LOS)

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 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. 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 (year 2010)

Location	Average Daily Traffic Volume and Levels of Service	
	"No Build"	"Build"
US 169 (west of CR 7)	7,950 (C)	9,130 (D)
US 169 (east of CR 7)	6,230 (C)	7,280 (C)
CR 7 (north of new Access Road 1)[1]	1,280 (A)	1,540 (A)
CR 7 (south of new Access Road 1)[1]	1,280 (A)	480 (A)
new CR 7 – Access Road 1 (west of power plant entrance)	NA	1,280 (A)
new CR 7 – Access Road 1 (east of power plant entrance)	NA	3,130 (B)

NA – Not Applicable
[1] From western -most point of the new CR 7, just south of West Range power plant site.
Source: SEH, 2006 (f and g)

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 show that ADT volumes on US 169 would increase between 15 to 17 percent and volumes on CR 7 (north of the new Access Road 1) would increase at approximately 20 percent as a result of Phase I construction activities. Traffic flow on CR 7 (south of the new Access Road 1) would actually decrease (i.e., improve) because it is expected that traffic would likely use the more stable and safer Access Road 1 to reach the West Range Site from US 169.

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, except for US 169 (east of CR 7), would continue to operate at the same LOS. The LOS for traffic on 169 (west of CR 7) would degrade from a C to a D. Though the level of service D represents high density flow, as defined in Section 3.15.2, flow of traffic is still considered stable at this level. Furthermore, the high traffic volume change would be temporary, lasting only as long as the construction period.

If the new Access Road 1 is constructed prior to heavy construction activities begin, portions of CR 7 would actually improve its LOS. Furthermore, as previously discussed, the operating conditions at the intersection of US 169 and CR 7 would improve and the safety hazards would be greatly reduced. However, if the new CR 7 were delayed or not constructed at all, then US 169 would operate at an LOS of D in both directions and CR 7 near the project site would operate at an LOS of C. Though plans to renovate the intersection of CR 7 and US 169 (if Access Road 1 were not constructed) 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.

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

Primary access to the West Range Site during operations would be same as that during construction – via the new Access Road 1 (new CR 7) and Access Road 2 (entrance driveway to site). Access Road 2 would be used by nearly all of the site-generated traffic, including truck hauls, during operation of the power plant.

Traffic Volumes and Levels of Service (LOS)

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 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 (year 2028)

Location	Average Daily Traffic Volume and Levels of Service	
	"No Build"	"Build"
US 169 (west of CR 7)	10,300 (D)	10,500 (D)
US 169 (east of CR 7)	8,220 (C)	8,400 (C)
CR 7 (north of new Access Road 1)[1]	1,670 (B)	1,700 (B)
CR 7 (south of new Access Road 1)[1]	1,670 (B)	460 (A)
new CR 7 – Access Road 1 (west of power plant entrance)	NA	1,250 (A)
new CR 7 – Access Road 1 (east of power plant entrance)	NA	1,550 (A)

NA – Not Applicable
[1] From western -most point of the new CR 7, just south of West Range power plant site.
Source: SEH, 2006 (f and g)

Based on the ADTs estimated in Table 4.15-2, the LOSs for the "Build" condition would remain the same as the "No Build" condition, except for CR 7 (south of new Access Road 1), which would actually improve because of the new CR 7. Though the LOS for traffic on US 169 (west of CR 7) would operate at a LOS of D (in either condition), flow of traffic is still considered stable at this level. Furthermore, 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. The Mesaba Energy Project would rectify this circumstance by lowering water levels in the CMP, thereby enhancing the ability to make use of the CN track (Excelsior, 2006b). 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 (STB).

Rail Alignment Alternatives

In considering siting criteria as described in Chapter 2, two rail alignments were identified and evaluated by Excelsior as being feasible (Alternative 1A and 1B). 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 1B would meet acceptable alignment, grade, and rail operations criteria. The length of rail line required for construction of these alternatives would total approximately six and seven miles, respectively. A rail bridge over Access Road 1 (new CR 7) to the West Range Site would be constructed to avoid a crossing that could cause major traffic interruptions close to the power plant. Existing roadways that would be affected by the rail spur into the site are forest roads that can be re-routed without causing major traffic disruptions. With regard to transportation impacts, both of these alternatives would result in similar and minimal impacts because the majority of crossings would be on forest roads.

4.15.4 Impacts on East Range Site and Corridors

4.15.4.1 Impacts of Construction

Site Access

The existing roadway system near the East Range Site was discussed in Section 3.15.2.2 and is shown in Figure 2.3-5. A new road, Access Road 1, would be constructed off of CR 666. The proposed access road would be a new two-lane loop-type roadway, approximately 10,000 feet in length, with two access points off of CR 666, just east of the plant. These roads 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.

Traffic would enter the site from the north access point. During construction and other periods of peak volumes, traffic would exit the site at the south access point. After the Mesaba Generating Station assumes normal operations and traffic patterns have been established, traffic may be allowed to exit the site from either access point. Having two access points off of CR 666 would also provide flexibility in accessing the generating station during construction of Access Road 1 and in the future when maintenance or construction work is performed on CR 666. 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 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 will 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.

It is anticipated that large equipment required at the site would be shipped by rail. The Duluth, Missabe, and Iron Range Railway Company (DMIR) 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 (LOS)

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 1. 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.

Traffic Volumes and Levels of Service (LOS)

Projected traffic volumes during plant operations were estimated in the same manner as that which were calculated for the projected construction traffic volumes. Table 4.15-4 includes ADT traffic estimated during operations for both Phases I and II and is projected to 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 nearby rail lines near the East Range Site were 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. The nearest competitive railroad is the BNSF Railway near Hibbing, 40 miles from the East Range Site. Realistically, the CN would be the only feasible near-term rail service provider into the East Range generating station. 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

Coal would be delivered by other railroads from the CN at either Superior, Wisconsin or to a railroad yard south of Eveleth, Minnesota. The CN would deliver coal to the site from Eveleth. Empty unit trains would return by the same route. The layout 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 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 under 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.

According to regional and local development plans, there are no planned development projects that would greatly add traffic volumes to either of the project areas. Though not yet approved, the Minnesota Steel project, which is located just east of the West Range Site, could add an average daily traffic load of approximately 3,500 vehicles during operations (Minnesota Steel, 2005). Access to the Minnesota Steel site would primarily be through County Highway 58. US 169 could also see some increased traffic volume as a result of the project; however, based on a Itasca County traffic study and proposed design improvements for US 169, traffic impacts are expected to be mitigated for this highway.

Besides the proposed new highway between Babbitt and Hoyt Lakes (see Section 3.15.2.2), there were no other planned transportation projects identified in local improvement plants that would change the existing conditions of local traffic in Itasca County (e.g., *2003 Itasca County 5-Year Plan for Highway Improvement Projects* and *Northeast Minnesota Long Range Transportation Plan Fiscal Years 2008-2030*).

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 were 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; however, for West Range site, Access Road 1 would unlikely be constructed and traffic hazards would remain at intersection of CR 7 and US 169.	During construction: temporary LOS degradation of US 169 – from an LOS of C to D; however, new CR 7 or proposed improvements at US 169/CR 7 intersection expected to alleviate traffic congestion and hazards. During operation: LOSs would remain the same on nearby roadways, except for CR 7 (south of new Access Road 1), which would improve from B to A because of new Access Road 1.	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.

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 offsite sources that could affect the West Range or East Range Sites, as well as the commercial availability of treatment, storage and disposal (TSD) 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 TSD facilities 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 six years from 2008 through 2014. 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, 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 either by pumping and treating surface water or by connection to the local municipal water system. 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 provided by local suppliers.

Construction material storage areas would be located within the planned construction site. Construction site access would be controlled for personnel and vehicles by a security fence around the construction 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 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.

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. 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 is shown in Table 4.16-1.

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: 3,550,000 cubic yards (West and East Range Site) Fill: 2,350,000 cubic yards (West Range Site) 1,150,000 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

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 the Resource Conservation and Recovery Act (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 TSD 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.

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 by the Great Lakes natural gas pipeline, as described in Chapter 2. 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 2.2-5 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 that shown.

Table 4.16-2. Feedstock Storage Requirements (Each Phase)

Material	Storage Requirements
Coal Pile	395,000 tons (5/45-day active/inactive storage based on maximum PRB-1 coal usage). Storage would be equipped with dust control and water run-off control.
Petroleum Coke Pile	111,000 tons (5/45-day active/inactive storage). Storage would be equipped with dust control and water run-off control.
Flux Silo	1,120 tons (5-day active storage).

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.

Slag, a black non-hazardous glass-like material, would be the primary non-hazardous waste generated during operations. 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. Although no large-scale market exists for slag at this time, successful applications of slag reported by the Wabash River Plant 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.

Elemental sulfur will also be generated as a byproduct of power plant operations. 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% of elemental sulfur consumption. 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).

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 4.16-3. 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 would be approximately 7,500 gallons per day for Phase I and II. As discussed in Section 4.14, sanitary wastes would be disposed of by connecting to the local/regional POTW, on-site treatment, or on-site septic tanks coupled to a leach field. The quantity and type of non-hazardous waste that would be generated during operations would be typical waste streams commonly accepted by recycling facilities or non-hazardous waste landfills, and therefore, commercially available disposal would be available. As a result, no adverse impact would be expected to occur from generating these wastes during facility operations.

Hazardous Waste

Table 4.16-3 summarizes the expected hazardous waste streams that would be generated during o Mesaba Generating Station operation. Hazardous waste generated during operations would be limited, for the most part, to the operation of the Mesaba 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). At the East Range site, an addition <24,500 tons per year of ZLD filter cake would be generated as the result of treating all process discharges in the ZLD system. Spent sulfuric acid would be disposed of off site at a licensed disposal facility. Depending upon the fuel being used, approximately 30 to 160 tons per day of elemental sulfur would be generated and stored in molten form. Potential markets for elemental sulfur from Mesaba plant operations are considered to be favorable, and include phosphate fertilizer manufacturing and sulfuric acid production (EERC, 2006). For comparison, the Wabash River Plant reportedly markets its high-purity elemental sulfur in the agricultural chemicals market. 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 set forth under RCRA for the handling, storage, and disposal of generated hazardous waste (previously described in Section 4.16.2.1). Hazardous waste generated during operations would be properly managed and stored on site in accordance with RCRA and Minnesota regulations (Minnesota Rules, Chapter 7045).

Table 4.16-3. Annual Quantity of Non-Hazardous and Hazardous Waste Generated from Phase I and Phase II Operations

Waste Description	Comments	Annual Quantity	H/NH/NA[a]	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 offsite treatment
ZLD filter cake (Gasification Island)	Inorganic and organic salts	4,400 tons	H	Stabilize, hazardous waste landfill
ZLD filter cake (Power Block-East Range Only)	Inorganic and organic salts	<24,500 tons	H	Stabilize, hazardous waste landfill
Refractory brick and insulation	Gasifier repairs	360 tons	NH	Non-hazardous waste landfill

Table 4.16-3. Annual Quantity of Non-Hazardous and Hazardous Waste Generated from Phase I and Phase II Operations

Waste Description	Comments	Annual Quantity	H/NH/NA[a]	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[b]	Characterize, dispose as non-hazardous or hazardous wastes
HRSG wash water (infrequent)	Detergent, residues, neutralized acids	100,000 gallons	NH[b]	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[b]	TBD

Table 4.16-3. Annual Quantity of Non-Hazardous and Hazardous Waste Generated from Phase I and Phase II Operations

Waste Description	Comments	Annual Quantity	H/NH/NA[a]	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]NH= non-hazardous, H=hazardous, NA=not applicable
[b]This waste stream would likely be non-hazardous, however, testing would have to be done to determine if it exhibits hazardous waste characteristics

The quantity and type of hazardous waste that would be generated during operations would be accepted by TSD 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 across the U.S., which can accept the types of wastes expected from construction and operation of the Mesaba Power Plant. 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 (FGD) 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.

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. 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 than those previously 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 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 than those previously described in Section 4.16.2.1, except for additional <24,500 tons per year of ZLD filter cake. 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 than those presented in Section 4.16.2.1. As described in Chapter 2, the East Range Site would capture all cooling tower blowdown discharges in the ZLD system, eliminating wastewater discharges at the East Range Site. 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 the construction and operations phase. Regarding rail transport and at-grade crossings, safety impacts as a result of increased rail increase 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 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 Equivalent Risk Emission Rate (ERER) approach, estimates risk from each emission source stack by computing an ERER quotient for the chemicals of concern. The ERER 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 ERER 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 potential chemicals of concern were estimated using the following sources (listed in order of preference):

- Results of regulatory test programs at the existing Wabash River, 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
- U.S. EPA emission factors (AP-42)

The potential chemicals of concern evaluated in the AERA are shown in Table 4.17-1. Table 4.17-2 shows the exposure pathways evaluated.

Table 4.17-1. Chemicals Evaluated in the AERA (Phases I and II)

Compound	Total Phase I Tons/year	Phase I and Phase II Tons/year
Acetaldehyde	0.046	0.092
Acetophenone	0.023	0.046
Acrolein	0.448	0.896
Antimony	0.029	0.058
Arsenic	0.066	0.131
Benzene	0.153	0.307
Benzyl chloride	1.081	2.162
Beryllium	0.007	0.013
Biphenyl	0.003	0.005
Bis(2-ethylhexyl)phthalate (DEHP)	0.113	0.225
Bromoform	0.059	0.118
Cadmium	0.243	0.486
Carbon disulfide	1.178	2.356

Table 4.17-1. Chemicals Evaluated in the AERA (Phases I and II)

Compound	Total Phase I Tons/year	Phase I and Phase II Tons/year
Carbonyl sulfide	0.000	0.000
Chloroacetophenone, 2-	0.011	0.022
Chlorobenzene	0.033	0.067
Chloroform	0.092	0.184
Chromium, total	0.017	0.033
Chromium, (trivalent)	0.012	0.023
Cobalt	0.011	0.021
Cumene	0.008	0.016
Cyanide (Cyanide ion, Inorganic cyanides, Isocyanide)	0.160	0.319
Dimethyl sulfate	0.074	0.148
Dinitrotoluene, 2,4-	0.000	0.001
Ethyl benzene	0.248	0.496
Ethyl chloride (Chloroethane)	0.064	0.128
Ethylene dibromide (Dibromoethane)	0.002	0.004
Ethylene dichloride (1,2-Dichloroethane)	0.061	0.123
Formaldehyde	0.435	0.871
Hexane	0.102	0.205
Hydrochloric acid	0.100	0.199
Hydrogen fluoride (Hydrofluoric acid)	1.266	2.531
Isophorone	0.894	1.788
Lead	0.014	0.029
Manganese	0.034	0.068
Mercury	0.013	0.027
Methyl bromide (Bromomethane)	1.245	2.490
Methyl chloride (Chloromethane)	0.827	1.653
Methyl chloroform (1,1,1 -Trichloroethane)	0.031	0.061
Methyl ethyl ketone (2-Butanone)	0.602	1.204
Methyl hydrazine	0.262	0.525
Methyl methacrylate	0.031	0.061
Methyl tert butyl ether	0.054	0.108
Methylene chloride (Dichloromethane)	0.057	0.115
Naphthalene	0.066	0.132
Nickel	0.024	0.047
Phenol	0.970	1.940

Table 4.17-1. Chemicals Evaluated in the AERA (Phases I and II)

Compound	Total Phase I Tons/year	Phase I and Phase II Tons/year
Proprionaldehyde	0.586	1.173
Selenium	0.015	0.030
Styrene	0.039	0.077
Tetrachloroethylene (Perchloroethylene)	0.066	0.133
Toluene	0.037	0.075
Vinyl acetate	0.012	0.024
Xylenes	0.098	0.196
Total Federal HAPs	*12.1*	*24.2*
Other Emissions		
Benz[a]anthracene	5.9E-05	1.2E-04
Benzo(k)fluoranthene	1.7E-04	3.4E-04
Benzo[a]pyrene	5.9E-05	1.2E-04
Chrysene (Benzo(a)phenanthrene)	1.5E-04	3.1E-04
Indeno(1,2,3-*cd*)pyrene	9.5E-05	1.9E-04
Methylchrysene, 5-	3.3E-05	6.7E-05
Sulfuric acid and sulfates	65.7	131.4
Total Volatile Organic Compounds (VOCs)	10.3	20.6

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	X	X	X	X

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 of 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 NIOSH, 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 Powder River Basin (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

Human health-related risks associated with release of potentially harmful contaminants from stack emissions were evaluated under the AERA (SEH, 2006i). 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.

The RASS screening calculated health risks for the proposed power plant based on the predicted levels of emitted pollutants as shown in Table 4.17-1. The total inhalation screening health risks associated with carcinogen and non-carcinogen emissions were found to be:

- Total inhalation screening risk of 7.2×10^{-4} from carcinogens;
- Total inhalation screening acute non-cancer hazard index of 75;
- Total inhalation screening chronic non-cancer index of 44; and
- Total inhalation screening sub-chronic non-cancer index of 3.3.

The cancer screening risk exceeded the MPCA cancer risk of 10^{-5} and the three hazard indices exceeded the MPCA total hazard index of 1.0. Again, note that the RASS method is used as a risk screening tool based on very conservative default dispersion assumptions. Exceedance of MPCA cancer risk or total hazard indices using the RASS method indicates the need for further modeling, in this case using the ERER method.

The ERER 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 ERER method indicate:

- The maximum-modeled inhalation acute non-cancer hazard index is 0.52.
- The maximum-modeled sub-chronic non-cancer index is 0.13.

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.

Chronic health risks attributable to facility emission sources were calculated by the IRAP method at each receptor location. The results indicate that the predicted 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 cancer risks posed by the project to adult and child residents are $6.2x10^{-7}$ and $2.5x10^{-7}$, respectively. The highest risks to adult and child farmers are $9.1x10^{-7}$ and $2.3x10^{-7}$. The highest risks to adult and child fishers are $9.1x10^{-7}$ and $2.9x10^{-7}$. The highest morbidity hazards posed by the project to adult and child residents are 0.015 and 0.032, respectively. The highest morbidity hazards to adult and child farmers are 0.005 and 0.011. The highest morbidity hazards to adult and child fishers are 0.015 and 0.032.

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-1 – Lake Resident	$6.2x10^{-7}$	$2.5x10^{-7}$			$9.1x10^{-7}$	$2.9x10^{-7}$	Passed
RI-3 – Lake Resident	$6.2x10^{-7}$	$2.5x10^{-7}$			$9.1x10^{-7}$	$2.9x10^{-7}$	Passed
RI-7 – Working Farm			$9.1x10^{-7}$	$2.3x10^{-7}$			Passed
Morbidity Hazard Index (Criterion = 1)							
RI-1 – Lake Resident	0.015	0.032			0.015	0.032	Passed
RI-3 – Lake Resident	0.015	0.032			0.015	0.032	Passed
RI-7 – Working Farm			0.005	0.011			Passed

(1) Included all chemicals and pathway/route of exposure.
(2) Distance and direction from center of power plant footprint: RI-1 – 1.2 miles to the southeast, RI-3 – 1.2 miles to the southeast, RI-7 – 2.2 miles to the northwest

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. 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 and it has the most readily available data, including a fish species survey, it was chosen to evaluate consumption of potentially contaminated fish tissue.

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.

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) = 16.51 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, average fish size = 0.002 parts per million

- Incremental increase in mercury in fish tissue from the proposed plant, 90^{th} percentile fish size = 0.003 parts per million
- Ambient Subsistence Fisher Hazard Quotient (average and 90^{th} percentile fish size) = 8.5 and 12.21, respectively
- Incremental Subsistence Fisher Hazard Quotient from the proposed plant (average as well as 90^{th} percentile fish sizes) = 0.04 and 0.06, respectively

The predicted increment attributable to the proposed facility emission results in hazard quotients ranging from 0.04 to 0.06. Thus, risk to a subsistence fisher resulting from ingestion of fish tissue after the facility is constructed is negligible. The quotient is less than the MPCA risk value of 1.0 via the fish ingestion pathway.

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.

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.

4.17.3 Corridor-Specific Impacts

The primary public safety aspects of utility corridors are associated with electromagnetic fields of 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). For the purposes of this EIS, the standards for assessing human health impacts at the edge of the ROW are 2-kV per meter for electric fields, and 150 mG for 69-kV to 230-kV lines or 200 mG for lines up to 500-kV for magnetic fields.

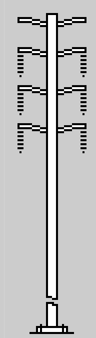
West Range

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.

Figure 4.17-1 shows the electric and magnetic field levels for the 230-kV double circuit without the 115-kV underbuild. Figure 4.17-2 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 well below both the 150 mG and 200 mG standards for 230-kV and 345-kV lines respectively. The electric field for the 345-kV configuration falls below the 2-kV per meter standard. 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	55.06	At CL	0.553
	At CL + 50 ft	29.97	At CL + 50 ft	0.382
	At CL + 100 ft	10.93	At CL + 100 ft	0.051
	At CL + 300 ft	0.98	At CL + 300 ft	0.008

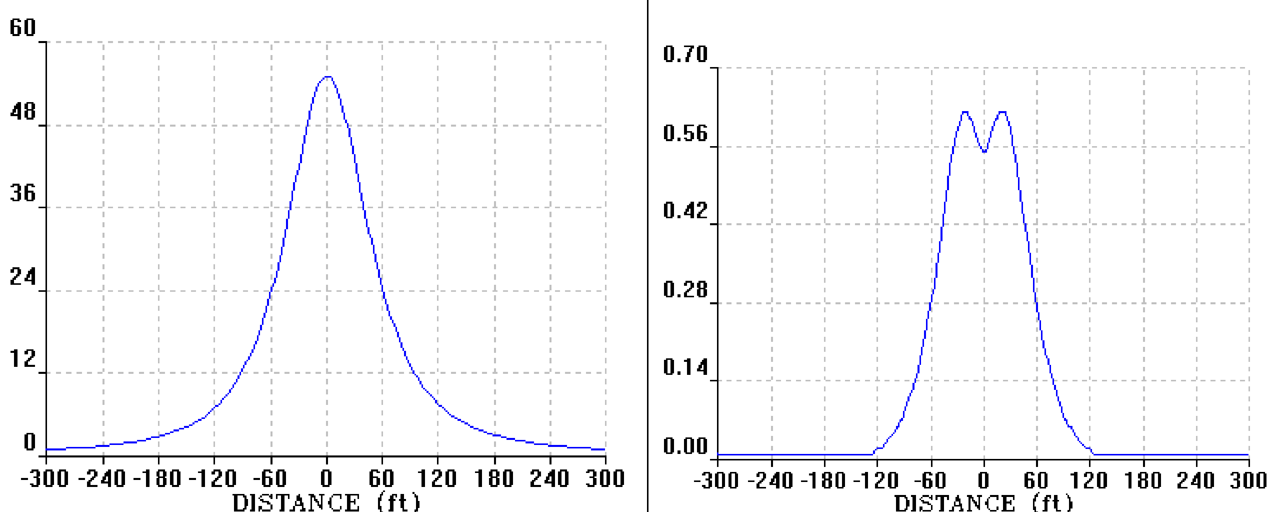
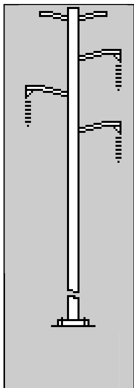


Figure 4.17-1. West Range, EMF for 230-kV – 2 Circuit Vertical Configuration Lapwing

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 standard for the 345-kV lines. The electric field is below the 2-kV per meter standard 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 within 50 to 100 feet of the centerline of the current 39L/37L route. These residences would fall outside areas where the electric fields could exceed 2-kV per meter under the Proposed Action.



Magnetic Field (mG)		Electric Field (kV/m)	
At CL	130.82	At CL + 30	2.006
At CL + 50 ft	93.58	At CL + 50 ft	1.532
At CL + 100 ft	44.33	At CL - 100 ft	0.645
At CL + 300 ft	5.94	At CL - 300 ft	0.057

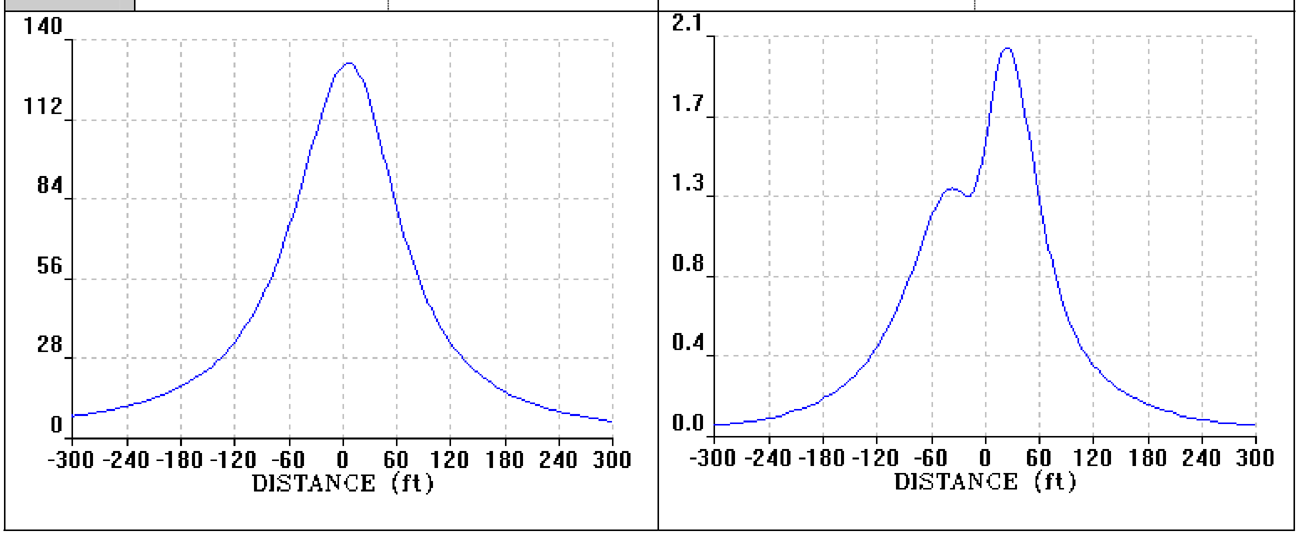


Figure 4.17-2. West Range, EMF for 345-kV – 1 Circuit Delta Configuration

Henshaw Effect

As discussed in Section 3.17, a researcher named Henshaw hypothesized that electric fields at the surface of power line conductors leads to increased charges on particles, thereby increasing the likelihood of inhaled particles which would be deposited on the surfaces inside the lungs and airways, even at considerable distances from the line. In theory, these events could lead to increases in respiratory and other diseases. Similarly, a British study found elevated rates of childhood leukemia at distances out to 600 meters (2,000 feet) from electric lines, where magnetic fields are similar to background levels. This study suggests that the Henshaw Effect could be a factor in the elevated childhood leukemia rates. 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 if the 2-kV per meter electric field standard at the edge of the ROW would be protective in terms of 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.

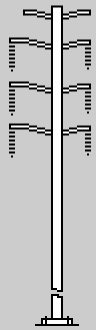
However, it seems unlikely that corona ions would have more than a small effect on the long-term health risks associated with particulate air pollutants, even in the individuals who are most affected. In public health terms, the proportionate impact will be even lower because only a small fraction of 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.

4.17.3.2 Natural Gas Pipelines

Natural gas pipeline safety is governed by the Pipeline and Hazardous Materials Safety Administration, Office of 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 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.



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

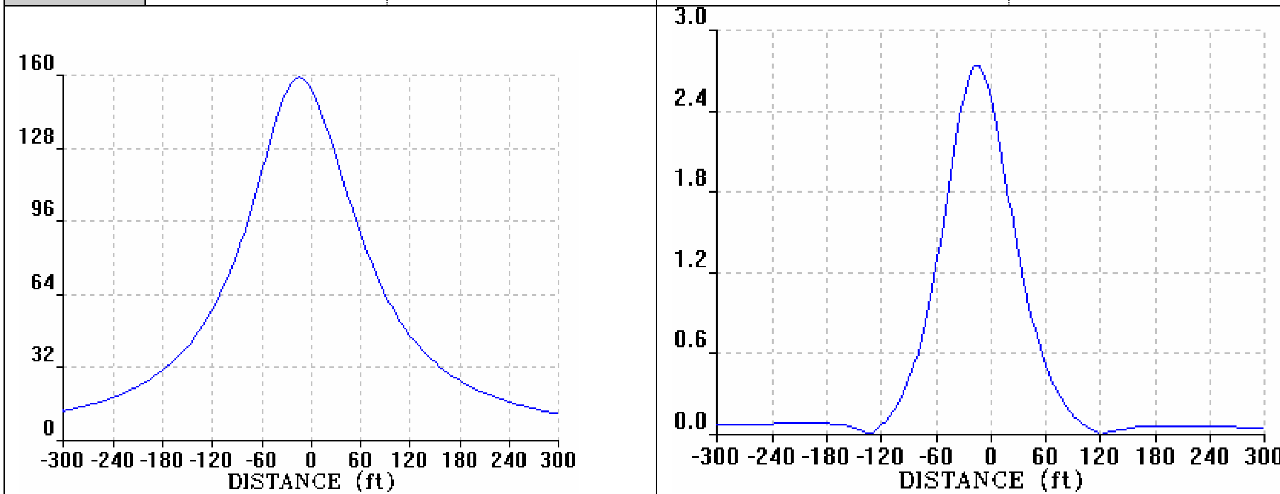


Figure 4.17-3. East Range, EMF for 345-kV – Vertical Configuration Bundle with 115-kV - Vertical Configuration Rail

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 the same as those for the West Range Site.
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 the same as those for the West Range Site.
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 the same as those for the West Range Site.

Basis for Impact	No Action	West Range	East Range
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 air emission modeling results, cancer risks posed by the project would be extremely small. As presented in Table 4.17-4, the highest cancer risks posed by the project to adult and child residents are $6.2x10^{-7}$ and $2.5x10^{-7}$, respectively. The highest risks to adult and child farmers are $9.1x10^{-7}$ and $2.3x10^{-7}$. The highest risks to adult and child fishers are $9.1x10^{-7}$ and $2.9x10^{-7}$.	Impacts would be the same as those for the West Range Site.
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 air emission modeling results, the morbidity hazards to the public would be extremely small. As presented in Table 4.17-4, the highest morbidity hazards posed by the project to adult and child residents are 0.015 and 0.032, respectively. The highest morbidity hazards to adult and child farmers are 0.005 and 0.011. The highest morbidity hazards to adult and child fishers are 0.015 and 0.032.	Impacts would be the same as those for the West Range Site.
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 the same as those for the West Range Site.
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 the same as those for the West Range Site.

INTENTIONALLY LEFT BLANK

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 residential locations above levels existing without the Proposed Action. The following increases in noise levels at outdoor noise-sensitive activity areas were used as a basis for evaluation:
    - 5 dBA L_{dn} increase if the ambient noise level is less than or equal to 60 dBA L_{dn}.
    - 3 dBA L_{dn} increase if the ambient noise level is between 60 dBA L_{dn} to 65 dBA L_{dn}.
    - 1.5 dBA L_{dn} increase if the ambient noise level is greater than 65 dBA L_{dn}.
- 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).

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 was 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, which includes residential and church land uses, are shown in Table 4.18-2.

Table 4.18-2. Noise Area Classification Thresholds for NAC-1

	L_{50}	L_{10}
Daytime (7:00 am to 10:00 pm)	60 dBA	65 dBA
Nighttime (10:00 pm to 7:00 am)	50 dBA	55 dBA

Source: MPCA, 1999

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 (ANSI) and International Standards Organization (ISO) 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 has been estimated for the surrounding sensitive receptors using Federal Rail Administration (FRA) and Federal Transit Administration (FTA) methodologies. Additionally, the American Public Transit Association (APTA) 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 APTA 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 FTA 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	125 – 135
Train Speed	10 mph

Federal Highway Administration Noise Analysis

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 (% 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 Noise Abatement Criteria (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 require 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.

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	1,700 ft south	Ambient Monitoring; Plant Operations Modeling; Construction Impacts; FHWA traffic modeling; Rail Operations Impacts
R2. Residence, North Big Diamond Lake	3,900 ft southeast	Ambient Monitoring; Plant Operations Modeling; Construction Impacts; FHWA traffic modeling; Rail Operations Impacts
R3. Residence, along CR 7	3,900 ft west	Ambient Monitoring; Plant Operations Modeling; Construction Impacts; FHWA traffic modeling; Rail Operations Impacts

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)
R4. 32423 CR 7	4,400 ft west	Ambient Monitoring; Plant Operations Modeling; Construction Impacts; FHWA traffic modeling; Rail Operations Impacts
R5. Dunning Lake Site	4,100 ft southeast	Ambient Monitoring; Plant Operations Modeling; Construction Impacts; FHWA traffic modeling; Rail Operations Impacts
R6. Lutheran Church	18,000 ft southeast	Plant Operations Modeling
R7. Catholic Church	10,700 ft northwest	Plant Operations Modeling
AAC-6. Near Beasley Ave., City of Taconite	8,800 ft southwest	Construction Impacts; Rail Operations Impacts
AAC-7. North side of Twin Lakes; near City of Marble	14,800 ft southeast	Construction Impacts; Rail Operations Impacts
AAC-8. Between O'Reilly Lake & Island Lake (off Reilly Beach Rd.)	11,260 ft northwest	Construction Impacts; Rail Operations Impacts

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

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)
R4. 321 Kent St, Hoyt Lakes	11,500 ft south	Ambient Monitoring; Plant Operations Modeling; Construction Impacts; Rail Operations Impacts
R5. Faith Lutheran Church	10,000 ft southwest	Plant Operations Modeling; Construction Impacts; Rail Operations Impacts
R6. Queen of Peace Catholic Church	10,200 ft southwest	Plant Operations Modeling; Construction Impacts; Rail Operations Impacts
R7. Trinity Methodist Church	10,300 ft southwest	Plant Operations Modeling; Construction Impacts; Rail Operations Impacts

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.

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 two or three minutes each, would be performed several times daily over a period of two or three 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 due to the following factors:

- 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

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.

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	45	46	44	44	38	34	36
Excavation	56	50	51	49	49	43	39	41
Foundation	44	38	39	37	37	31	27	29
Building Construction	51	45	46	44	44	38	34	36
Finishing	56	50	51	49	49	43	39	41

*Note: AAC 6 is not the same location as Receptor 6 – Lutheran Church and AAC 7 is not the same location as Receptor 7 – Catholic Church. (Source: SEH et al., 2005)

Table 4.18-8 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 Future Plant Steam Blow	Steam Blow Noise Level, dBA
R1	2,210	103
R2	4,615	97
R3	4,110	98
R4	5,215	96
R5	5,015	96
AAC R6*	9,530	90
AAC R7*	15,650	86
AAC R8	12,340	88

*Note: AAC 6 is not the same location as Receptor 6 – Lutheran Church and AAC 7 is not the same location as Receptor 7 – Catholic Church. (Source: SEH et al., 2005)

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.

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 except for R1. R1 (an access road) is 2,000 feet from the proposed plant and in an area with no residential housing.

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	R2	R3	R4	R5[1]	R6[1]	R7[1]
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

Bold numbers indicate levels above MPCA daytime guidelines
* Receptor 1 is located at the boundary of the Buffer Land and is isolated from residential receptors.
[1]These 3 Receptors represent churches within the Hoyt Lakes Area
Source: SEH, 2005b

Table 4.18-10 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 Steam Blow	Steam Blow Noise Level
R1*	1,900 ft	105 dBA
R2	10,000 ft	91 dBA
R3	9,200 ft	91 dBA
R4	12,800 ft	88 dBA
R5	10,700 ft	90 dBA
R6	11,000 ft	90 dBA
R7	11,000 ft	90 dBA

* Receptor 1 is located at the boundary of the Buffer Land and is isolated from residential receptors.
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.

4.18.2.2 Impacts of Facility Operation

Plant Noise

The dominant noise sources for the base plant configuration included the Heat Recovery Steam Generator (HRSG) and ASU stack exits, large buildings with major process equipment inside (including the Gas Turbine Generators [GTGs] and Steam Turbine Generator [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

The noise modeling results at the seven nearest receptors are shown below in Table 4.18-11. For the community receptors R2 through R5, the predicted aggregate noise emissions (without any assumed noise control treatments) from the proposed complete power project (Phases I and II) were above the indicated Minnesota L_{50} community limits during the nighttime. At R3 and R4, these noise levels exceeded the L_{10} threshold by 3.4 and 1.5 dBA, respectively. At R2 through R5, the nighttime noise levels exceedances above the L_{50} threshold ranged from 1.6 dBA (R5) through 3.6 dBA (R4). Predicted noise levels were well within the daytime limits for all locations.

The largest nighttime L_{10} decibel increase was 3 dBA at R2 and R5; the largest nighttime L_{50} decibel increase was 2.7 dBA at R2. Note that although R3 and R4 are above the noise limits, existing ambient conditions at both residences already exceed the Minnesota regulations, because of their proximity to CR7; however, these locations are expected to incrementally receive less than 1 dB from the combined plant, 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 at Receptors for West Range Site

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	55/55	2.1/1.8	1.4/1	55.1/53.8	52.4/50
R2	54/53	50/49	50/50	1.4/1.8	3/2.7	55.4/54.8	53/**51.7**
R3	59/55	**58/53**	46/46	0.2/0.3	0.4/0.5	59.2/55.3	**58.4/53.5**

Table 4.18-11. Estimated Plant Noise Levels at Receptors for West Range Site

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)
R4	59/52	**56/53**	45/45	0.2/0.5	0.5/0.6	59.2/52.5	**56.5/53.6**
R5	51/49	50/49	50/50	2.6/2.6	3/2.6	53.6/51.6	53/**51.6**
R6	52/50	50/49	35/35	0/0	0/0	52/50	50/49
R7	52/50	50/49	40/40	0.2/0.4	0.4/0.5	52.2/50.4	50.4/49.5

Note: Bold font indicates 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)

Because noise standards were exceeded under the base case assumptions, the following techniques were evaluated to further reduce noise from plant operations:

- 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.

With the proposed 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). With the proposed mitigation, noise levels would not increase at any nearby residence by more than one decibel. Thus, it is anticipated that with the proper plant noise mitigation, noise level increases are not expected to be perceptible at any of the listed receptors.

Plant Noise at East Range Site

The modeling results at the seven nearest receptors are shown below in Table 4.18-12.

Table 4.18-12. Estimated Operational Noise Levels at Receptors at East Range Site

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	50/50	49/49	58/58	0.6/0.6	0.5/0.5	50.6/50.6	49.5/49.5
R2	52/52	50/49	40/40	0.2/0.2	0.4/0.5	52.2/52.2	50.4/49.5
R3	53/53	50/49	42/42	0.5/0.5	0.3/0.8	53.5/53.5	50.3/49.8
R4	52/50	49/48	35/35	0/0	0/0.2	52/50	49/48.2

Table 4.18-12. Estimated Operational Noise Levels at Receptors at East Range Site

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)
R5	53/50	50/49	39/39	0/0.3	0.3/0.4	53/50.3	50.3/49.4
R6	53/50	50/49	39/39	0/0. 3	0.3/0.4	53/50.3	50.3/49.4
R7	53/50	50/49	39/39	0/0. 3	0.3/0.4	53/50.3	50.3/49.4

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. (Source: SEH, 2005b)

During operation of the plant 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 (0.5 dBA for both L_{10} and L_{50}), while R2 received the greatest nighttime increase (0.8 for L_{50}); however, these increases are well below the commonly-held threshold of a perceptible change in community noise levels (which is ±3 dB).

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

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 38 to 58 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 R7 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 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 Distance to Rail Yard (Loading & Unloading) (ft)	Estimated Yard Noise (dBA)	Estimated RMS Vibration Velocity (dBV)
R1	4,110	44	6,020	21	56
R2	500	58	7,825	18	74
R3	3,510	45	4,815	23	57
R4	5,265	43	6,520	20	54
R5	500	58	8,025	18	74
AAC-6*	2,000	49	13,040	13	62
AAC-7*	500	58	19,050	8	74
R8	10,780	38	12,035	13	47

*Note: AAC-R6 is not the same location as Receptor 6 (Lutheran Church) and AAC-R7 is not the same location as Receptor 7 (Catholic Church). (Source: SEH et al., 2005)

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 8 to 23 dBA at the nearby residences. Noise generated by yard operations would not exceed the FRA and ATPA noise guidelines, and therefore, 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.

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.

Freight train noise levels would range from 43 to 52 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 receptors represented by R1, R2, and R3. 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 Distance to Rail Yard (Loading & Unloading) (ft)	Estimated Yard Noise (dBA)	Estimated RMS Vibration Velocity (dBV)
R1	1,700	52	1,700	30	68
R2	5, 800	45	9,500	16	58
R3	5,200	46	8,700	17	57
R4	9,300	42	12,000	15	54
R5	7,300	44	10,000	15	48
R6	8,000	43	10,200	15	47
R7	8,100	43	10,200	15	47

* Receptor 1 is located at the boundary of the Buffer Land and is isolated from residential receptors. (Source: SEH, 2005b)

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 30 dB at the nearby residences. 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.

Federal Highway Administration Noise Analysis (West Range)

As stated earlier, the FHWA noise analysis was required for the West Range because of the proposed realignment of CR 7 (this analysis was not required for the East 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.

Due to the proximity of the proposed access roadway running between Big Diamond Lake and Dunning Lake to the West Range Site, the model identified the following noise issues:

- The nighttime state L_{10} standard would be exceeded at ten receptor sites during construction. However, this traffic-related noise impact would be temporary; because it is limited to the construction period.
- The “Daytime” L_{10} standard would be exceeded during construction at one virtual receptor, MR19, because it is 275 feet from the proposed roadway. However, this construction period noise impact would also be temporary.
- Nighttime state L_{10} standards were exceeded at five receptors during plant operation.

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'	40dBA	37dBA	34dBA	33dBA
MR2/5400'	40dBA	37dBA	34dBA	32dBA
MR3/5500'	40dBA	37dBA	33dBA	32dBA
MR4/5800'	38dBA	35dBA	32dBA	31dBA
MR5/5600'	38dBA	36dBA	32dBA	31dBA
MR6/5600'	38dBA	36dBA	32dBA	31dBA
MR7/5450'	38dBA	36dBA	32dBA	31dBA
MR8/5300'	38dBA	36dBA	32dBA	31dBA
MR9/4600'	40dBA	38dBA	33dBA	32dBA
MR10/320'	57dBA	63dBA	54dBA	56dBA
MR11/1400'*	55dBA	53dBA	49dBA	47dBA
MR12/1250'*	56dBA	54dBA	50dBA	48dBA
MR13/1050'*	59dBA	56dBA	52dBA	50dBA
MR14/850'*	62dBA	58dBA	53dBA	51dBA
MR15/550'*	66dBA	61dBA	56dBA	54dBA
MR16/350'*	66dBA	65dBA	59dBA	57dBA
MR17/300'*	66dBA	65dBA	60dBA	58dBA
MR18/300'*	66dBA	65dBA	60dBA	58dBA
MR19/275'*	67dBA	66dBA	60dBA	61dBA
MR20/1000'**	58dBA	56dBA	52dBA	51dBA

Notes: Shaded values represent L_{10} values above state standards. * Represents residences at Big Diamond Lake. **Represents residence at Dunning Lake.

[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

In defining the impacted receptors, the FHWA, Mn/DOT, and MPCA regulations were examined and the following conclusions were made:

- No receptors met the criteria for *Noise Level Approaching the Noise Abatement Criteria (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.
- A total of 16 impacts were located according to the MPCA definition of an impacted receptor. These are in the form of L_{10} metrics and are at their peak during AM conditions, and during the construction time frame resulting in an average decibel increase at these receptors of 1 dB to 6 dB over and above the MPCA "nighttime" L_{10} criteria of 55 dB.

- "Nighttime" construction times (10:00 pm – 7:00 am) yield the most impacted receptors per MPCA definition. A total of 10 locations are primarily located at Big Diamond Lake and Dunning Lake.
- "Daytime" construction times yield one impacted receptor, MR19, due to its 275 foot proximity to the proposed roadway.
- "Nighttime" 20-year project plant service traffic levels reveal five impacted receptors due to their close proximity to the proposed roadway and the reduced MPCA guidelines of 55 dBA/L_{10} during this time frame.
- "Daytime" 20-year projected plant service traffic levels reveal no impacted receptors per FHWA or MPCA and Mn/DOT guidelines.

Since some of the predicted noise levels at the receptor locations exceeded the noise standards, a mitigation analysis was also completed to determine if measures, such as a noise wall, were reasonable and effective in attenuating the noise at those locations. This overall approach is outlined in Mn/DOT Noise Policy for Type I and Type II Federal-Aid Projects as per 23 CFR 772. If noise mitigation is found to be cost-effective, additional reasonableness factors, such as the desires of affected property owners, are considered. Other mitigation techniques such as routing traffic via different corridors were studied; however, the topography of the land dictates where the roadway can be cost-effectively built. The noise analysis determined that a barrier was the most effective in terms of noise mitigation and cost and was the predominant mitigation device studied.

Noise barrier construction decisions are based on a study of feasibility and reasonableness. Feasibility is determined by physical and/or engineering constraints (i.e., whether a noise barrier could feasibly be constructed on the site). Reasonableness is a more subjective measure and is based on a number of factors. For a noise barrier to be considered acoustically effective, it must achieve a noise reduction of 5dB or more per residence. To be considered cost-effective, the cost per (single) dB of reduction per residence should be equal to or less than $3,250. Cost-effectiveness of the barrier is calculated by dividing the cost of the noise barrier ($15 per square foot for noise walls per Mn/DOT standard) by the product of the average decibel reduction and the total number of residences affected. The result of this calculation is a cost per decibel reduction per residence. Due to the low density of homes within the study area and the length of the wall needed to effectively reduce noise levels to affected receptors (>5dB), the cost/decibel reduction ratio for each residence was calculated to be $20,625 per decibel reduced, per residence. Therefore, based on factors for determining the feasibility, it was determined that a noise wall would not meet the minimum reasonability criteria and would therefore, not be required (SEH et al., 2005).

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]) 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 88 to 103 dBA; however, steam piping would be equipped with silencers that would reduce noise levels by 20 dBA to 30 dBA at each receptor location. MPCA residential daytime noise limits of 60 dBA (L_{50}) would not be exceeded at any of the residential receptors during construction. Rail construction noise could potentially result in a short-term, temporary noise impact at R2 and R5, which would be diminished as the rail construction moved away. FHWA noise analysis: Nighttime L_{10} threshold would be exceeded at ten receptor sites during construction. Daytime L_{10} threshold would be exceeded at one receptor site during construction.	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 103 dBA; however, steam piping would be equipped with silencers that would reduce noise levels by 20 dBA to 30 dBA at each receptor location. MPCA residential daytime noise limits of 60 dBA (L_{50}) would not be exceeded at any of the residential receptors during construction.
Conflicts with a jurisdictional noise ordinance or Minnesota regulations (i.e., Minnesota Pollution Control Agency [MPCA]) during operations	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.	Daytime: MPCA noise thresholds would not be exceeded. Nighttime: Without mitigation, the noise level exceedances above the L_{50} threshold would occur at R2 through R5 and would range from 1.6 dBA (R5) through 3.6 dBA (R4), respectively. The noise levels would exceed the L_{10} threshold by 3.4 and 1.5 dBA at R3 and R4, respectively. With the proposed mitigation, it is expected that state noise standards would be met at all sites, except for the L_{10} limit at R3 and R4 because the levels are already over	Daytime and nighttime MPCA noise thresholds would not be exceeded.

Basis for Impact	No Action	West Range	East Range
		the standard due to CR7.	
Result in a substantial permanent increase in ambient noise levels at residential areas above levels existing without the Proposed Action. The following increases at outdoor activity areas of noise-sensitive uses would be considered significant: 5 dBA L_{dn} increase if the ambient noise level is less than or equal to 60 dBA L_{dn} 3 dBA L_{dn} increase if the ambient noise level is between 60 dBA L_{dn} to 65 dBA L_{dn} 1.5 dBA L_{dn} increase if the ambient noise level is greater than 65 dBA L_{dn}	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.	Plant Noise: Without mitigation, the greatest predicted increase occurs for the nighttime L_{10} limit at 3 dBA (at R2 and R5) and for the nighttime L_{50} limit at 2.7 dBA (at R2). With the proposed mitigation, it is expected that any resulting increase in noise levels from plant operations would not exceed 1 dB, thus would not be perceived at any of the residential receptor locations. Rail Noise: Incremental noise increase may be discernable at R2, R5, and R7 and would be short-term. Maximum noise levels would still be below the ATPA threshold. Noise generated by yard operations would be well below the FRA and ATPA noise guidelines. Train horns, as required under FRA regulations would be adverse unavoidable impacts at at-grade crossings. FHWA noise analysis: Nighttime L_{10} threshold would be exceeded at five receptor sites during operations; however, no receptors meet the FHWA definition of *Substantial Increase in Noise*.	Plant Noise: Without mitigation, predicted daytime and nighttime noise level increases were less than 1.5 dBA, which would not be detectable at any receptor locations. Rail Noise: Incremental noise increase may be discernable at R1, R2, and R3; however, the impact would be short-term and maximum noise levels would still be below the ATPA threshold. Noise generated by yard operations would be well below the FRA and ATPA noise guidelines. Train horns, as required under FRA regulations would be adverse unavoidable impacts at 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.
Gas Turbine, Steam Turbine, & HRSG 2-on-1 Power Island (70 dBA at 400' from island envelope)	(a) Include acoustical panel specifications for GTG 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 GTG 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

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.

INTENTIONALLY LEFT BLANK