MESABA ENERGY PROJECT

ENVIRONMENTAL SUPPLEMENT:

SECTION THREE

Prepared by

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Barr Engineering Co.
4700 West 77th Street
Minneapolis, MN 55435
(952) 832-2600

URS Corporation
8181 East Tufts Avenue
Denver, Colorado 80237
(303) 694-2770

Short Elliott Hendrickson
3535 Vadnais Center Dr.
St. Paul, MN 55110
(800) 325-2055

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APPENDICES – See Attached Environmental Supplement Appendix CD

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Appendix 2	Market Analysis for Slag and Sulfur Produced by IGCC Power Station Located in Iron Range
Appendix 3	West Range Soil Boring Logs
Appendix 4	RODM Datasheets
Appendix 5	Noise Evaluation Study
Appendix 6	National Historic Preservation Act Reports

ACRONYMS

37L, 39L, etc.	Existing High Voltage Transmission Line Identification Numbers
acfm	Actual Cubic Feet per Minute
ACSR	(Conductor)
AERA	Air Emission Risk Analysis
AGR	Acid Gas Recovery
Al_2O_3	Aluminum Oxide
AMP	Arcturus Mine Pit
AP-42	USEPA Compendium of Air Pollutant Emission Factors
APE	Area of Potential Effect
AQRV	Air Quality Related Values
AREMA	American Railway Engineering and Maintenance Association
ASU	Air Separation Unit
BACT	Best Available Control Technology
BCC	Bioaccumulative Chemical of Concern
BFD	Block Flow Diagram
BFW	Boiler Feed Water
BMP	Best Management Practices
BNSF	Burlington Northern Santa Fe (Railway Company)
BOD	Biological Oxygen Demand
BTA	Best Technology Available
Btu	British Thermal Unit
CAA	Clean Air Act

$CaCO_3$	Calcium Carbonate (Limestone)
CAIR	Clean Air Interstate Rule
CALMET	
CALPUFF	
CaO	Calcium Oxide (Lime)
CCPI	Clean Coal Power Initiative
CE	Cliffs-Erie
CEMS	Continuous Emission Monitoring System
C.F.R.	Code of Federal Regulations
CKT	Circuit
CMP	Canisteo Mine Pit
CN	Canadian National (Railway Company)
CO	Carbon Monoxide
CO_2	Carbon Dioxide
COC	Cycles of Concentration
COD	Chemical Oxygen Demand
COS	Carbonyl Sulfide
CR/CRs	Country Road(s)
CSFB	Credit Suisse First Boston
CTG	Combustion Turbine Generator
DLN	Dry Low NO_x
DOE	Department of Energy
DOT	Department of Transportation
EIS	Environmental Impact Statement
EMF	Electromagnetic Field
EPA	Environmental Protection Agency
EPC	Engineering, Procurement and Construction
EPRI	Electric Power Research Institute
EU	Emission Unit
FAV	Final Acute Value
Fe_2O_3	Iron Oxide
FEED	Front End Engineering and Design
FERC	Federal Energy Regulatory Commission
FGD	Flue Gas Desulfurization
FSQ	Full Slurry Quench
GCP	Good Combustion Practice
GLG	Great Lakes Gas Transmission Company
GLI	Great Lakes Initiative

GMMP	Gross Marble Mine Pit
GO	Generator Outlet
GPM	Gallons per Minute
gpm	Gallons per Minute
H_2	Hydrogen
H_2O	Water
H_2S	Hydrogen Sulfide
H_2SO_4	Sulfuric Acid
HAMP	Hill-Trumbull/Hill Annex Mine Pit
HAP	Hazardous Air Pollutant
HHV	Higher Heating Value
HP	High Pressure
HRSG	Heat Recovery Steam Generator
HVTL	High Voltage Transmission Line
IGCC	Integrated Gasification Combined Cycle
IP	Intermediate Pressure
IRR	Iron Range Resources
ISBL	Inside Battery Limits
K_2O	Dipotassium Oxide
kW	Kilo Watt
LAER	Lowest Achievable Emission Rate
lb/million Btu	Pound per Million British Thermal Unit
lb/MMBtu	Pound per Million British Thermal Unit
LGIA	Large Generator Interconnection Agreement
LGIR	Large Generator Interconnection Request
LGIP	Large Generator Interconnection Procedure
LLC	Limited Liability Company
LMP	Lind Mine Pit
LOS/LOSs	Line of Sight/Lines of Sight
LP	Low Pressure
LSTK	Lump Sum Turn Key
MAAQS	Minnesota Ambient Air Quality Standards
MACT	Maximum Available Control Technology
MDEA	Methyl-Diethanolamine
MDNR	Minnesota Department of Natural Resources
MEP	Mesaba Energy Project
MgO	Magnesium Oxide
MISO	Midwest Independent (Transmission) System Operator

MMBtu	Million British Thermal Units
MMBtu/hr	Million British Thermal Units Per Hour
MOPS	Minnesota Office of Pipeline Safety
MP	Minnesota Power (Company)
MPCA	Minnesota Pollution Control Agency
MPUC	Minnesota Public Utility Commission
MSDS	Material Safety Data Sheets
MVA	Million Volts Amps
MVR	Mechanical Vapor Recompression
MW	Megawatt
N_2	Nitrogen
Na_2O	Disodium Oxide
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NETL	National Energy Technology Laboratory (DOE)
NH_3	Ammonia
NiO	Nickel Monoxide
NNG	Northern Natural Gas Co.
NO_X	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
NSP	Xcel Energy (Formerly NSP, Northern States Power)
NSPS	New Source Performance Standards
NTP	Notice to Proceed
O&M	Operation and Maintenance
O_2	Oxygen
OSBL	Outside Battery Limits
OSHA	Occupational Safety and Health Administration
P_2O_5	Diphosphorus Pentoxide
PC	Pulverized Coal
PEP	Project Execution Plan
PM	Particulate Matter
PM_{10}	Particulate Matter having an aerodynamic diameter less than 10 Microns
POI	Point of Interconnection
POTW	Publicly Owned Treatment Works
PPA	Power Purchase Agreement
ppmvd	Parts per Million (dry volume)
ppmw	Part per Million (wet basis)

PRB	Powder River Basin
PSD	Prevention of Significant Deterioration
psig	Pounds per Square Inch (gauge)
PSQ	Partial Slurry Quench
PTE	Potential to Emit
RACT	Reasonable Available Control Technology
RBLC	RACT/BACT/LAER Clearinghouse
RCRA	Resource Conservation and Recovery Act
RMP	Risk Management Program
ROW/ROWs	ROW/Rights of Way
S	Sulfur
SO_3	Sulfur Trioxide
scf	Standard Cubic Feet
SPCC	Spill Prevention Control and Countermeasure
SCPC	Supercritical Pulverized Coal
SCR	Selective Catalytic Reduction
SIL	Significant Impact Limits
SIS	System Impact Study (Part of the MISO LGIP)
SiO_2	Silicon Dioxide
SNCR	Selective Non Catalytic Reduction
SO_2	Sulfur Dioxide
SRU	Sulfur Recovery Unit
STG	Steam Turbine Generator
SV	Stack Vent
Syngas	Synthetic Gas
TCLP	Toxicity Characteristic Leaching Procedure
TDS	Total Dissolved Solids
TiO_2	Titanium Dioxide
TOC	Total Organic Carbon
TP	Total Phosphorous
TPY	Tons Per Year
TRS	Total Reduced Sulfur
TSP	Total Suspended Particulate Matter
TSS	Total Suspended Solids
TTRA	Taconite Tax Relief Area
TVB	Tank Vent Boilers
V_2O_5	Vanadium Pentoxide
VOC	Volatile Organic Compounds

WWTF	Waste Water Treatment Facility
ZLD	Zero Liquid Discharge

3.0 ENVIRONMENTAL CONSEQUENCES

Section 3 identifies potential impacts on the human and natural environment from constructing and operating Mesaba One and Mesaba Two and evaluates options to avoid or reduce negative impacts. The section is divided into fourteen separate subsections that address, among other things, potential impacts on aesthetics (3.1), air quality and human health (3.2), water availability and water quality (3.4), wetlands (3.6), land use (3.7), ecology, endangered species (3.9), historic and cultural resources (3.13), and socioeconomics (3.14).

3.1 Aesthetics

Construction and operation of the IGCC Power Station, its Associated Facilities and new HVTL/pipeline routes will result in long-term visual, noise, and traffic-related impacts in the vicinity of the West Range and East Range Sites. The extent to which Mesaba One and Mesaba Two will affect the views from nearby vantage points is addressed below. Noise and traffic impacts are addressed in Sections 3.10 and 3.12, respectively.

In addition to long-term visual impacts, temporary visual impacts are also expected. Such temporary visual impacts are associated with preconstruction land clearing and grading activities. Efforts taken to plant and cultivate screening trees and reseed and water affected areas are generally successful in reducing visual impacts within one or two growing seasons. Although such efforts will reduce visual impacts, they will not totally eliminate long sight-line views down previously unoccupied linear corridors.

An artist's visualization of the Phase I and II Developments is shown in Figure 1.5-4. This visualization does not illustrate Site specific grading details.

3.1.1 Methodology

Depending upon an observer's location, views of the IGCC Power Station, its Associated Facilities, new HVTL structures, and the new HVTL/natural gas pipeline corridors may be blocked to varying degrees by trees or surrounding topographical features. The Proponent has performed a regional visibility analysis using geographic information system ("GIS") software (ESRI® Arc/Info and ArcMap™ 9.1), the known heights and locations of the IGCC Power Station stacks, the expected heights/locations of the GO HVTL structures, topographical details characterizing the placement of such stacks and structures, and the known locations of rural residential receptors/developments and their topographic characteristics. The GIS software assesses the view from each cell location of the model input grid and identifies those areas from which each of the IGCC Power Station stacks and HVTL structures will be visible.

To optimize computing performance, the topographic data input limits of the analysis were set within a 50 mile radius of the stack locations. One-foot Lidar-based topographic contours of the IGCC Power Station Footprint and Buffer Land were available for use in characterizing the West Range Site. One foot Lidar-based contours were not available for the East Range Site; in their place, five-foot Mesabi Range contours were used where available. The five foot Mesabi Range contours were also used at the West Range Site to cover areas where the Lidar-based contours were unavailable. In neither the West Range nor the East Range case were these resolved topographic input datasets sufficient to cover the majority of the 50-mile radius analyzed. To cover the balance of the 50-mile study area the Proponent used USGS 30 meter digital elevation models ("DEM").

The Minnesota DNR GAP Land Cover database (available from the MNDNR Data Deli at http://deli.dnr.state.mn.us/metadata.html?id=L390000102101) was used in combination with other GIS databases to prepare an overlay of existing vegetative cover across the modeling domain. This overlay was used to identify where forest growth could interfere with line-of-sight ("LOS") views to the IGCC Power Station or its HVTL structures (and connecting conductors).

Due to the resolution of the 30-meter dataset, many developed or "open area" features were not accurately depicted in the vegetative cover data set (for example, a straight road, instead of appearing as a straight, uninterrupted line on the vegetative cover map might appear as a jagged line interrupted by forest growth). Therefore, existing roads, existing rail, proposed road and rail alignments, the IGCC Power Station Footprint, and residential receptors identified for this project were incorporated into the DEM using higher resolution geographic and topographic databases. The vegetation overlay was revised to account for these known cleared areas and subsequently used to identify non-vegetated areas from which a clear sight line to the Power Station stacks could be possible. Prior to performing the visibility analysis, such non-vegetated areas were adjusted +6 feet from ground level to account for the conservative LOS "eye level" of a human observer. The resulting DEMs are shown in Figure 3.1-1 for the West Range Site and Figure 3.1-2 for the East Range Site, respectively.

The results of the visibility analysis described in Sections 3.1.2 and 3.1.3 below show locations where the IGCC Power Station stacks and the individual GO HVTL structures are expected to be visible.

A more detailed resolution assessment will be conducted for the residential areas near the IGCC Power Station itself based on the coverage area limits of the 1-foot and 5-foot contours. A regional 30 meter resolution visibility analyses has been conducted for the HVTL alignments as these areas extend beyond the limits of the detailed topographical contours.

Appendix 7 presents a detailed explanation of the databases and methodology used to prepare the vegetative cover maps and the software used to generate the visibility maps.

3.1.1.1 Distance from Which Stacks/Buildings Can Be Observed Given a Clear Line of Sight (Site Independent Aesthetic Features)

The dimensions of the dominant buildings and stack emission points for the West Range and East Range Sites are identical. Section 1.6.7.8 provides the dimensions of the dominant buildings within the IGCC Power Station Footprint. Table 3.1-1 provides the height, diameter, and exhaust gas flow rate in actual cubic feet per minute ("acfm") for each of the four major stack emission points associated with each phase of development. Table 3.1-1 also identifies the cooling towers serving the ASU and power block. Although the cooling towers are a relatively minor source of particulate matter, they will exhaust substantial quantities of air laden with water vapor. Although each cell of the cooling towers is not likely to be visible through the surrounding forest growth, the winter-time plume from each cell is likely to be visible for fairly long distances.

Figure 3.1-1. West Range Visualization Model Input For Vegetation, Open Areas, and Topography

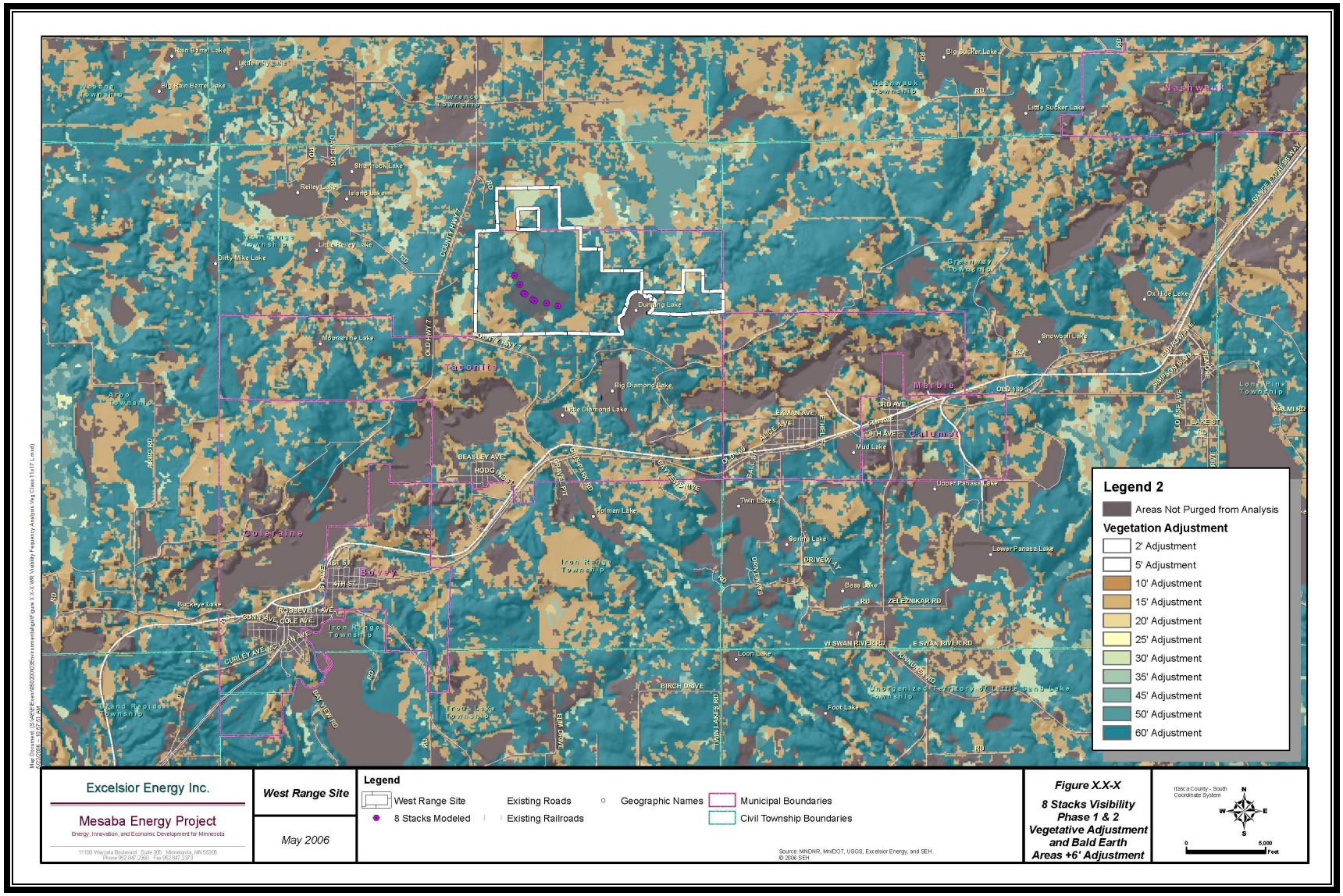


Figure 3.1-2. East Range Visualization Model Input For Vegetation, Open Areas, and Topography

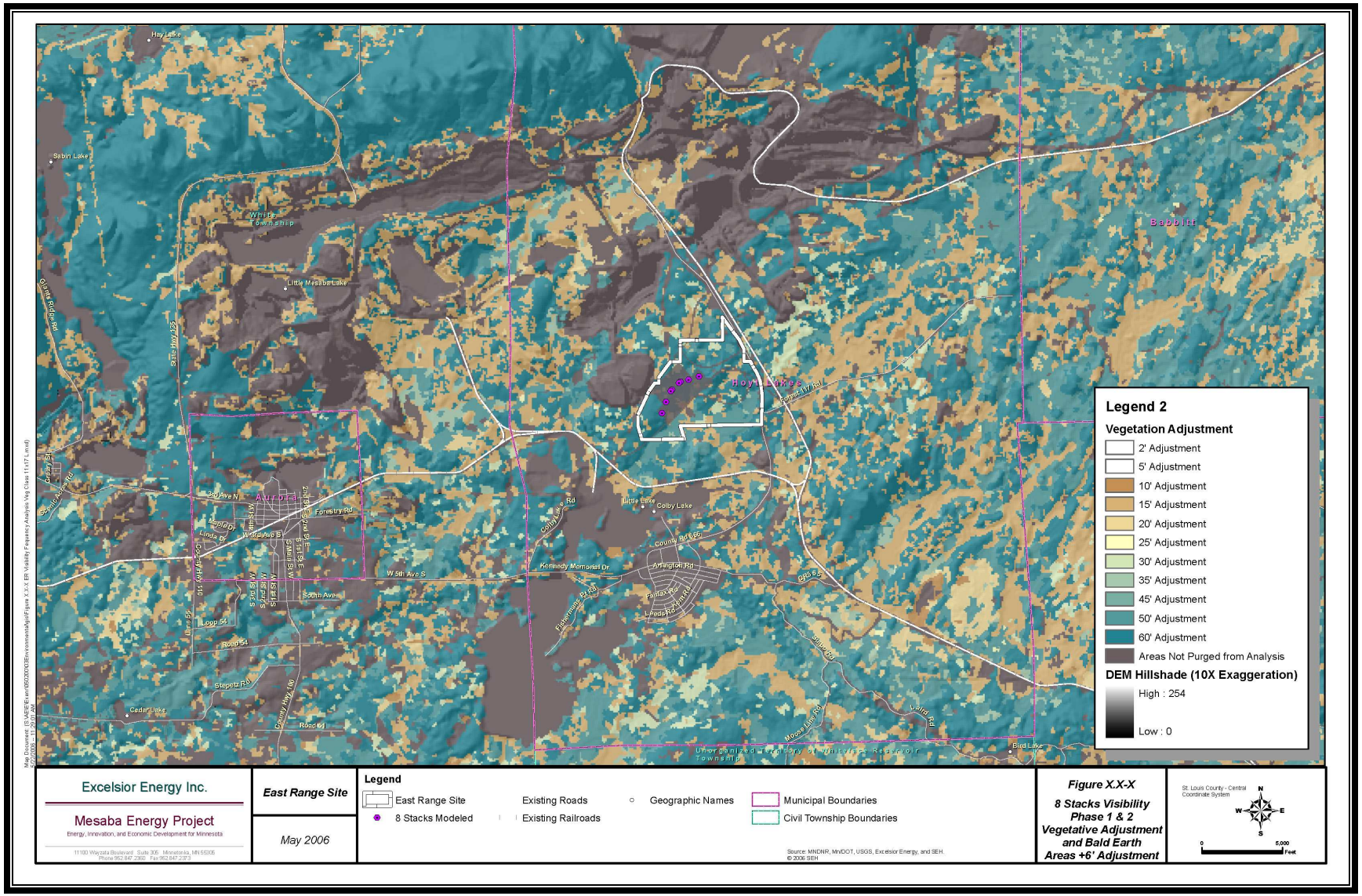


Table 3.1-1
Dominant Emission Points Serving Mesaba One and Mesaba Two

Emission Point	Height of Emission Point (ft)	Inside Diameter of Emission Point (ft)	Design Exhaust Gas Flow Rate (acfm)	Total Number of Emission Points	
				Mesaba One	Mesaba Two
CTG/HRSG	150	20	1,240,000	2	2
Tank Vent Boiler	210	4	47,100	1	1
Flare	185	5.5	Variable	1	1
ASU Cooling Tower	48	33	5 cells @ 1,370,000	5	5
Power Block Cooling Tower	48	33	12 cells @ 1,370,000	12	12

Figure 3.1-3 provides a basis for a conservative example of the distance from which an observer with a LOS view to the IGCC Power Station could first see its stack emission points. The distances provided are based on holding a ruler an arm's length away from an observer's eye and assessing the narrowest line readily discernable. For this analysis, the Proponent determined that a line 0.005 of an inch wide could be discerned at a distance of 25 inches. Using geometric principles and provided that the observer has a clear LOS to the IGCC Power Station this translates to being able to discern the CTG/HRSG stack at a distance of approximately 20 miles. Using this same principle, the distances at which the other tall structures are first likely to be discerned are presented in Table 3.1-2.

Table 3.1-2
Distances At Which Dominant Buildings and Emission Points Are First Discernable

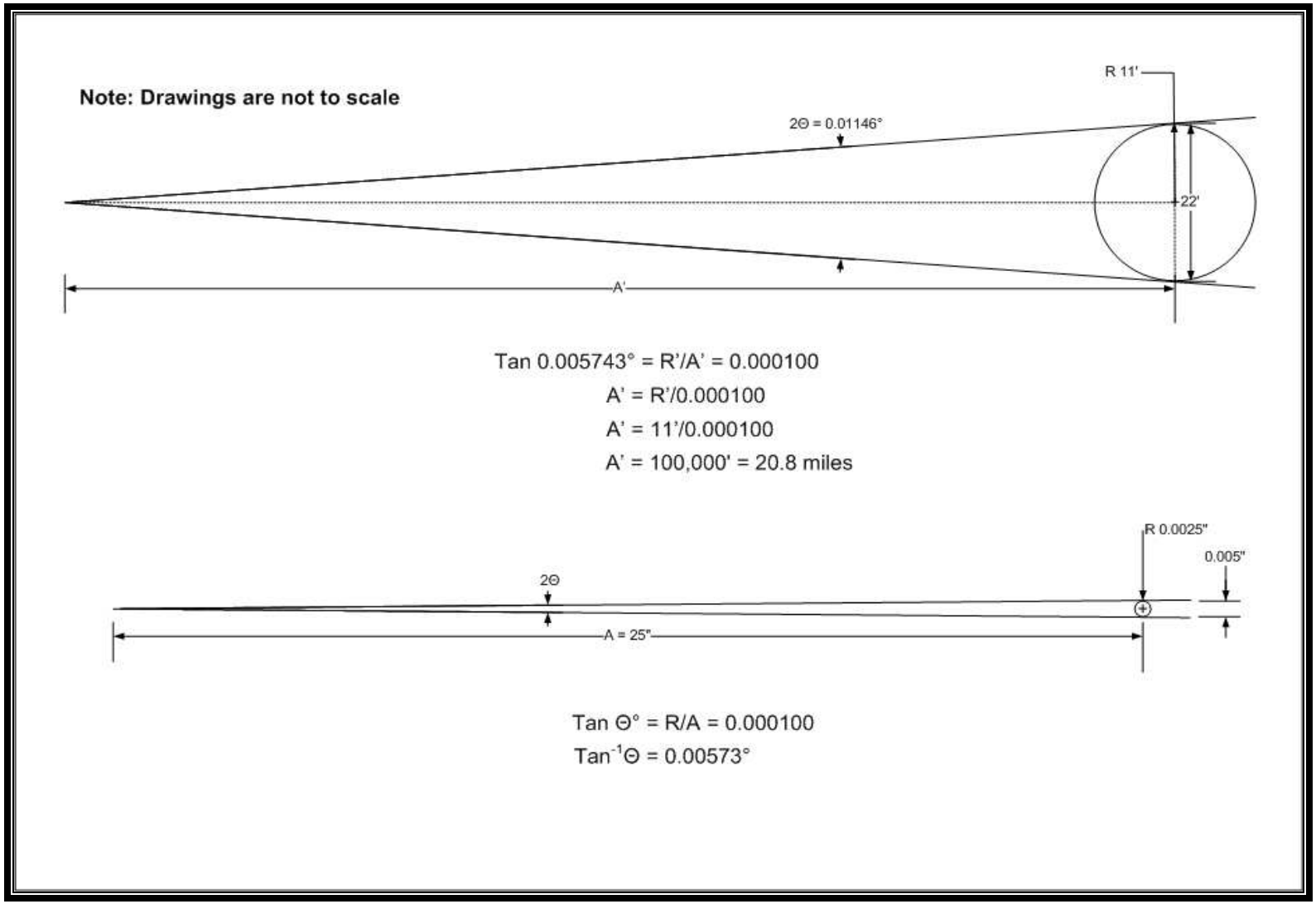
Emission Point	Height of Emission Point (ft)	Outside Diameter of Emission Point or Width (ft)	Theoretical Distance At Which Structure Can Be Discerned* (miles)	Theoretical Line of Sight Constraint ** (miles)
CTG/HRSG	150	22	20.8	18-19
Tank Vent Boiler	210	5.5	5.1	21-22
Flare	185	7	6.6	20-21
CTG Building	90	170	161	15-16
Rod Mill Feed Bins	150	155	147	18-19

*Assuming a clear LOS, the ground on which the 6 feet observer and the object are standing are at the same elevation, and there is no visibility degradation due to atmospheric conditions.
**LOS range based on different computational methods provided in Sections 3.1.1.2 and 3.1.1.3

In the instance of very tall and very wide buildings, the distance at which the structure can first be seen (as calculated by the example provided in Figure 3.1-3) greatly exceeds the theoretical LOS constraint. The LOS constraint depends upon the heights at which the observer's eye is positioned and the top of the building or structure in question. Accounting for the curvature of

the earth, and the difference between the base elevation of the observer and the base of the object, the applicable distances for the CTG and Rod Mill buildings are calculated in accordance with the equations presented in Sections 3.1.1.2 and 3.1.1.3. The LOS equations and parts of the discussion presented in those sections are from the references cited.

Figure 3.1-3 Distance Within Which Objects Become Discernable



The data presented in Table 3.1-2 detail that if an observer was standing at the same base elevation as the IGCC Power Station buildings and stacks and there were no obstacles between such objects and the observer, the observer would be able to see the object from the LOS distance away. Of course, it would be a rare instance in Northern Minnesota where there were no such interferences (for example, trees, waste rock piles, natural hills, etc.). Where the values in the 4th column of Table 3.1-2 (entitled "Theoretical Distance At Which Structure Can Be Discerned") are less than the LOS Constraint values (in the 5th column), the discernable distance limit would represent the visual constraint. For example, an observer standing at a base elevation equal to that of the CTG building and having a clear view to it could theoretically discern its presence from over one hundred miles away. However, the curvature of the earth would realistically preclude the observer from seeing the object at such distances.

3.1.1.2 Line of Sight Distance Calculations (Accounting Earth's Curvature)

The LOS distance in nautical miles between an observer's position and the point at which such observer can first discern an object is given by the following equation (see the Earth Curvature Nomograph in Figure 3.1-4 for an explanation of the terms in the equation) [1]:

$$R_{NM} = 1.23\left(\sqrt{h_{radar}} + \sqrt{h_{target}}\right) \quad \text{with } h \text{ in ft}$$

In obtaining the radar horizon equations, it is common practice to assume a value for the Earth's radius that is 4/3 times the actual radius. This is done to account for the effect of the atmosphere on radar propagation. For a true LOS, such as used for optical search and rescue, the constant in the equations changes from 1.23 to 1.06.

A nomograph for determining maximum distance is depicted in Figure 3.1-4. Although an aircraft is shown to the left, it could just as well be a ship, with radars on a mast of height "h", or an individual ground level observer. Any target of height "H" is depicted on the right side. Note that the calculations presented for the Rod Mill Feed Bill building and the CTG Building use 1.06 in the equation presented in the above equation making the correct equation in the nomograph: $H = 0.890*(R-1.06*h^{½})^2$. Also note that "h" and "H" must be referenced from a common reference point (that is, from the lower of the two points' base elevation). For example, if an observer (whose eye level is at six feet) is standing on a hill 2,000 feet msl in height and the target (having a height of 150 feet) is positioned at a point 1,500 feet msl, then the following would be true:

h = 506 ft

H = 150 ft

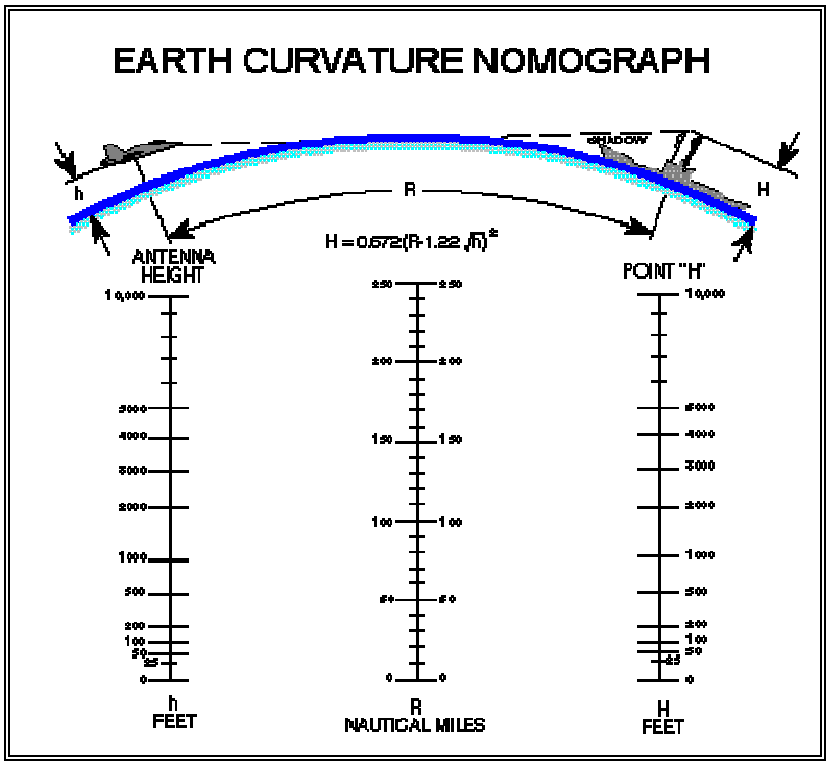
and the theoretical LOS distance between the two points would be:

$R_{Miles} = 1.06*[(506)^{½} + (150)^{½}]*1.151 = 42.4$ miles.

The factor "1.151" appearing in the above equation is required to convert nautical miles to statute miles.

[1] Electronic Warfare and Radar Systems Engineering Handbook. Naval Air Warfare Center and Naval Air Systems Command, NAWCWPNS TP 8347, April 1, 1997. *See* https://ewhdbks.mugu.navy.mil/Hdbk-cv6.pdf

Figure 3.1-4 Earth Curvature Nomograph



From: Electronic Warfare and Radar Systems Engineering Handbook, 1997.

3.1.1.3 Visibility Calculations Yielding Line of Sight Distances

An alternative method for estimating the LOS distance from an observer to the top of an object is associated with the mechanism used within the visibility model itself. The visibility model referenced in Section 3.1.1, contains the following algorithm for estimating the planimetric distance from an observer to a target receptor (in this case, the top of a stack emission point)[2]

$$HT_{corr} = HT_{Surface} - 0.87 * \frac{Distance^2}{Diameter_{Earth}}$$

where:

HT_{corr} =	Height of object above base elevation (that is, the lower of the observer's elevation feet msl or the object's base elevation, see example in Section 3.1.1.2) corrected for curvature of the earth and atmospheric refraction, meters
$HT_{surface}$ =	Known height of the object above base elevation determined for HT_{corr}, meters
Distance =	Planimetric distance (along the ground) in meters from the observer to the target, meters
$Diameter_{Earth}$ =	Defined as 12,740,000 meters.

[2] ESRI, 2003. "Line of Sight and Visibility Analyses Using ArcObjects™, An ESRI White Paper."

The term HT_{corr} equals zero in the instance where the above equation is used to calculate maximum LOS distances (that is, distances where the top of objects disappear into the horizon). Therefore:

$$D^2 = T_{Surface}*(Diameter_{Earth} \div 0.87)$$
$$D = [HT_{Surface}*(Diameter_{Earth} \div 0.87)]^{½}$$

If the observer's eye is at the surface, the "D" calculated in the above equation is the total LOS distance. If the observer's eye is at any other height, the term "D_{Obs}" must be calculated to determine the LOS distance from the horizon to the observer's eye as follows:

$$D_{Obs} = [HT_{Obs}*(Diameter_{Earth} \div 0.87)]^{½}$$

Using the example heights provided in Section 3.1.1.2 above, the total LOS distance would be as follows (remembering elevations using this formula must be expressed in meters):

$$D_{Total} = D + D_{Obs}$$
$$D_{Total} = (45.72 \text{ meters}*12{,}740{,}000 \text{ meters} \div 0.87)^{½} + (154.23 \text{ meters}*12{,}740{,}000 \text{ meters} \div 0.87)^{½}$$
$$D_{Total} = 25{,}875 \text{ meters} + 47{,}523 \text{ meters}$$
$$D_{Total} = 45.6 \text{ statute miles}$$

The difference between the two distances calculated in Section 3.1.1.2 and this Section 3.1.1.3 are functions of the differences in the diameter of the earth used in the calculation and the value used to express atmospheric refraction. The two distances represent a range within which the theoretical maximum LOS is to be expected. Stated in other terms, the range represents the distance from which an observer can discern the top of an object when there are no terrain obstacles or other obstacles interfering with his or her view of the object.

The highest buildings and stacks associated with the IGCC Power Station are identified in Table 3.1-1 and Section 1.6.7.8. The tallest stack emission point is seen to have the smallest diameter. As shown in Table 3.1-2, the limit of visual impact for the objects listed would appear to be on the order of 20 miles assuming the observer has a clear LOS to the stacks (no topographical or immediate forest obstructions) and that he or she is standing at, or lower, than the base elevation of the object. However, if the observer is standing at a relatively high vantage point (that is, the base elevation at which the observer is standing is significantly higher than the base elevation upon which the object is placed), the IGCC Power Station buildings (not the emission points, however; though they will be in the LOS, the observer will not be able to discern them because of their narrow width) will be visible over further distances. Table 3.1-3 shows the theoretical LOS distances from which a 6 feet observer standing at a specified elevation above the base elevation upon which the tallest Power Station building is located could be discerned emerging from the horizon. This presumes of course, that there are no visual obstructions between the observer and the object, which in the case of North Central Minnesota, will be mostly limited to long stretches of cleared area (like long linear stretches of highway directly in-line with the IGCC Power Station).

Table 3.1-3
LOS Distances At Which the Dominant Building Emerges from the Horizon *

Emission Point	Height of Object (ft)	Base Elevation of Object** (ft)	Base Elevation of 6 feet Observer*** (ft)	Outside Diameter of Emission Point or Width (ft)	Distance At Which Structure Becomes Visible in the Horizon**** (miles)
Rod Mill Feed Bins	150	0	0	155	18-19
		0	50	155	24-26
		0	100	155	27-30
		0	150	155	30-32
		0	200	155	32-35

**See* Section 3.1.1.2
**H = 150 ft; $HT_{Surface}$ = 150 ft
***h = 0+6; 50+6; 100+6; 150+6; and 200+6
****First value in range given is "R" (*see* Section 3.1.1.2); second value is "D" (*see* Section 3.1.1.3)

During daylight hours on clear days in the summer, the rod mill feed bins (150 feet in height and 155 feet in width) could presumably be seen by a 6 feet observer from as far away as 32 to 35 miles from a vantage point 200 feet higher than the base of the rod mill feed bin building.

The tallest stack is on the Tank Vent Boiler (210 feet), however, that stack is only 5.5 feet in diameter and will not be discernable from significant distances. During the winter months, a condensed plume of water vapor will be visible rising from the Tank Vent Boiler and will increase its visibility. The stack serving the HRSG is 150 feet tall and approximately 20 feet in diameter. Given the volume of combustion gases exhausted from each of the CTG/HRSG stacks, the condensed water vapor plume will be visible for longer distances on clear, cold winter days. However, numerous water vapor plumes are already visible during the winter months along Highway 169 from Mountain Iron to Grand Rapids.

3.1.2 West Range

The IGCC Power Station emission points and its GO HVTL structures will affect views in the vicinity of the West Range Site. The taller IGCC Power Station buildings and stack emission points will 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 Station are available (for example, from the north-south segment of CR-336 located approximately two miles due north of the Power Station Footprint). As well, the new and taller HVTL structures will be visible from further distances than the existing 115kV structures.

Trees and other vegetative growth will be cleared along new corridors to construct natural gas and water/wastewater pipelines, HVTLs, new access roadways, and rail tracks. Permanently cleared ROWs on such corridors will be visible wherever a LOS between the observer and ROW in question occurs (for example, where such routes follow or cross existing roadways). The general visual impacts from the plant, HVTL, pipeline, and road construction are provided below.

3.1.2.1 IGCC Power Station Footprint

3.1.2.1.1 Seasonal Variations

Figure 1.5-26 shows the current topographic contours in the vicinity of the IGCC Power Station Footprint and Buffer Land. During "leaves on" times of the year, the West Range IGCC Power Station, buildings and emission points will 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 Station will increase (due in part to the loss of leaves on the trees and in part to the increased visibility associated with the cold-weather condensation of water vapor present in combustion gases and cooling tower exhaust).

Figure 3.1-5 below shows the results of the GIS visibility analysis for the area immediately surrounding the West Range Site. This figure shows those areas from which the IGCC Power Station stack emission points will be visible. Such areas are shown in one of eight colors depending upon the observation "frequency" (i.e., the number of stack emission points that will be visible) at that particular point. Areas colored in red are points from which all eight of the Power Station stacks are visible to an observer 6 feet above ground level. Due to the presence of trees or hills which block a direct LOS to the Power Station, there are relatively few vantage points from which all eight stacks are visible.

Prior to the EIS scoping meetings, the Proponent will calibrate the visibility model with actual observations of helium-filled balloons spatially positioned at prominent emission points (for example, the Tank Vent Boiler and CTG/HRSG) and lofted to their expected height (plus-or-minus the difference between the existing grade at such points and the elevation at which such points will be positioned in accordance with the grading plan shown in Figure 1.5-8). Pictures will be taken from points where the model predicts all eight stacks will be visible and points where the model predicts that no stacks will be visible. The height of vegetative cover represented in Figure 3.1-1 for the visibility model will be adjusted where necessary to reflect actual observations.

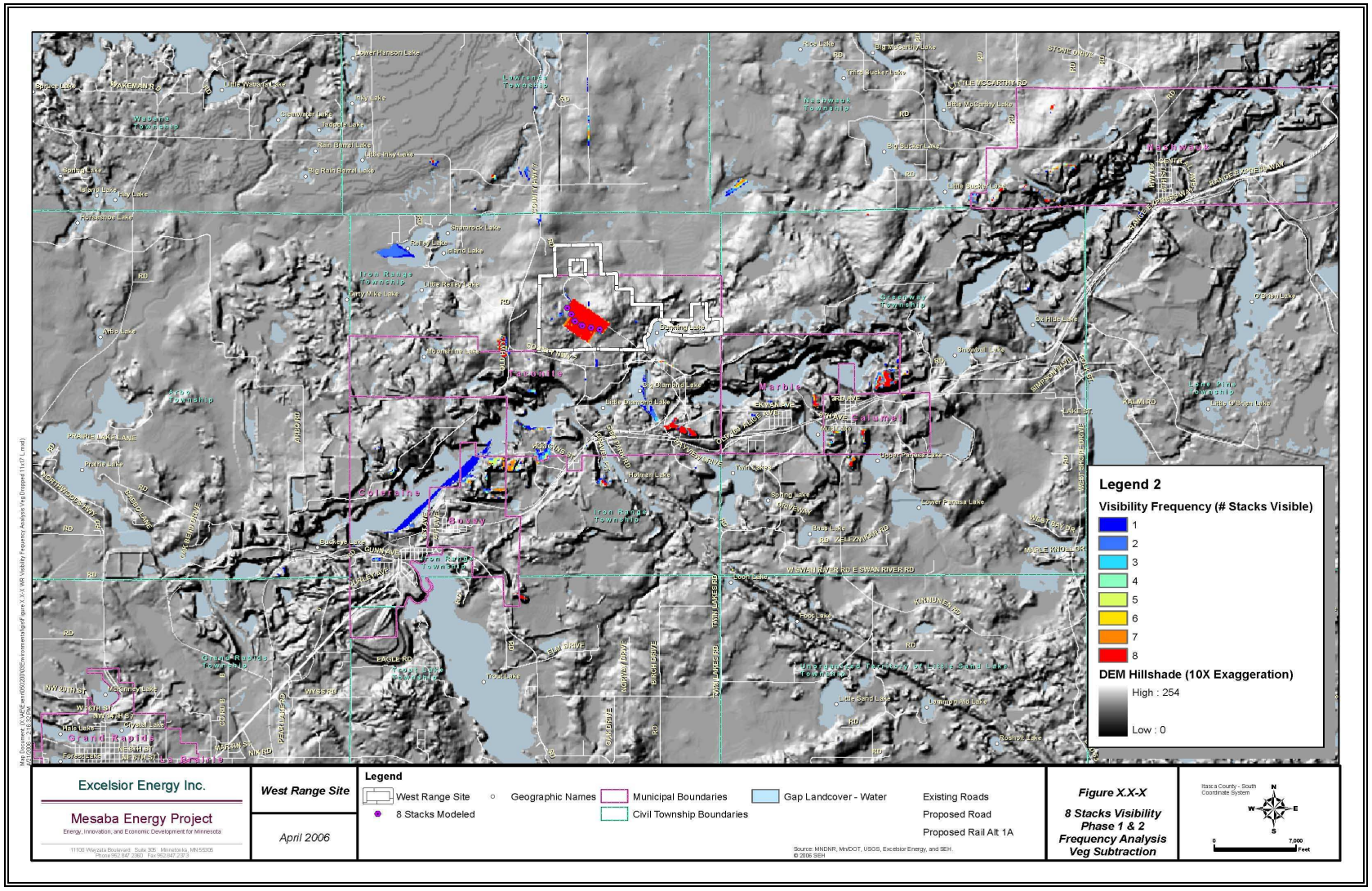
3.1.2.1.2 Diurnal Variation

The Tank Vent Boiler emission point will be positioned at a height greater than 200 feet above ground level. As a result, the Proponent will be required to submit a request to the Federal Aviation Administration ("FAA") for a determination of no hazard to aviation. 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 (61 m) above ground level (AGL) or exceeds any obstruction standard contained in 14 C.F.R. 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.

If required to install obstruction lighting, such lighting will increase visibility of the structures during evening hours (and daylight hours, if the lighting were required to be operated 24 hours per day).

Figure 3.1-5 West Range Site Predicted Visibility Impact Areas for IGCC Power Station Stack Emission Points



3.1.2.1.3 Station Lighting Plan

Mesaba One and Mesaba Two will be equipped with security lighting that will enhance visibility of the IGCC Power Station during evening hours. This will negatively impact aesthetics for residents living close to the Power Station and those driving within visual range. A Power Station lighting plan will be developed during the FEED and environmental review processes and will seek to minimize such aesthetic impacts. The lighting plan will be developed in consultation with the City of Taconite.

3.1.2.2 HVTLs and Structures

The taller single pole steel HVTL structures along the Plan A routes are not expected to represent hazards to air navigation and are not likely to require obstruction lighting. The Plan B Phase II Alternate Route (WRB-2A) may require obstruction lighting along prominent ridges along existing ROWs where the taller new structures will replace existing structures one-half their height. No rare natural features are found within any of the routes identified. Section 2.1.1.3 identifies the significant receptors along each of the following three alignments, Sections 3.6.1.2 through 3.6.1.4 wetland impacts, and Sections 3.7.1.2 through 3.7.1.4 land use impacts.

3.1.2.2.1 HVTL Alternative 1 Plan A Preferred Route (WRA-1)

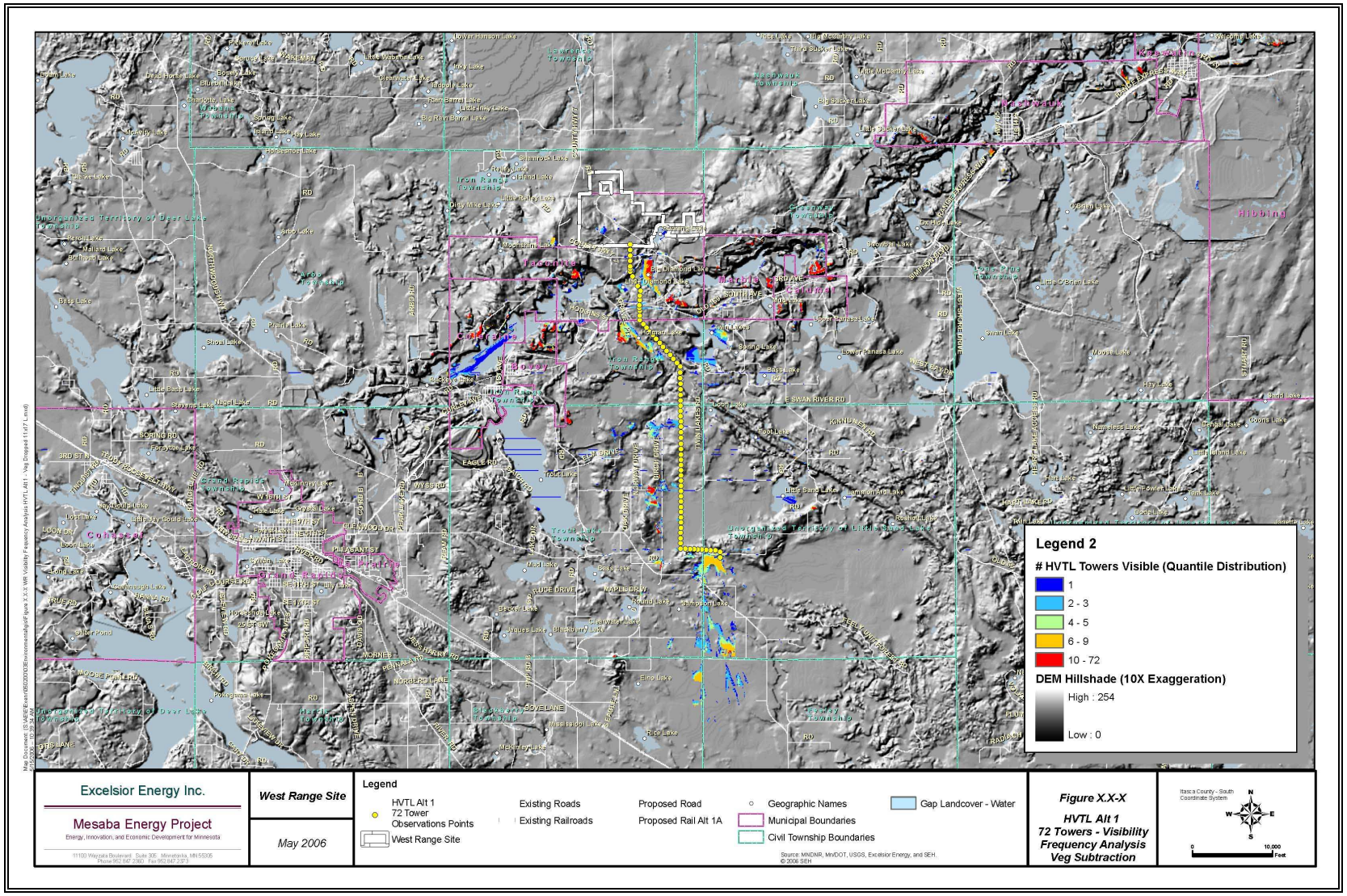
The Plan A Preferred Route (WRA-1) is shown in Figures 1.5-28 through 1.5-30. The proposed double circuit 345-kV HVTL for this route will be carried on single-pole steel structures. Single steel pole structures are taller than wooden H-frame structures and other alternatives but can span longer distances and require less ROW. Longer spans between poles means that fewer poles are required compared to other structure types. These single-pole structures will be visible to residents along the proposed route between the IGCC Power Station and the Blackberry Substation and to passengers of vehicles traveling along certain sections of Twin Lakes Road and Birch Road (that is, where the HVTL parallels those two county roads; mostly between Mileposts 3 and 6 shown on Figures 1.5-29 and 1.5-30).

For the proposed double -circuit 345-kV line, the structures will be about 130 to 140 feet tall, with average spans of about 800 feet. Structures on the taller end of this range will be needed on the one-mile segment where the structures share ROW with an existing line near the Blackberry Substation. On that segment, one structure will carry three circuits (the double circuit 345kV lines serving Mesaba One and Mesaba Two and one existing 115kV line). 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.

The GO HVTLs will be located more that eight miles from the Grand Rapids Airport ("GPZ") and will parallel the existing 5,755 feet runway. Therefore, it is unlikely the structures will be considered obstructions to air travel and require obstruction lighting.

The results of the GIS-based visibility analysis for the preferred (WRA-1) HVTL route for the West Range Site are shown in Figure 3.1-6. The results of the analysis show that the HVTL structures will be visible at various points along this route.

Figure 3.1-6 West Range Site Predicted Visibility Impact Areas for HVTL Structures Along Plan A Preferred Route (WRA-1)



3.1.2.3 HVTL Alternate 1A Plan A Alternate Route (WRA-1A)

The Plan A Alternate Route (WRA-1A) is shown in Figures 1.5-31 through 1.5-33. Most of the previous discussion regarding the aesthetic impacts associated with the preferred route also applies to this alternate route. In addition, between Mileposts 3 and 4 (*see* Figure 1.5-32), the route will cross the Swan River three times and travel directly alongside or overhead it 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. Flows in the Swan River in this area during the spring-time snow melt could be sufficient to support small watercraft (that is, canoes and short kayaks), but such activity is not likely at that time of the year.

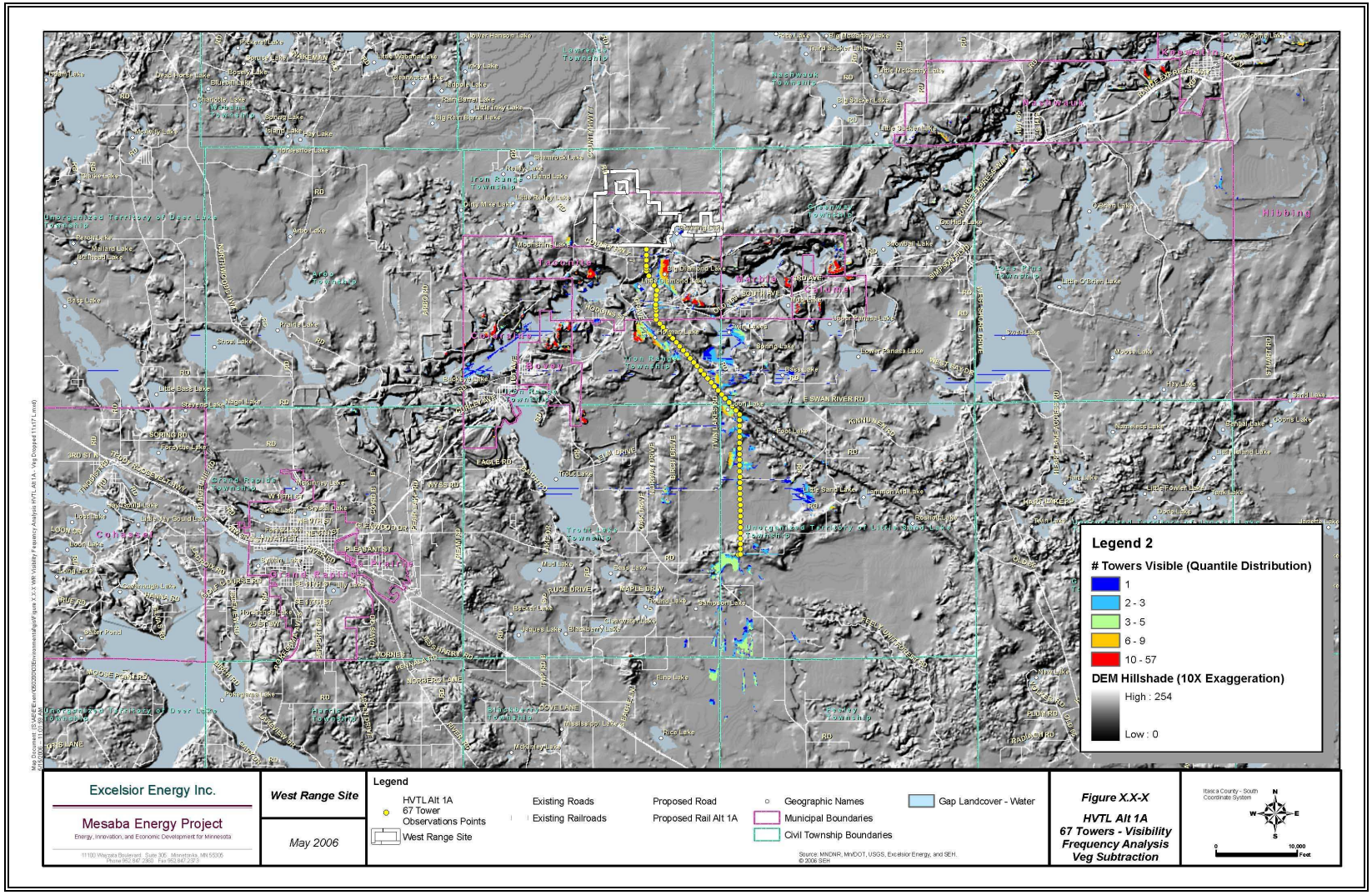
A long LOS view (just south of the bridge over the Swan River) near Milepost 4 looking toward the northwest would alter the aesthetic character of the stream; although the long LOS view would be noticeable when looking in a southeasterly direction, part of that view is already open by a large wetland area and by active gravel pit mining. A public access point is located on Loon Lake and the HVTL would be visible (when standing at the access point) for most of the distance between Mileposts 4 and 5 where the HVTL route turns due south. From Milepost 5 south to the Blackberry Substation, aesthetic impacts would be related to LOS views of local residents owning property crossed by the HVTL alignment and travelers driving on Twin Lakes road. A long LOS view would be present looking south from CR 70 near Milepost 6. At this point, the HVTL alignment crosses a large wetland area that is relatively level and over which the HVTL structures would likely be visible for a 1.5 mile distance (until cresting the hill and disappearing from view just north of the Blackberry Substation).

The results of the GIS-based visibility analysis for the Plan A Alternate Route (WRA-1A) are shown in Figure 3.1-7. Similar conclusions to those expressed for the preferred site are appropriate: the HVTL structures will be visible from areas along the route and for long distances from the lines where clear LOSs are available. The alternate route is even further removed from the airport than the preferred route so that lighting on the structures is not likely to be required.

3.1.2.3.1 HVTL Plan B Phase II Alternate Route (WRB-2A)

The Plan B Phase II Alternate Route is shown in Figures 1.5-34 through 1.5-37. Visual impact modeling has not been conducted for this alternate route. However, certain observations are apparent in the absence of such studies. First, all but about one mile of this route will use existing HVTL ROWs so that aesthetic impacts associated with long LOSs down existing corridors that have been cut through previously undisturbed forest growth are already in place. Second, the northern part of this route (the 28L corridor) runs through remote areas having very low residential density so that aesthetic impacts on nearby residents would be mostly avoided. Third, the southern part of the route (the 62L/63L corridor) also goes through long stretches of low residential density where aesthetic impacts can be minimized. However, the 62L/63L corridor goes through some areas of relatively high residential density (see Table 2.1-2) that increases aesthetic impacts on this route relative to the Plan B Phase II Preferred Route WRB-2.

Figure 3.1-7 West Range Site Predicted Visibility Impact Areas for HVTL Plan A Alternate Route (WRA-1A) and Plan B Phase II Preferred Route (WRB-2)



Those generalities aside, use of the taller structures along the existing ROWs will be more imposing (the HVTL structures will be twice the height of the current "H" frame structures) and visible for longer distances to travelers along U.S. Highway 169 and the residents of Pengilly where the existing corridor travels along a prominent ridge. Although there are no airports near this stretch of the route, the FAA may require obstruction lighting to be placed on the structures along the ridge. Residents along the southern half of the HVTL route that live close to the existing route will be affected by a more imposing visual impact of taller structures and the addition of another three conductors to the six conductors now present in their viewshed.

3.1.2.4 Natural Gas Pipeline Alternative 1

Aesthetic impacts associated with Natural Gas Pipeline Alternative 1 will be generally as described in previous sections where the aesthetic impacts of pipelines have been introduced (*see* Sections 3.1 and 3.1.2). In general, permanent aesthetic impacts will occur on pipeline routes where new ROWs are required and temporary impacts will occur on existing routes where existing grasses and shrubs must be cleared to bury new pipe.

Natural Gas Pipeline Alternative 1 will require new ROW along a majority of its route (approximately 11.5 miles of the pipeline route will be new ROW of which about 3.3 miles will be along the new Plan A Preferred HVTL route (WRA-1); about 1.5 miles of the route will follow the existing HVTL ROW corridor from the retired Greenway Substation to the southern boundary of the Buffer Land). Along the new ROW segments (*see* Figures 1.5-38 through 1.5-40 between Mileposts 0 and 8.3), significant clearing will be required. Efforts taken to cultivate, reseed and water such affected areas are generally successful in reducing visual impacts within one or two growing seasons. Although such efforts will reduce visual impacts, they will never eliminate long LOS views down linear pipeline corridors that were previously forested, as trees will not be allowed to propagate within such corridors.

The impacts to significant receptors, wetlands, and on land use are discussed subsequently in Sections 2.1.1.4, 3.6.1.5 and 3.7.1.5, respectively.

3.1.2.5 Natural Gas Pipeline Alternative 2

Approximately 8 miles of this 14 mile route would travel along existing natural gas pipeline ROW under control of Northern. 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 (*see* Figures 1.5-43 and 1.5-44) would occur entirely along the new HVTL ROW described in Section 3.1.2.4 above.

3.1.2.6 Natural Gas Pipeline Alternative 3

The first 3.5 miles of this 11.5 mile route will travel along existing natural gas pipeline ROWs under control of Northern. New pipeline ROW will follow new/existing highway ROWs between Coleraine and the existing HVTL ROW connecting the retired Greenway Substation to the Buffer Land. As with Natural Gas Pipeline Alternative 2 (Section 3.1.2.5 immediately above), aesthetic impacts along the existing section of natural gas pipeline ROW will be temporary and occur across one or two growing seasons. Permanent aesthetic impacts along new/existing highway and or railway ROWs will be expected to be minimal as additional

clearing, where required, will occur along areas already cleared (eliminating long LOSs through forest growth).

3.1.2.7 Process Water Supply Pipeline

Figure 3.1-8 provides a reference for the mileposts identified in the following subsections discussing aesthetic impacts for the Process Water Supply Pipeline Segments 1-3 and for the Process Water Blowdown Pipelines discussed in Section 3.1.2.8 below.

3.1.2.7.1 Segment 1: LMP to CMP

As noted under Section 3.1, temporary aesthetic impacts will be associated with preconstruction land clearing and grading activities. However, all but the first 0.2 miles and the last 0.2 miles of this route will be along existing highway ROW or forest roads where aesthetic impacts will be minimal because of previous permanent construction-related disturbances. Efforts taken to cultivate, reseed and water such affected areas are generally successful in reducing visual impacts within one or two growing seasons. Although such efforts will reduce visual impacts, they will not eliminate long sight-line views down linear pipeline corridors that were previously forested, as trees will not be allowed to propagate within such corridors. As noted, previously undisturbed areas are minimized along this pipeline segment. Where the pipeline traverses unforested areas visual changes will be minimized by replanting the corridor with similar vegetation.

Where natural gas or water pipelines will be constructed and impacts to roadways or ATV trail-type surfaces are unavoidable, the original surface condition will be restored or improved. Where the routes follow existing county roads or highways, clearing of trees and shrubs on permanent ROW will be minimized. Where the pipeline segment will follow secondary or forest roads such clearing will be increased.

Temporary aesthetic impacts associated with constructing Segment 1 of the Process Water Supply Pipeline will be limited to equipment operations, traffic disruptions, and trenching activities that leave piles of soil exposed.

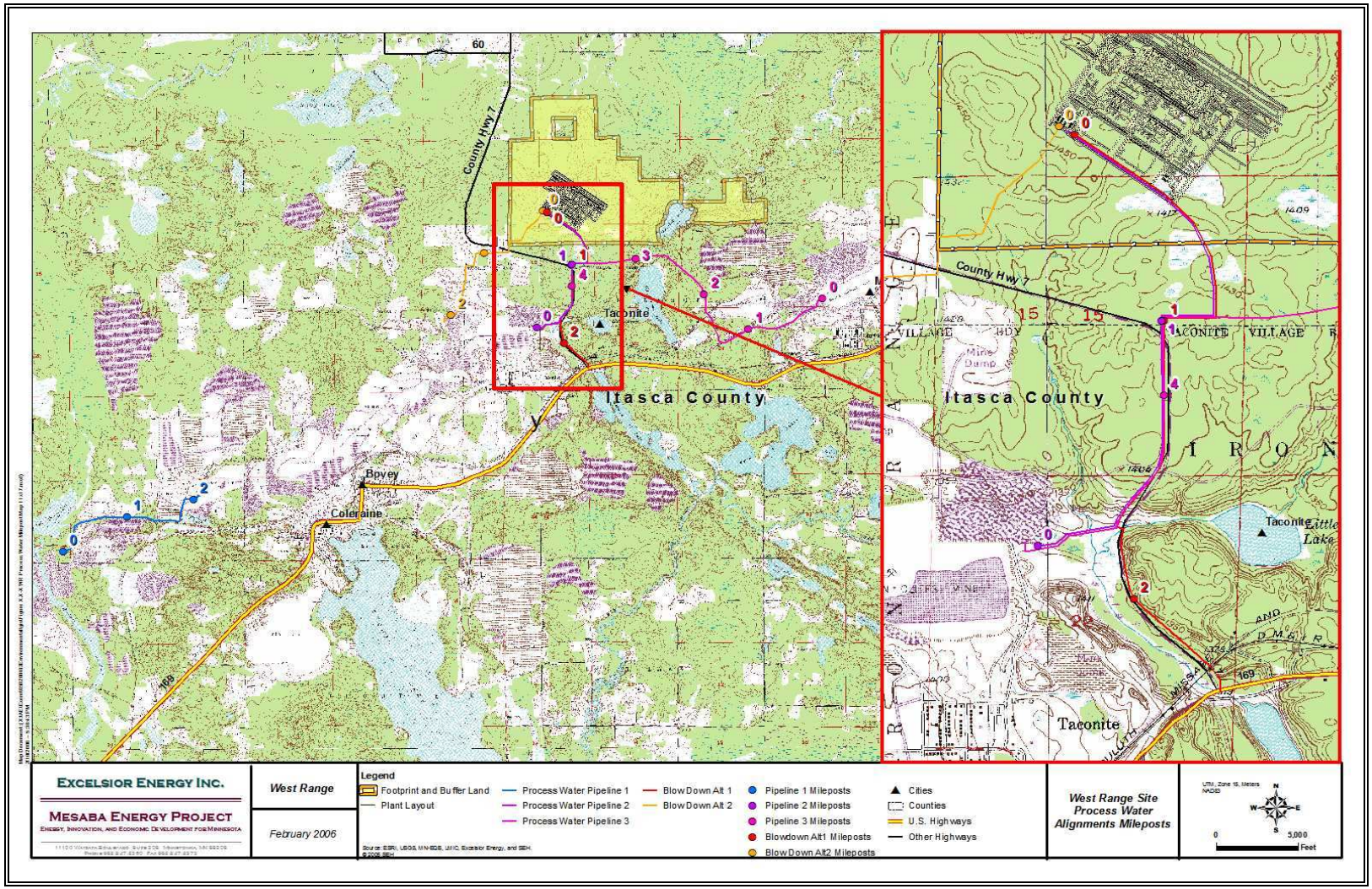
Wetland and land use impacts associated with this segment of the Process Water Supply Pipeline are discussed in Sections 3.6.1.8.1 and 3.7.1.8.1, respectively.

3.1.2.7.2 Segment 2, CMP to IGCC Power Station

Noticeable permanent aesthetic impacts along Segment 2 of the Process Water Supply Pipeline will occur as a result of two LOS views along a relatively short stretch of CR 7. Permanent impacts that occur as a result of clearing trees along CR 7 will be minimal as the disturbed areas can be replanted with transitional grasses and shrubs. The two points where permanent new LOS views are expected will occur at about Milepost 0.3 (looking west) and at Milepost 1 (looking due east). The latter view will be along Access Road 2 so the degradation of the view (for the traveler approaching the point where CR 7 turns south to connect with U.S. Highway 169) due to construction of Segment 2 will be minimal. The former view will be visible from CR 7 but only over the relatively short distance of 1,400 feet, thereby causing limited aesthetic impacts.

Temporary aesthetic impacts associated with constructing Segment 2 of the Process Water Supply Pipeline will be limited to equipment operations, traffic disruptions, and trenching activities that leave piles of soil exposed until all pipelines are placed in the trench and buried.

Figure 3.1-8 Process Water Supply and Blowdown Pipeline Milepost Map



Wetland and land use impacts associated with this segment of the Process Water Supply Pipeline are discussed in Sections 3.6.1.8.2 and 3.7.1.8.2, respectively.

3.1.2.7.3 Segment 3 HAMP Complex to CMP

The first two miles of this pipeline segment will occur mostly along previously disturbed areas. Milepost 0-1.7 of Segment 3 will follow existing mining roads, Milepost 1.7 to 2.6 will follow Rail Line Alternative 1A, Milepost 2.6 to 3.7 will follow Access Road 1 (presuming Itasca County follows through with its present intention of constructing that section of new roadway), and the remainder of the route will follow Segment 2 to the CMP. Therefore, the permanent aesthetic impacts expected to occur as a result of constructing this pipeline segment are associated with the supplemental clearing of additional land at the periphery of these infrastructure developments.

As noted previously, temporary aesthetic impacts associated with constructing segments of the Process Water Supply Pipeline will be limited to equipment operations, traffic disruptions, and trenching activities that leave piles of soil exposed until all required pipelines are placed in the trench and buried.

Wetland and land use impacts associated with this segment of the Process Water Supply Pipeline are discussed in Sections 3.6.1.8.3 and 3.7.1.8.3, respectively.

3.1.2.8 Railway

See Figures 1.5-7 and 1.12-55 to refer to Rail Line Alternative 1A and Figures 1.12-55 and 1.12-58 to Rail Line Alternative 1B. Noise impacts associated with rail line construction and train operations are presented in Section 3.10. Aesthetic concerns would arise due to increased rail traffic between the IGCC Power Station and coal/petroleum coke suppliers. Fifteen grade crossings are encountered between the west end of Grand Rapids and the West Range Power Station Footprint. Unit coal trains traveling at about 25 miles per hour will take approximately three to four minutes to clear each such crossing. On average, at least one unit train per day will be required to maintain full load operations of Mesaba One and Mesaba Two. Under worst case conditions, three unit trains could be unloaded in one 24-hour period. Therefore, on average an additional wait of eight to ten minutes per day will occur at each grade crossing (each unit train will traverse each grade crossing twice; once with a full load and once empty); under worst case conditions, the additional daily wait at each crossing could total up to 24 – 30 minutes. The additional time consumed waiting for trains to clear traffic will represent an aesthetic impact as well as traffic and noise related impacts.

3.1.2.8.1 West Range Rail Line Alternative 1A

Rail Line Alternative 1A will closely parallel the existing track for a distance of about 0.3 miles, diverge from the existing track for a distance of about 0.5 miles, rejoin an existing track bed for about 0.4 miles, and then travel about 2.9 miles across new ROW to access the IGCC Power Station Footprint and form the rail loop. Permanent aesthetic impacts will not be evident from U.S. Highway 169 nor from CR 7 as the existing rail track is mostly out of sight of both thoroughfares and the new trackage will be located on the north side of the existing track (that is,

construction will be focused on the side of the track furthest from U.S. 169 and at an elevation significantly above the grade at which CR 7 is located). The centerline of the Rail Line Alternative 1A alignment will 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 permanent aesthetic impacts will be readily noticed by these residents and others living north of Big Diamond Lake. Mesaba One and Mesaba Two operating at full load will require at least one unit train delivery of coal per day. However, the rail track and unloading system will be designed to unload up to three unit train deliveries of coal per day. Obvious 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.

Construction activities will temporarily impact the present aesthetic character that exists in the vicinity of the residential developments on Big Diamond and Dunning Lakes. Significant cuts, some of which may be as deep as 60 feet, must occur within close proximity to residents nearest the track (to develop the grade required to accommodate unit train deliveries). Such cuts will require blasting and will result in the rail line becoming more visible to surrounding areas. Where rock outcrops are not exposed, slopes will be planted with vegetation. Construction vibrations, noise, dust, and heavy truck traffic transporting rock blasted from cuts to other parts of the IGCC Power Station Footprint requiring fill will be among the temporary negative aesthetic impacts that may be observed.

3.1.2.8.2 West Range Rail Line Alternative 1B

Alternative 1B will move the centerline of the rail track about 2,500 feet from the Dunning Lake resident and about 2,900 feet from the resident on Big Diamond Lake. Such movement away from these residents will lessen all temporary and permanent aesthetics impacts identified above in Section 3.1.2.8.1 for Rail Line Alternative 1A.

3.1.2.9 Roadways

See Section 1.12.3.2 for a discussion of the roadway infrastructure planned for the West Range Site.

3.1.2.9.1 Access Road 1

If constructed by the County, Access Road 1 will be an extension of CR 7 that will require cuts through previously disturbed and undisturbed areas. Such cuts can be significant and could maintain and possibly enhance the aesthetic nature of that segment of road. However, the traveler's sense of aesthetics would be compromised if the road passed too closely to existing residential properties so that numerous driveways were visible from the highway. The substantial increase in the level of traffic past Big Diamond Lake and Dunning Lake residents would compound the negative aesthetic impact associated with construction of the IGCC Power Station. The County has indicated its intention to leave in place the existing segment of CR 7 between Highway 169 and the Power Station allowing travelers their choice of route; heavy truck traffic would be required to travel via the new segment of highway.

3.1.2.9.2 Access Road 2

Access Road 2 will not affect to a great degree the aesthetic character of the existing surroundings. No direct view of the Power Station will be opened to those deciding to travel on the existing segment of CR 7. Those deciding to travel on Access Road 1 will have a view up Access Road 2, but will not have a LOS into the Power Station Footprint.

3.1.3 East Range

As with the West Range Site, the IGCC Power Station emission points and its GO HVTL structures will affect views in the vicinity of the East Range Site. The taller IGCC Power Station buildings and stack emission points will be visible from nearby residential areas, high vantage points, CR 666, and other points where clear LOSs between an observer and the Power Station are available (for example, from vantage points above the south shore of Colby Lake approximately one mile due south of the Power Station Footprint). As well, the new and taller HVTL structures will be visible from further distances than the existing 115kV structures.

Trees and other vegetative growth will be cleared on the East Range IGCC Power Station Footprint and along new and existing corridors for purposes of constructing Mesaba One and Mesaba Two, natural gas and water/wastewater pipelines, HVTLs, new access roadways, and rail tracks. Permanently cleared areas within the Power Station Footprint and Buffer Land and the ROWs on corridors accommodating the HVTLs, natural gas pipeline, and Associated Facilities will be visible wherever a LOS between the observer and structure/ROW in question occurs (for example, where such routes follow or cross existing roadways). The general aesthetic impacts associated with constructing and operating the East Range IGCC Power Station, HVTLs, natural gas and water/wastewater pipelines, rail system, and roadways are provided below.

3.1.3.1 IGCC Power Station Footprint

3.1.3.1.1 Seasonal Variations

Building and stack heights for the East Range IGCC Power Station will be identical to those specified for the West Range Site. Figure 3.1-9 below shows the results of the GIS visibility analysis for the area surrounding the East Range Site. This figure shows those areas from which the IGCC Power Station stack emission points will be visible. Such areas are shown in one of eight colors depending upon the observation “frequency” (i.e., the number of stack emission points that will be visible) at that particular point. Areas colored in red are points from which all eight of the Power Station stacks are visible to an observer 6 feet above ground level. Figure 1.5-48 shows the current topographic contours in the vicinity of the IGCC Power Station Footprint and Buffer Land.

As noted in Section 3.1.3, the Power Station’s stack emission points will be visible from most vantage points along the south shore of Colby Lake, LOS views from the southwest section of Hoyt Lakes, the southwest end of Whitefish Reservoir, and points mostly to the north of the Station Footprint and Buffer Land. Due to the presence of trees or hills which block direct LOSs to the Power Station, there are many locations where the stack emission points will not be seen.

During "leaves on" times of the year, the East Range IGCC Power Station buildings and stacks will be partially screened from homes located on the south shore of Colby Lake. But, in general, Colby Ridge residents and other homes on the south shore of the lake will be able to see the Power station buildings and stacks year round. Residents living within the south east part of Hoyt Lakes are not likely to see the Power Station or its stacks because of terrain obstacles. The Power Station will be highly visible from CR-666; however, the majority of traffic currently traveling this road will be people on route to construct or operate the IGCC Power Station or one of the other industrial projects proposed for the area. The change in the area's aesthetic character due to the presence of the Power Station is not likely to be a negative development for those travelers.

In the wintertime, the visibility of the structures associated with the Power Station will increase (due in part to the loss of leaves on the trees and in part to the increased visibility of the plume of condensed water vapor rising from the stacks and cooling towers).

Prior to the EIS scoping meetings, the Proponent will calibrate the visibility model with actual observations of helium-filled balloons spatially positioned at prominent emission points (for example, the Tank Vent Boiler and CTG/HRSG) and lofted to their expected height (plus-or-minus the difference between the existing grade at such points and the elevation at which such points will be positioned in accordance with the grading plan shown in Figure 1.5-11). Pictures will be taken from points where the model predicts all eight stacks will be visible and points where the model predicts that no stacks will be visible. The height of vegetative cover represented in Figure 3.1-2 for the visibility model will be adjusted where necessary to reflect actual observations. Some model predictions will likely be contravened due to recent logging activities.

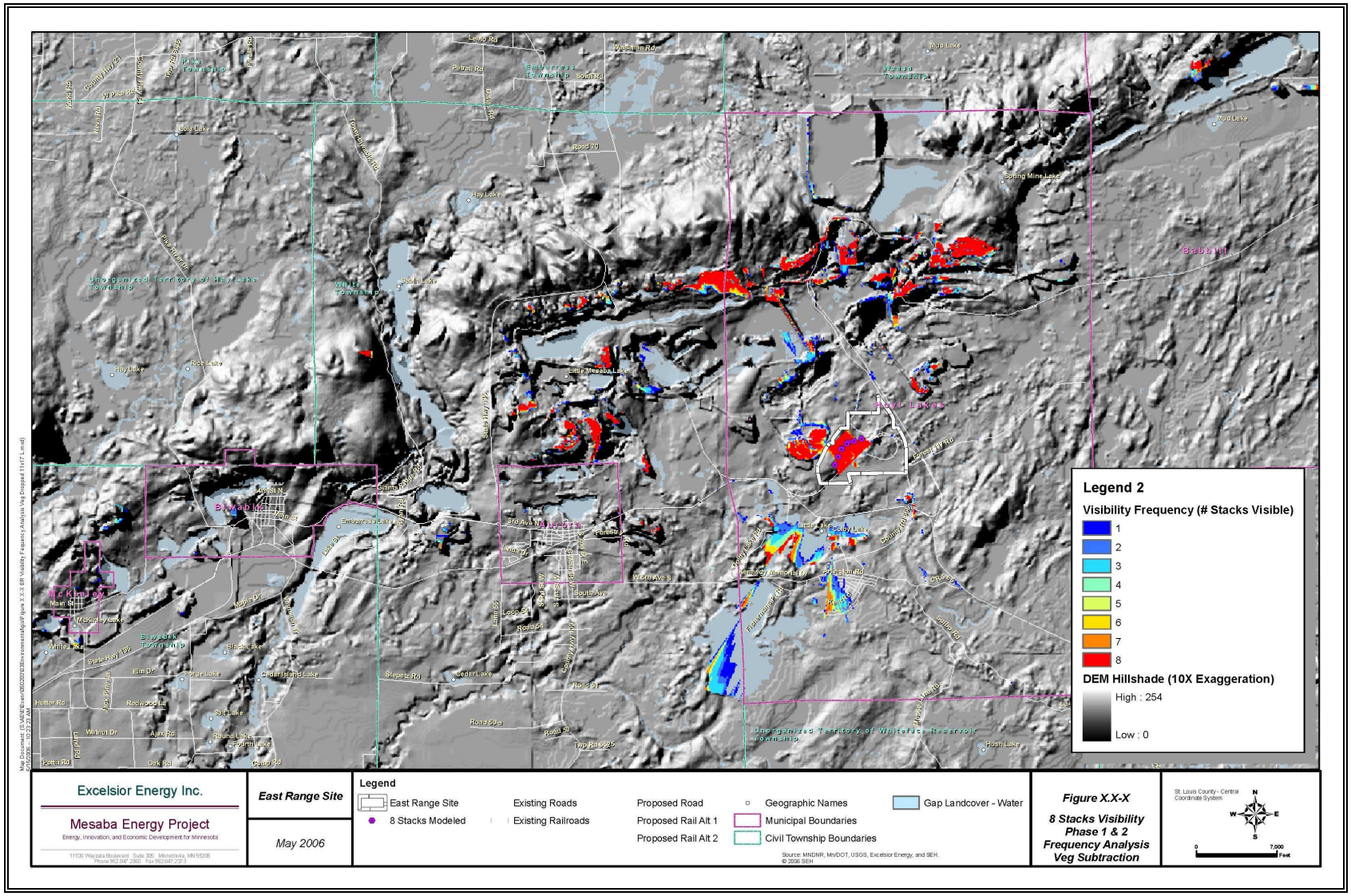
Compared to the West Range Site, more residents will be able to see the plant, but their view will be from slightly further away (the nearest residence being about 6,000 feet from the Power Station Footprint compared to about 3,250 feet for the closest resident living nearby the West Range Power Station Footprint).

Overall, aesthetic impacts will mirror those for the West Range Site with one additional exception. Fewer people will be traveling on route to recreational opportunities at the East Range Site as no through traffic is permitted on CR-666.

3.1.3.1.2 Diurnal Variation

The Tank Vent Boiler emission point will be positioned at a height greater than 200 feet above ground level. As a result, the Proponent will be required to submit a request to the FAA for a determination of no hazard to aviation.

Figure 3.1-9 East Range Site Predicted Visibility Impact Areas for IGCC Power Station Stack Emission Points



The East Range IGCC Power Station stack emission points are not close enough to any public airport to be deemed likely 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 (and daylight hours, if the lighting were required to be operated 24 hours per day).

3.1.3.1.3 Station Lighting Plan

Station lighting impacts will be more visible to Colby Ridge residents than to residents living nearby the West Range IGCC Power Station. Otherwise, the same comments made for the West Range Site apply to the East Range Site. The Proponent will work in consultation with the City of Hoyt Lakes to develop a Station lighting plan that minimizes aesthetic impacts.

3.1.3.2 High-Voltage Transmission Line Routes

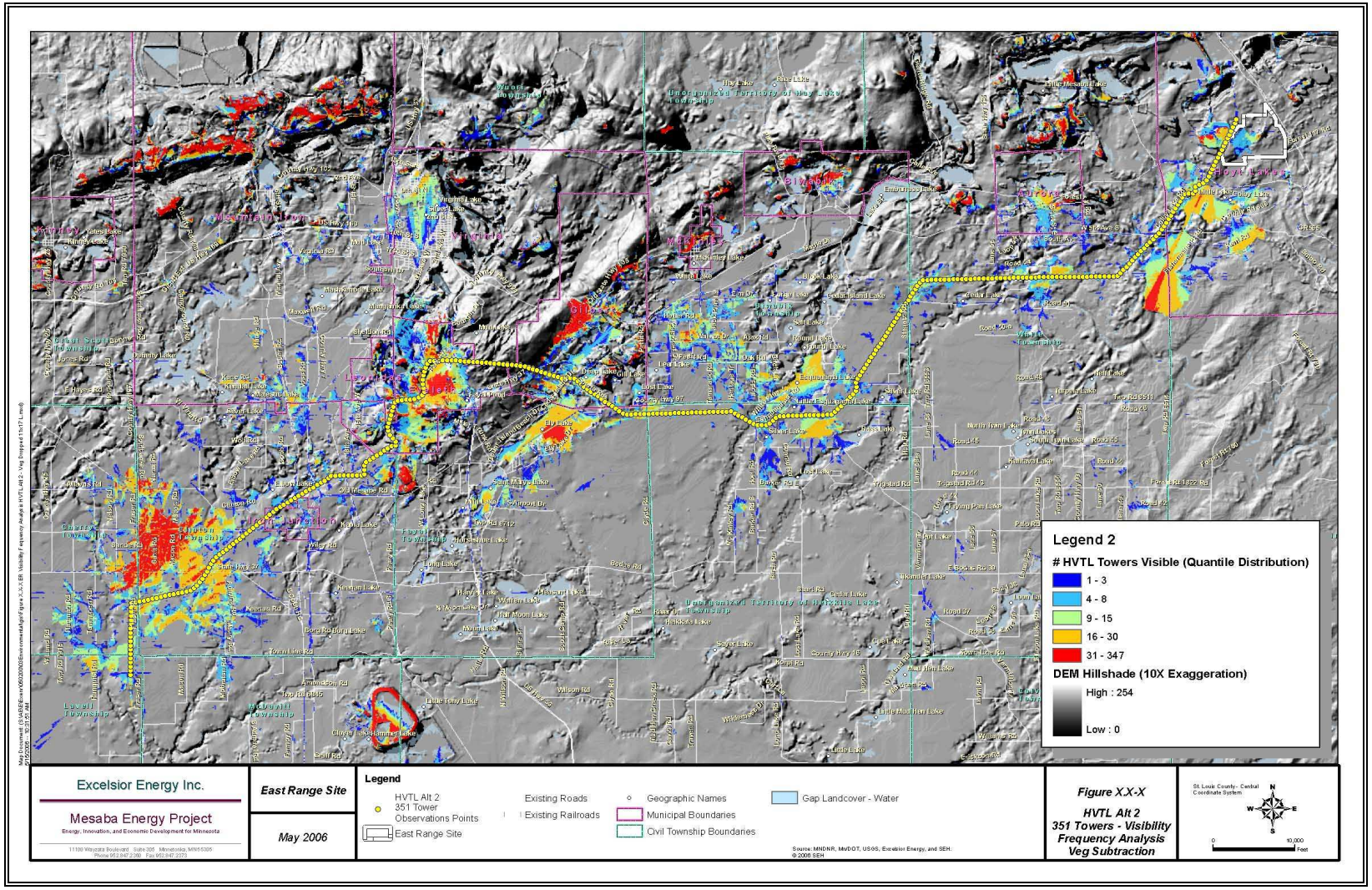
Single pole steel structures are proposed for both HVTL routes required to accommodate the GO HVTLs for the East Range IGCC Power Station. The heightened visibility of the taller structures will affect the aesthetic character of the existing viewshed. H-frame or other structure types may be necessary near waterfowl areas or water crossings.

3.1.3.2.1 39L/37L Route (Alternate 2)

To minimize the width of new ROW needed (see Section 1.5.3.3.1), the proposed 39L/37L Route will utilize vertically configured 140 foot single-pole steel structures (*see* Figures 1.12-32 through 1.12-35) to carry one new 345-kV circuit and the existing 115-kV circuit across most of the Route's length (all but the first two miles and the two mile transition between the 39L and 37L routes). Single steel pole structures are taller than the existing wooden H-frame structures and can accommodate longer spans between poles (the proposed double circuit HVTL structures will average spans greater than 800 feet thereby allowing use of fewer poles compared to other structure types). Due to their increased height, these structures will be more visible to residents.

The results of the GIS-based visibility analysis for the 39L/37L Route are shown in Figure 3.1-10. Long stretches of relatively flat terrain across the length of this Route increase the number of views that will include the taller HVTL structures. In addition, the 39L/37L Route passes nearby relatively populated areas that will increase the number of residents having a direct LOS to one or more of the HVTL structures. Figure 3.1-10 shows the highest "frequency" of visible structures occurring in Hoyt Lakes, Gilbert, and Eveleth. Relatively flat terrain across which long views are possible include areas looking to the north from Ely Lake and south to the Forbes Substation.

Figure 3.1-10 East Range Predicted Visibility Impact Areas for 39L/37L Route Utilizing Vertically Oriented Double Circuit Single Pole Structures



The 39L/37L route is located about 3,300 feet from Sky Harbor (9Y5) Airport (deemed a Seaplane Base) and will 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 will be required on portions of this HVTL. This aesthetic impact would be new and noticeable over significant distances. The 39L/37L Route is also located relatively close to the Eveleth-Virginia Municipal ("EVM") Airport. The filing to the FAA will include a request for determination as to whether the structures on the segment of the 39L/37L Route near the EVM Airport pose a hazard to air navigation and require special lighting.

3.1.3.2.2 38L Route

The single pole delta configured double circuit HVTL structures used to carry the existing 115kV HVTL along the 38L Route will be shorter than the vertically configured structures used in the 39L/37L Route (125 feet for the delta structures compared to 140 feet for the vertically configured structures; *see* Figures 1.12-25 through 1.12-27). This somewhat reduces the observation "frequency" across each relevant viewshed. Figure 3.1-11 shows the areas where visual observations of the HVTL structures are predicted. The 38L Route, even though it will have shorter structures, will still be visible from high vantage points and along flat terrain where there exist long LOSs to a particular structure or group of structures.

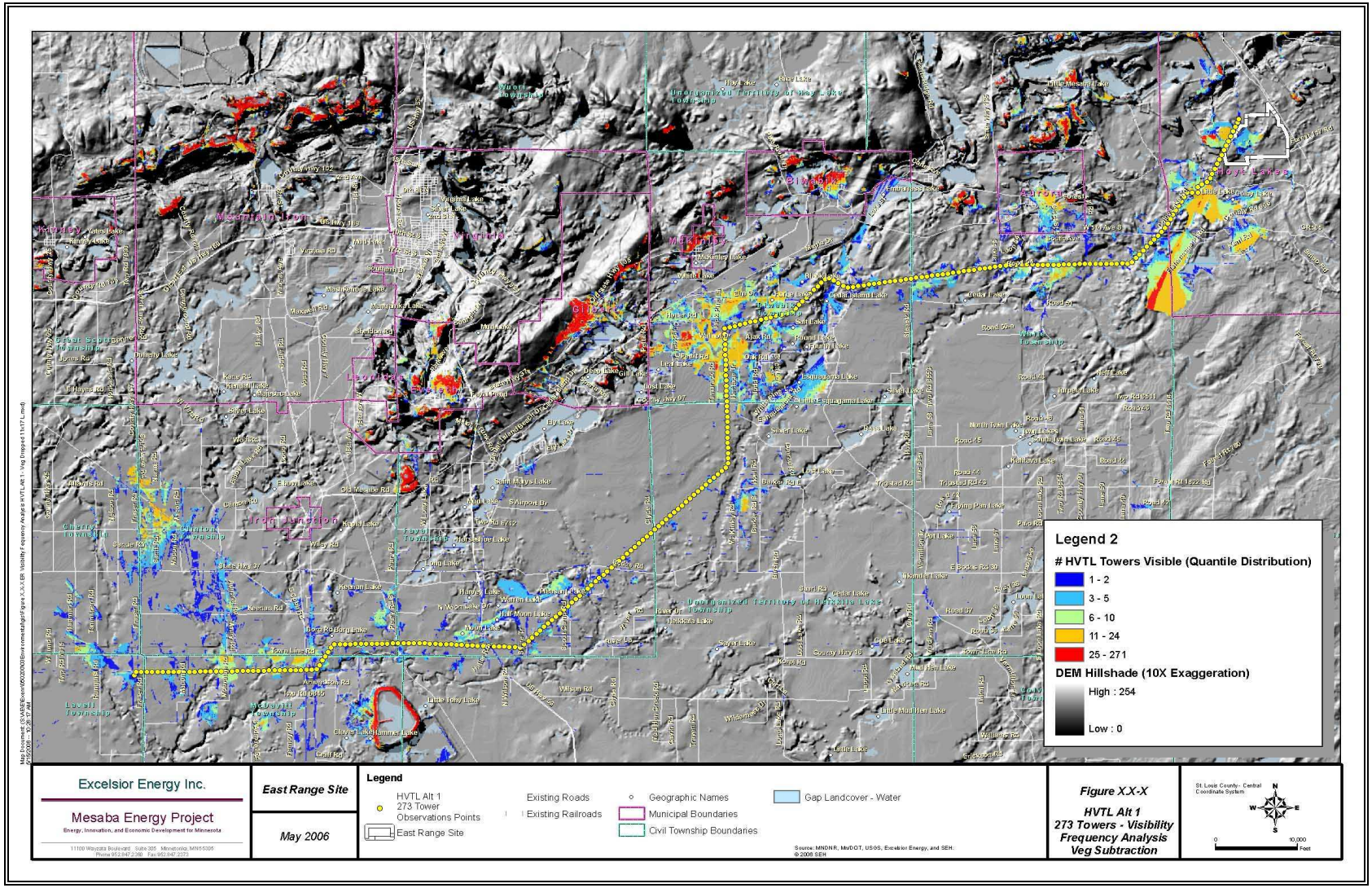
The Proponent will be required to file a request with the FAA to determine whether the structures on the 38L represent an obstruction to air navigation with respect to the EVM Airport (the 38L is within 20,000 feet of the EVM Airport, the airport has a runway greater than 3,200 feet in length, and the Tank Vent Boiler is right at the margin of exceeding a slope of 100:1 horizontally from the nearest runway).[3] If obstruction lighting is required,[4] the aesthetic impact will be new and noticeable over significant distances.

3.1.3.3 Natural Gas Pipeline Alternative 1

Construction of the natural gas pipeline to serve the East Range IGCC Power Station will only create a temporary aesthetic impact in that it will be located in a preexisting ROW for such infrastructure. Such temporary aesthetic impacts would be associated with equipment operations, traffic disruptions, and trenching activities that leave piles of soil exposed for indefinite time periods. The temporary impacts will be short-lived and confined to one or two growing seasons.

[3]USDOT, FAA, March 2000, Advisory Circular AC 70/7460-2K, "Proposed Construction or Alteration of Objects that May Affect the Navigable Airspace."
[4] USDOT, FAA, August 2000, "Advisory Circular AC 70/7460-1K, "Obstruction Marking and Lighting."

Figure 3.1-11 East Range Predicted Visibility Impact Areas for 38L Route Using Single Pole Delta Configured Double Circuit Structures



3.1.3.4 Process Water Supply Pipelines

The aesthetic impacts associated with construction and/or operation of the East Range process water supply pipelines will be largely confined to areas of property that have been off limits to the public for a long time or previously disturbed from past mining practices. Therefore, any aesthetic impacts will be minimal and/or unnoticed.

3.1.3.5 Process Water Blowdown Pipeline

The East Range IGCC Power Station will employ a ZLD system to eliminate discharges of cooling tower blowdown. Therefore, there will be no aesthetic impacts associated with constructing a pipeline to an outfall or the discharge structure at that point. Aesthetic impacts related to use of the ZLD system will include increased truck traffic required to transport solids produced to a solid waste landfill. At this time Cliffs Erie operates a permitted demolition landfill (permitted by the State of Minnesota) located about 3.5 miles north-northwest of the East Range IGCC Power Station and has expressed an interest in creating a special cell for disposal of the solids created by evaporating mine pit waters.[5] If storage is physically and economically feasible, minimal aesthetic issues will be raised as traffic associated with transporting the solids will occur outside the general public's zone of normal activity.

3.1.3.6 Potable Water and Domestic Wastewater Pipelines

Potable water and domestic wastewater pipelines will be buried and generally follow existing utility corridors so that their installation will generally create only temporary aesthetic impacts. Directional drilling under Colby Lake will alleviate aesthetic concerns.

3.1.3.7 Railway

Rail traffic and its impact on the aesthetics associated with small town living would not significantly differ from the impact described for the West Range Power Station in Section 3.1.2.8. No grade crossings occur in Hoyt Lakes, with the nearest crossing occurring in Aurora where two crossings currently occur.

3.1.3.7.1 East Range Rail Line Alternative 1

The closest resident is located about 5,000 feet from the rail spur that will be constructed to the East Range Power Station Footprint. Construction of the rail spur will mostly be shielded from residents' views by existing tree cover and/or topographic obstructions. Although the rail loop and trains will be visible from CR-666, traffic along the road will be primarily limited to personnel going to work at one of the three new projects proposed for the area. Therefore, aesthetic impacts related to the rail spur are not expected to be significant.

3.1.3.7.2 East Range Rail Line Alternative 2

Aesthetic impacts associated with Railway Alternative 2 would be more visible to traffic on CR-666 and would generally be of greater impact as it is an alignment that would handle a complete

[5] Bruce Gerlach, personal communication, 2005.

coal train that 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. To maintain a workable grade, this track would have to cross under CR 666, requiring construction of a roadway bridge. The primary advantage of Alternative 2 is that less environmental impact will occur to wetlands within the proposed East Range Property Boundary. However, compared to Alternative 1, the track elevation on the east end is 35 feet higher in elevation than the west end (making the profile grades more visible); and the total coal train aesthetic impacts are spread over a larger area. Therefore, the trains will be more visible from CR 666, noise impacts will be more discernable, and dusting from the rail cars would increase because the cars would be more exposed to the wind.

3.1.3.7.3 Roadways

Construction of Access Road 1 will create new sight lines for individuals traveling CR 666. However, this is not likely to represent a significant aesthetic impact.

3.2 Air Quality

The emissions from the IGCC Power Station will be independent of the Site selected. Emission rates used in assessing ambient air quality impacts are provided in Section 1 (Section 1.8.1).

3.2.1 Permitting Status

The permitting status of the project will be the same at either the West Range or East Range sites. An application for a Part 70/New Source Review Construction Authorization must be submitted to the MPCA for review. MPCA will review the application to determine if the plant will meet applicable air quality standards and regulations. The sections below summarize the contents of the air permit application, the air quality requirements, and summaries of the results of air quality evaluations.

3.2.2 NAAQS and PSD Increment Impact Analysis

State and federal air quality rules prohibit emissions from a new facility that cause an exceedance of state or National Ambient Air Quality Standards ("NAAQS"). In addition, the emissions cannot exceed established Prevention of Significant Deterioration ("PSD") increments. To demonstrate compliance with these requirements, the Proponent conducted air dispersion modeling analysis for the two proposed sites. The AERMOD air dispersion model, which is MPCA's and USEPA's preferred model, was used for the analysis.

3.2.2.1 West Range Analysis

3.2.2.1.1 Significant Impact Analysis

Results of AERMOD modeling using only the facility emissions from Phases I and II demonstrated that project impacts exceed Significant Impact Levels ("SILS") (see Table 3.2-1). Impacts are shown for normal operation, when the flares are operated, and during system startup. Because highest predicted impacts are significant, PSD increment and NAAQS compliance modeling is necessary for sulfur dioxide ("SO_2"), particulate matter ("PM_{10}"), and nitrogen oxide "(NO_x").

There are no applicable PSD increments for CO, and NAAQS compliance need only be demonstrated for the one-hour ambient standard. The normal operation scenario was addressed in all increment and NAAQS analyses for SO_2, PM_{10}, and NO_x since it represents 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.

Table 3.2-1
Highest Project Impacts (Phase 1 and 2) and PSD SILs West Range

Pollutant and Averaging Time	Normal Operation	Flaring	Startup	SIL
	µg /m3	µg/m3	µg /m3	µg /m3
SO_2				
One-hour	132.0	77.3	N/A	25.0
Three-hour	80.7	26.6	N/A	25.0
24-hour	32.3	6.2	N/A	5.0
Annual	1.32	N/A	N/A	1.0
PM_{10}				
24-hour	24.6	N/A	N/A	5.0
Annual	1.86	N/A	N/A	1.0
CO				
One-hour	159.8	421.9	3088	2000
Eight-hour	54.3	135.0	462	500
NO_x				
Annual	2.69	N/A	N/A	1.0

3.2.2.1.2 PSD Increment

Increment analyses were completed for SO_2, PM_{10}, and NO_x. The modeling included all Mesaba Phase I and II sources at maximum emission rates in normal capacity operation, plus all regional increment consuming (and expanding) emissions listed in inventories provided by the MPCA. Increment consuming emissions were included in the input file as positive numbers, and increment-expanding emissions (decreases since the baseline date) were included as negative numbers. No consideration was given in the modeling analysis for the recently announced plans by Minnesota Power to significantly reduce emissions at its Clay Boswell, Syl Laskin, and Taconite Harbor power stations.

Results of the increment analyses are shown in Table 3.2-2, along with a comparison to the allowable Class II PSD increments. The data in Table 3.3-3 demonstrate that the Mesaba Project, in combination with all other regional PSD sources, will comply with all applicable NAAQS.

Table 3.2-2
Results of Mesaba Class II PSD Increment Analysis (μg/m^3)
West Range

Pollutant/Averaging Time	Highest* Concentration	PSD Increment
SO_2: Three-hour	76.4	512
24-hour	20.8	91
Annual	1.56	20
PM_{10}: 24-hour	21.2	30
Annual	1.93	17
NO_2: Annual	2.70	25

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

3.2.2.1.3 Class II NAAQS Evaluation

The NAAQS modeling demonstration consisted of calculating the maximum impact of Mesaba Project sources and all other regional sources, and comparing the highest total impacts, plus background concentrations, to the applicable Minnesota and NAAQS. For the Mesaba Project, maximum emission rates in normal operation were modeled for all sources and pollutants, except in the case of CO for which the startup scenario has maximum impacts.

For inclusion of other regional sources, a two-step procedure was utilized following the recommendations of MPCA modeling staff. In the first step, the Mesaba Project was modeled along with nearby sources for which emission parameters were provided by the MPCA. The location and time of high and highest second-high concentrations were defined by these model results. These specific high impact events were then remodeled, through use of the AERMOD EVENT option, including a much larger inventory of all regional sources. The full regional inventory, referred to as First Approximation Run ("FAR") data, was provided by the MPCA. FAR data files were generated specifically for the Mesaba site location; separate files were provided for each pollutant and averaging time.

Application of the FAR data provide an approximation of the combined impacts of all sources, for the specific times and receptors that were modeled. If predicted impacts threaten ambient standards, or if there is indication of significant interaction between multiple sources, more refined multiple source modeling could be necessary. However, as shown in the following, highest predicted impacts in the Mesaba analysis are far below applicable standards, and there are very low impacts of regional sources within the Mesaba SIA. Therefore, the FAR DATA methodology in this case provides assurance of compliance with all NAAQS limits.

Table 3.2-3 summarizes results of the NAAQS model analysis. For SO_2, PM_{10}, and NO_x the table shows maximum impacts of the three modeling runs: the Mesaba Project alone, the Mesaba

Project plus local sources that were explicitly included in the five-year model runs, and the Mesaba Project plus all regional sources from FAR modeling of the highest impact days. For CO, no inventory of regional emissions is available; the data in Table 3.2-3 show CO concentrations from Mesaba alone, and conservative total concentration estimates obtained by adding an urban background concentration to Mesaba impacts. All predicted concentrations are far below allowable levels and the results demonstrate compliance with all Minnesota and federal ambient standards.

Table 3.2-3
Results of Project Class II NAAQS Modeling
West Range

Pollutant Averaging Time	Highest (1) Mesaba Alone	Highest(1) Mesaba & Nearby	Highest(1) All Sources	Background	Total	NAAQS
	ug/m^3	ug/m^3	ug/m^3	ug/m^3	ug/m^3	ug/m^3
SO_2						
1-hour	124.5	262.7	267.8	10	277.8	1,300
3-hour	76.4	104.2	106.3	10	116.3	915
24-hour	20.8	25.1	37.3	10	47.3	365
annual	1.32	1.95	2.64	2	4.6	60
PM_{10}						
24-hour	11.0	11.7	15.4	20	35.4	150
Annual	1.86	2.16	3.38	10	13.4	50
NO_x						
Annual	2.69	3.19	4.88	5	9.9	100
CO						
1-hour	2,689.6	N/A	N/A	7,000(2)	9,690	40,000
8-hour	389.7	N/A	N/A	3,000(2)	3,390	10,000

(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) Background CO concentrations are very conservative estimates from urban monitors in Minneapolis/ St. Paul. No background data exist for the Project area.

3.2.2.1.4 Class I Impacts and Increment Consumption

An air quality modeling analysis was conducted to estimate impacts of the Project on air quality in Class I areas located near the site: the Boundary Waters Canoe Area ("BWCA"), Voyageurs National Park ("VNP") and the Rainbow Lakes Wilderness ("RLW") in Wisconsin. The distance from the Station to the closest point in each of these Class I areas is approximately 61 miles (98 km) for the BWCA, 75 miles (121 km) for VNP, and 117 miles (188 km) for RLW. The next closest Class I area, Isle Royale National Park, is more than 300 km from the station, beyond the distance where long-range transport modeling has been shown to provide realistic impact predictions.

The Class I analyses addressed PSD Class I increments for SO_2, and PM_{10}. The dispersion modeling analysis used standard EPA long-range transport modeling methodologies, and

followed guidance as presented in EPA's Guideline on Air Quality Models, the IWAQM Phase 2 report, and the FLAG Phase I report. The analyses also incorporated suggestions and guidance received in pre-application meetings with the U.S. Forest Service and the National Park Service.

The CALPUFF model was used to calculate pollutant impacts from the Project, for each year of meteorological data, for three-hour, 24-hour, and annual averaging periods. The two-phase Mesaba facility alone was modeled alone and the results compared with Class I PSD increments and SILs. Table 3.2-4 summarizes the highest CALPUFF model results for each Class I area, and shows the applicable Increment and SIL values. The data indicate that maximum Mesaba impacts are far below allowable increments for all pollutants and Class I areas. Impacts are also below the SIL in most cases, indicating that impacts will be insignificant, and no further analysis is necessary. However, for short-term SO_2 concentrations, impacts are indicated to exceed the SIL in the BWCA and VNP. Because the 3-hour and 24-hour SO_2 impacts could be significant, it was necessary to carry out a cumulative analysis, including other regional SO_2 increment sources, to quantify total PSD increment consumption.

Table 3.2-4
Class I PSD Increment Modeling Results for Mesaba Energy Project
West Range

Boundary Waters/Pollutant	Year Evaluated			Class I Inc	Class I SIL	Max
Averaging Period	1990	1992	1996	(ug/m3)	(ug/m3)	(ug/m3)
SO_2 3-Hour	1.3804	1.4547	1.5505	25.0	1.00	1.5505
SO_2 24-Hour	0.4554	0.3382	0.3589	5.0	0.20	0.4554
SO_2 Annual	0.0147	0.0127	0.0095	2.0	0.10	0.0147
NO_x Annual	0.0174	0.0152	0.0109	2.5	0.10	0.0174
PM_{10} 24-Hour	0.0866	0.0617	0.0586	8.0	0.30	0.0866
PM_{10} Annual	0.0041	0.0037	0.0026	4.0	0.20	0.0041

Voyageurs/Pollutant	Year Evaluated			Class I Inc	Class I SIL	Max
Averaging Period	1990	1992	1996	(ug/m3)	(ug/m3)	(ug/m3)
SO_2 3-Hour	1.5911	1.0477	1.4836	25.0	1.00	1.5911
SO_2 24-Hour	0.2506	0.2943	0.4492	5.0	0.20	0.4492
SO_2 Annual	0.0128	0.0110	0.0113	2.0	0.10	0.0128
NO_x Annual	0.0151	0.0125	0.0142	2.5	0.10	0.0151
PM_{10} 24-Hour	0.0537	0.0500	0.0745	8.0	0.30	0.0745
PM_{10} Annual	0.0037	0.0032	0.0031	4.0	0.20	0.0037

Rainbow Lakes/Pollutant Averaging Period	Year Evaluated 1990	1992	1996	Class I Inc (ug/m3)	Class I SIL (ug/m3)	Max (ug/m3)
SO_2 3-Hour	0.7088	0.7567	0.7012	25.0	1.00	0.7567
SO_2 24-Hour	0.1806	0.1917	0.1711	5.0	0.20	0.1917
SO_2 Annual	0.0075	0.0083	0.0065	2.0	0.10	0.0083
NO_x Annual	0.0081	0.0071	0.0068	2.5	0.10	0.0081
PM_{10} 24-Hour	0.0369	0.0462	0.0316	8.0	0.30	0.0462
PM_{10} Annual	0.0022	0.0028	0.0019	4.0	0.20	0.0028

The short-term cumulative SO_2 increment analysis used the CALPUFF model to calculate the combined impacts of all regional increment consuming and increment expanding sources at each of the Class I areas. In response to a request for SO_2 increment inventories, the MPCA provided emissions and stack data for those northern Minnesota sources with a potential for Class I impacts.

Results of the cumulative SO_2 increment analysis are shown in Table 3.2-5. Maximum predicted increment consumption in each of the Class I areas is shown to be well within the PSD Class I limits. It can therefore be concluded that the Mesaba Project will not cause or contribute to any violation of Class I PSD increments.

Table 3.2-5
Mesaba Cumulative SO_2 Increment Results (Highest Second Highs)
West Range

Boundary Waters/Pollutant Averaging Period	1990	1992	1996	Class I Inc (ug/m3)	Max (ug/m3)	Violation? (Y/N)
SO_2 3-Hour	6.1	7.0	5.8	25.0	7.0	NO
SO_2 24-Hour	2.6	2.1	2.2	5.0	2.6	NO
Voyageurs/Pollutant Averaging Period	1990	1992	1996	Class I Inc (ug/m3)	Max (ug/m3)	Violation? (Y/N)
SO_2 3-Hour	5.2	4.6	5.5	25.0	5.5	NO
SO_2 24-Hour	1.6	1.5	1.6	5.0	1.6	NO
Rainbow Lakes/Pollutant Averaging Period	1990	1992	1996	Class I Inc (ug/m3)	Max (ug/m3)	Violation? (Y/N)
SO_2 3-Hour	4.5	4.3	4.7	25.0	4.7	NO
SO_2 24-Hour	1.4	1.2	1.3	5.0	1.4	NO

3.2.2.2 East Range Analysis

An air quality modeling analysis was carried out for the proposed East Range Site for the Mesaba Energy Project. The analysis included consideration of near-field impacts (for Class II areas within 50 km of the site), and impacts on Class I areas as estimated by the CALPUFF long-range transport model (see Section 3.2.2.2).

Air quality modeling utilized the same models, methodology and Project specifications as applied for West Range Site permitting analyses. However, the East Range analysis had the primary objective of identifying significant differences relative to the West Range Site. Accordingly, East Range modeling was less comprehensive than that completed for the West Range permit application.

The East Range analysis utilized the proposed Mesaba plant layout for that site, representing a complete two-phase facility. A new receptor layout was developed, with the same boundary and rectangular grid receptor spacing as applied previously for the West Range Site. Receptor elevations for all areas surrounding the site were determined from USGS DEM data, so as to accurately represent topography at the site.

All air pollution emissions from the Mesaba Project were assumed equal to those previously defined for the West Range Site with one exception. Because of different water quality at the East Range Site, PM_{10} emissions from cooling towers will be greater. Cooling tower PM_{10} emissions were specified as 256 tons per year, as compared to 39 tons per year for a West Range facility.

3.2.2.2.1 Near Field Results

Maximum air quality impacts within 50 km of the East Range Site were estimated by application of the AERMOD model. Preprocessed meteorological data applicable to the site location were obtained from the MPCA web site. For comparison to West Range results, model runs were executed for SO_2 and PM_{10}, assuming normal operation of the two-phase facility.

Table 3.2-6 shows a comparison of East Range results to those for the West Range Site. The highest predicted concentrations for the two sites are quite comparable. Predicted SO_2 impacts are slightly lower for the East Range Site. Differences, due to slightly different meteorological data and terrain, are not significant. PM_{10} concentrations are slightly higher at the East Range, probably as a result of higher cooling tower emissions. Because of the close agreement between predicted impacts at the two sites, modeling for other pollutants and operating scenarios is deemed unnecessary.

Table 3.2-6
Comparison of East Range Site Near-Field Model Predictions to West Range Impacts as Shown in Permit Application

Pollutant/Scenario	East Range Site		West Range Site	
	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				
One-hour average	126.9	103.1	130.2	122.4
Three-hour average	64.8	64.7	77.6	73.4
24-hour average	27.5	20.3	31.2	21.1
PM_{10} – Normal Operation				
24-hour average	30.5	26.1	27.9	23.4

The terrain elevation data used for specification of receptor elevations did not include the significant man-made waste rock deposit immediately west of the site. Because highest elevations of this feature are up to 125 feet above plant grade level, additional modeling was conducted to determine whether higher concentrations could occur on the waste rock deposit. The one-hour SO_2 and 24-hour PM_{10} model simulations were repeated with receptor elevations as shown by the waste-rock topography. Maximum predicted concentrations at the elevated receptors were in all cases less than the highest concentrations previously determined at receptors elsewhere. It can therefore be concluded that there will be no adverse impacts on local high terrain points.

No additional modeling was performed to include other local or regional pollution sources. Because predicted maximum impacts are far below applicable ambient air and increment limits, and Mesaba significant impacts are limited to very small areas in close proximity to the site, it is highly unlikely that interaction with any nearby or regional sources would contribute to compliance issues. Regional multi-source modeling for the West Range Site showed negligible combined impacts of Mesaba and other sources.

Based upon the similarity between predicted impacts for the East and West Range Sites, it is concluded that there are no significant Class II area permitting problems for a Mesaba East Range site location.

3.2.2.2.2 Class I Results

A complete CALPUFF model analysis was carried out for the East Range Site, analogous to that performed for the West Range air permit application. Because the East Range Site is located closer to the Class I areas of concern, particularly the Boundary Waters Canoe Area, somewhat

larger potential impacts are indicated. The predicted impacts are, however, modest and amenable to mitigation.

Table 3.2-7 shows PSD increment consumption results for both the West and East Range Sites at the three Class I areas evaluated. As at the West Range, SO_2 impacts are significant (above the Significant Impact Level, or SIL) but far below allowable increment limits. A cumulative SO_2 increment analyses was carried out for the West Range Site; it 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 increment that would be consumed by an East Range Mesaba facility, it can be concluded that there would be no Class I increment violation attributable to the Project.

Table 3.2-7
Mesaba Project (Phases I and II) Increment Impacts
East Range Site/ West Range Site

Class I Area and Pollutant	Max Mesaba		Class I SIL ($\mu g/m^3$)	Class I Increment ($\mu g/m^3$)
	E. Range ($\mu g/m^3$)	W. Range ($\mu g/m^3$)		
Boundary Waters CA				
SO_2 3-hr	6.08	1.55	1.0	25.0
24-hr	2.26	0.46	0.2	5.0
Annual	0.06	0.01	0.1	2.0
NO_x annual	0.09	0.02	0.1	2.5
PM_{10} 24-hr	0.36	0.09	0.3	8.0
Annual	0.01	0.004	0.2	4.0
Voyageurs NP				
SO_2 3-hr	2.12	1.59	1.0	25.0
24-hr	0.68	0.45	0.2	5.0
Annual	0.01	0.01	0.1	2.0
NO_x annual	0.02	0.01	0.1	2.5
PM_{10} 24-hr	0.11	0.07	0.3	8.0
Annual	0.004	0.004	0.2	4.0
Rainbow Lake WA				
SO_2 3-hr	1.19	0.76	1.0	25.0
24-hr	0.39	0.19	0.2	5.0
Annual	0.01	0.01	0.1	2.0
NO_x annual	0.01	0.01	0.1	2.5
PM_{10} 24-hr	0.08	0.05	0.3	8.0
Annual	0.003	0.003	0.2	4.0

3.2.3 Nonattainment Area Impact Analysis

The two proposed sites are located in areas that have been designated as attainment or not classified for each of the NAAQS. Therefore the facility is not subject to Nonattainment New Source Review and Lowest Achievable Emission Rate requirements.

3.2.4 Good Engineering Practice Height Analysis

As part of the NAAQS analysis, a Good Engineering Practice ("GEP") Height analysis was conducted. The evaluation demonstrated that all the stacks are less than GEP; therefore can be modeled at their actual heights.

3.2.5 Risks to Human Health and Ecology

3.2.5.1 West Range

An Air Emissions Risk Assessment ("AERA") was conducted for the West Range Site to identify the sources or groups of sources, chemicals and associated pathways that may pose an unacceptable health risk to the public as a result of the proposed facility air emissions. The AERA is included as Appendix E to the Part 70/New Source Construction Authorization Permit Application and attached as Appendix 5 to the Joint Application.

The AERA was completed using several methods. Acute and sub-chronic risks are determined by using MPCA's Risk Assessment Screening Spreadsheet ("RASS") and Equivalent Risk Emission Rate ("ERER") approach. Chronic risks are determined using the Industrial Risk Assessment Program – Health ("IRAP") View model. Risk associated with fish tissue ingestion is determined using the MPCA Draft Mercury Risk Estimation Method for ingestion of mercury in fish tissue and IRAP is used to determine risk associated with fish contaminated by contaminants other than mercury.

The acceptable MPCA risk level for chemicals producing carcinogenic effects from all combined facility emission sources is less than one in 100,000 (10^{-5}). For chemicals producing non-carcinogenic effects, a hazard index less than 1.0 is acceptable.

Using default, conservative RASS dispersion assumptions, the RASS screening analysis results exceeded the MPCA hazard index of 1.0 requiring the conduct of additional detailed risk analysis modeling. Follow-up modeling showed acute and sub-chronic health risks as determined by the ERER method are 0.52 and 0.13, respectively. Both hazard indices under the detailed approach are within the acceptable MPCA total hazard index of 1.0.

Chronic health risks as determined by IRAP at 11 receptors representing rural residents, hobby and working farmers, and lakeshore residents indicate the following:

- Cancer risk ranges from 9.1×10^{-7} to 5.0×10^{-8}
- Non-cancer hazard indices range from 0.032 to 0.0028

Both ranges are within acceptable MPCA health risk levels.

Predicted risk associated with the ingestion of fish tissue caught from Big Diamond Lake indicates that the hazard quotient incremental contribution of mercury in fish tissue ranges from 0.45 to 0.65 (dependent on fish size).

The predicted cancer risks from all combined facility emission sources and COPCs range from 2.9×10^{-7} to 3.8×10^{-7}. The predicted non-cancer hazard indices range from 0.00013 to 0.00085. Health risks predicted by both methods indicate results that are within acceptable MPCA risk levels.

3.2.5.2 East Range Site

The results of the West Range AERA were used to assess potential health risks associated with the East Range site. Mass emissions of hazardous air pollutants are expected to be the same at both plant sites. The results of the RASS evaluation are independent of the plant location because the method does not use site specific dispersion modeling. The ERER, IRAP and mercury evaluations use site specific modeling, but the NAAQS evaluations that were conducted for the West and East Range sites produced similar results. Therefore ERER, IRAP and mercury evaluations at the East Range Site are expected to be similar to the West Range results.

An evaluation was conducted at the East Range site to identify receptors within the 3 kilometer diameter buffer area surrounding the site. Within the 3 kilometers are Little Lake and portions of Colby Lake. Colby Lake is similar in size and approximate distance from the proposed site as Big Diamond Lake. The results of the evaluation of risk due to fish consumption completed for Big Diamond Lake are likely similar to an evaluation of risk at Colby Lake.

The northern most portion of the City of Hoyt Lakes and a development on the south shore of Colby Lake are located within the buffer area. No farms, schools, nursing homes, assisted living facilities, or licensed daycares are located with 3 kilometers of the facility. Therefore, the West Range AERA analysis is also representative of risks at the East Range Site.

3.2.6 Emissions from Cooling Towers

The evaporative cooling towers at the Mesaba Project will discharge warm saturated air to the atmosphere, as well as small quantities of liquid water droplets. The wet plumes are emitted vertically from 33-foot diameter fan stacks at an elevation of 48 feet above grade. Because of the buoyancy of the warm moist air and the vertical velocity imparted by the fans, the wet plumes will rise to significant heights above the ground.

The potential environmental impacts of cooling tower emissions 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. Since meteorology is similar at the two proposed locations, the plume impacts are expected to be similar.

The most obvious impact of the Mesaba One and Mesaba Two cooling towers will be visible condensed water plumes. These will exist during periods of low air temperature and light winds. The plumes, which appear 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. Because the plumes consist almost entirely of condensed water (some particulate matter is released) they have no adverse effects other than their visual impact.

Experience with large cooling towers at power plants in cold climates has shown that fogging and icing impacts of mechanical draft towers similar to those at the Mesaba Project are minimal. Extensive research was carried out 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 prediction of cooling tower effects, and collection of field observations at operating towers.[6] In general it was found that environmental impacts are negligible except within 500 to 1000 feet of the towers. Because of 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.

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 were conducted during permitting of Sherburne County Generating Station Unit 3;[7] these analyses 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.[8]

The Sherburne County Generating Station cooling tower facility is approximately twice as large as the Mesaba Project cooling towers in terms of total heat dissipation to the atmosphere. Thus, despite the somewhat colder climate in northern Minnesota, there is no reason to anticipate off-site fog or icing impacts.

There are no major highways, airports, or other sensitive facilities in close proximity to either proposed site. Given data and experience at other cooling tower installations, it is concluded that there will be no significant fogging, icing, or drift deposition impacts of the Mesaba 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.

3.2.6.1 West Range

The IGCC Power Station on the West Range will have lower PM emissions than the East Range Station due to the higher COC at which the cooling towers will operate (*see* Section 1.8.1.1.6).

3.2.6.2 East Range

See Section 3.2.6.1 above.

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[6] Hanna, Steven R. 1984: Atmospheric Effects of Energy Generation. Chapter 15 of Atmospheric Science and Power Production, Office of Scientific and Technical Information, U.S. Department of Energy. DOE/TIC – 27601.
[7] Minnesota Pollution Control Agency, 1981: SHERCO 3 Final Environmental Supplement, St. Paul, Minnesota.
[8] Lee, A.H. And G.D. Heberling, 2002: personal communication with Xcel Energy SHERCO plant personnel.

3.2.7 Visibility (Air Quality Related Impact)

3.2.7.1 West Range

A visibility impact analysis was carried out for BWCA and VNP. Visibility analysis is not required for Rainbow Lakes. The recommended methodology for assessing visibility impacts according to the 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 particle type in scattering light, and the relative humidity which influences the size of hygroscopic pollutants (sulfates and nitrates). The 24-hour average light extinction caused by emissions from the modeled source(s) is then compared to the background light extinction, a value based upon "natural" or pristine unpolluted conditions for each Class I area.

The FLMs have established threshold changes in light extinction (as a percentage of natural background) that are believed to represent potential adverse impacts on visibility. These thresholds are 5% (a potentially detectable change) and 10% (a level that may represent an unacceptable degradation).

Table 3.2-8 presents results of the initial CALPUFF visibility analysis following the FLAG methodology, and using "Method 2" of CALPOST for calculation of visibility impacts. In Method 2, relative humidity data from the nearest surface weather station is used to calculate both source and background light extinction. Other methods, discussed below, use average relative humidity values, consider natural visibility impairment, and take into account average light extinction over a LOS rather than extinction at a single receptor location.

Table 3.2-8
Mesaba CALPUFF Visibility Results
Methods 2, 6 and 7
West Range

Speciated PM 12/5/2005	1990 **Method 2** > 5 %	1990 **Method 2** > 10 %	1990 **Method 2** Max %	1992 **Method 2** > 5 %	1992 **Method 2** > 10 %	1992 **Method 2** Max %	1996 **Method 2** > 5 %	1996 **Method 2** > 10 %	1996 **Method 2** Max %
Boundary Waters Wilderness	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	1990 **Method 6** > 5 %	1990 **Method 6** > 10 %	1990 **Method 6** Max %	1992 **Method 6** > 5 %	1992 **Method 6** > 10 %	1992 **Method 6** Max %	1996 **Method 6** > 5 %	1996 **Method 6** > 10 %	1996 **Method 6** Max %
Boundary Waters Wilderness	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	1990 **Method 7*** > 5 %	1990 **Method 7** > 10 %	1990 **Method 7** Max %	1992 **Method 7** > 5 %	1992 **Method 7** > 10 %	1992 **Method 7** Max %	1996 **Method 7** > 5 %	1996 **Method 7** > 10 %	1996 **Method 7** Max %
Boundary Waters Wilderness	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 used for Voyageurs NP.

The data in Table 3.2-8 indicate that calculated visibility impacts greater than 5 or 10% could occur at some point within the BWCA and VNP on a small number of days each year. Because these data suggest a potential for detectable visibility degradation due to Mesaba emissions, additional analyses were carried out to better quantify and evaluate the possibility of visibility impacts. These analyses are described in following sections.

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, and that very high relative humidities 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; 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 are reported. Method 7 represents another attempt to account for natural visibility reduction in assessing the impact of man-made pollution.

A criticism of Method 7 is that it tends to minimize the effect of source-induced haze on days when natural impairment may only exist for a small part of the day. It is possible that the impact of the source could still be significant during other hours of the day. This is a valid point, but the FLAG procedures specify visibility calculation on a 24-hour daily basis, on the grounds that model predictions for any single hour are subject to significant error. If the 24-hour averaging is appropriate for the basic visibility calculation, it may be reasonable to also utilize some 24-hour averaging in the effect of natural visibility impairing events. The occurrence of fog or precipitation on specific hours at a nearby weather station indicates the likelihood of these events at other times and/or locations within the Class I area.

Table 3.2-8 shows the results of Method 6 and Method 7 visibility calculations for the Mesaba 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% change in light extinction at the BWCA, and none at VNP.

In EPA's BART guidance for regional haze, the 98th 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% indicates a significant impact. Under this criterion, the Method 7 results show no significant visibility impact of the Mesaba Project at either Boundary Waters or Voyageurs.

3.2.7.2 East Range

Visibility modeling results for the East Range Site are shown in Table 3.2-9. The results for Voyageurs National Park are comparable to those previously derived for the West Range Site. Predicted visibility impacts at the Boundary Waters are substantially higher than West Range results.

Table 3.2-9
Mesaba Class I Area Visibility Impacts (Phases I and II)
CALPUFF Method 2 Model Results

Class I Area and Meteorological Data Year	Days ≥ 5%	Days ≥ 10%	Maximum Δb_{ext}
Boundary Waters Canoe Area			
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

There are several reasons why the Boundary Waters impacts are likely over-estimated and do not preclude permitting.

- Some portions of the BWCA 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 in the West Range permit application, detailed analysis of the visibility impact days is likely to demonstrate natural visibility impairment on many days. The Project-related impacts are not relevant on such days.

- Emission reductions at other regional sources will be required under Minnesota's developing Regional Haze/BART regulations. Additionally, recently announced plans by Minnesota Power for significant emission reductions have not been taken into account. Finally, acquisition of additional emissions reduction credits by the Proponent could further reduce existing visibility impacts and offset any potential Mesaba contributions.

Additional visibility analysis and negotiated mitigation measures would likely be necessary for the East Range Site to satisfy all potential concerns about visibility impacts. However, recent permit actions in Minnesota along with developing regional haze strategies indicate that all

concerns can be addressed and visibility protection can be achieved. Mesaba contributions to potential visibility impacts, though significant under conservative FLM methodologies, are small relative to existing source contributions and existing air quality.

3.2.8 Construction Impacts

Air quality impacts during construction will result from dust generated from material handling, site grading, and construction vehicle traffic and from combustion of fuels in power equipment and vehicles. Construction vehicles will include trucks, dozers, excavators, backhoes, loaders, cranes, forklifts, and other equipment. Power equipment will also be used including pumps, generators, and light towers. Given the size of the East and West Range properties, it is not likely that construction dust will leave the site.

3.2.9 Vehicular Emissions

Emissions will be generated from vehicles operated on the site during construction and during operation of the plant. These emissions will be by-products of combustion from the exhaust from the vehicle engines and fugitive dust generated from traffic on the roadways near and on the plant site.

On-site personnel during peak construction activities is 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, employment is expected to be between 125 and 175 persons. Estimated emissions from the East and West Range sites are comparable.

When compared with emissions from the facility, vehicular emissions are relatively small. Table 3.2-10 shows estimated peak daily emission rates from personal vehicles. The estimated emission rate of carbon monoxide, the pollutant emitted at the greatest rate, is 22 pounds per day.

Table 3.2-10
Daily Emission Rates from Vehicle Traffic

Pollutant	Emission Factor[1] gram/mile	Number of Vehicle Trips/day	Distance Per Trip mile/trip	Emission Rate 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 (www.epa.gov/greenvehicles/select.htm).
2 NMOC = non methane organic compounds, which is equivalent to volatile organic compounds.

Roadways and parking lots where emissions from mobile sources such as vehicles will occur are referred to as indirect sources. The State of Minnesota does not have an indirect source permitting program. According to Minnesota Department of Transportation Highway Project Development Process Handbook (HPDP Handbook, Part II, Section D "Air Quality"), a detailed air quality analysis is required if anticipated traffic volumes exceed traffic volumes of the top ten intersections in Minnesota (see HPDP Handbook Appendix 5). The smallest traffic volume of the top ten intersections is 35,800 annual average daily traffic ("AADT"). As previously stated, peak traffic counts associated with the Mesaba Energy Project are expected to be much less than 35,800 vehicles per day and, therefore, a detailed air quality analysis is not required.

3.2.10 Soil and Vegetation

The PSD regulation requires analysis of air quality impacts on sensitive vegetation and soil types. Evaluation of impacts on sensitive vegetation and soils was performed at the West Range site by comparing predicted project impacts to screening levels presented in the 1980 EPA document titled: *A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils and Animals* (EPA, December 1980, EPA 450/2-81-078). These screening levels represent the minimum concentrations in either plant tissue or soils at which adverse growth effects or tissue injury was reported in the literature. The procedures specify that predicted impact concentrations used for comparison account for facility impacts added to ambient background concentrations. Most of the designated vegetation screening levels are equivalent to or exceed PSD increments. The 3-hour and 1-hour SO_2 sensitive vegetation screening levels are more stringent than comparable NAAQS and State Ambient Air Quality Standards. Air quality modeling indicates that project impacts will be below NAAQS and PSD thresholds.

A comparison of the SO_2 sensitive vegetation screening levels with SO_2 impacts from the proposed project is presented in Table 3.2-11. The comparison includes ambient background concentrations in the impact levels. Maximum impacts for the 1-hour and 3-hour averaging periods are less than 20% of the allowable concentrations.

Since dispersion modeling results at the East and West Range sites are similar, impacts on vegetation are expected to be similar.

Table 3.2-11
Vegetative Sensitivity Screening for SO_2 Concentrations

Averaging Time	Background Concentration ($\mu g/m^3$)	Maximum Contribution from Project ($\mu g/m^3$)	Maximum Total Concentration ($\mu g/m^3$)	Sensitive Vegetation Screening Level ($\mu g/m^3$)
1-Hour	10	124.5	134.5	917
3-Hour	10	76.4	86.4	786

3.3 Geology and Soils

3.3.1 Soils

Existing soils across the West and East Range Sites are described in Section 2.4.6.1 and 2.4.6.2 respectively.

3.3.1.1 West Range

3.3.1.1.1 IGCC Power Station Footprint

Extensive grading will take place at the West Range IGCC Power Station Footprint. The total cut for the West Range IGCC Power Station will be approximately 2,975,000 cubic yards. Some areas of the facility site will also require filling. The total fill is anticipated to be approximately 1,750,000 cubic yards. Some of the fill will occur over the organic soils.

3.3.1.1.1A Topsoil

The majority of the West Range IGCC Power Station Footprint is currently covered in forest. After clearing and grubbing, the topsoil will be stockpiled for later use.

3.3.1.1.1B Glacial Till

The glacial till (affiliated with the Nashwauk and Keewatin Series) is generally a sandy lean clay or clayey sand. Some fat clays were encountered within the till sequence as well as silty sands. The till will be removed (excavated) where necessary for the facility. In some locations, such as the lower half of the till in Boring WR-8, the material is very wet and significant measures will be required in order to dry the material and compact it to required density levels. The wet till will also be unsuitable for founding structures and will require replacement with suitable material beneath foundations. The Itasca County soil survey notes that the material is also frost susceptible. Care will be required in design of project features to minimize damage to facilities and roads due to frost action in the natural till or embankments constructed from till.

The till is also noted to be easily eroded when exposed and difficult to re-vegetate. In order to minimize soil erosion and sediment transport, it will be necessary to use techniques described in the MPCA's Best Management Practices for Dealing with Storm Water Runoff from Urban, Suburban and Developing Areas of Minnesota, dated March 1, 2000. Where soils are replaced by plant facilities, the material will not again support vegetation until the facilities are demolished and restoration initiated. Development of vegetative cover on the till will require placement of topsoil.

3.3.1.1.1C Coarse Alluvium

The coarse alluvium (sand and gravel) is suitable for use as foundation fill if it is processed to remove cobbles and boulders. The material with fewer fines will tend to erode easily on slopes if unvegetated. Some of the material tends to be a bit dirty (high fines content). The sand and gravel with high fines content will require close water content control and may tend to pump during compaction if it is too wet. However, this material will be more stable on slopes prior to

receiving its vegetative cover. Development of vegetative cover will require placement of topsoil over the sand and gravel.

3.3.1.1.1D Peat and Muck

Peat and muck also exist on the site. It is not suitable to leave such material beneath building or equipment foundations. Therefore, it will be necessary to excavate peat and muck deposits and replace them with competent fill prior to construction of the West Range IGCC Power Station.

3.3.1.1.2 West Range HVTL Alternative 1

Minimal grading is expected along the West Range HVTL Alternative 1 corridor. Existing transmission towers will be removed and replaced with new transmission towers that will accommodate both the new HVTL lines and the existing lines. These towers are typically constructed at existing grade and will be supported by a drilled concrete pier foundation that will require an excavation 15 to 55 feet deep and 7 to 12 feet in diameter. Therefore, disturbance of soils is expected to be limited to localized areas around transmission towers and wheel paths for the construction equipment.

Areas that are stable and dry can be worked on during summer months, with difficult swampy areas reserved for winter construction. In areas where the frozen ground will not support weight, cribbing or matting is laid on the ground, to spread the weight. Most vehicle traffic will use the ROW for construction, with possible placement of a few access roads to the ROW. Erosion control measures will be implemented to minimize erosion during construction.

Post-construction reclamation activities will 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 will be restored to their original condition to the extent practicable and as negotiated with landowners.

3.3.1.1.2A Glacial Till and Lacustrine Soils

The glacial till and lacustrine soils are generally suitable for excavations for the drilled shaft foundations. However, casing will be required in areas where the groundwater table is within the depth of the drilled shaft. Boulders and cobbles in the till could impede the excavations. The glacial outwash is sandy and will also require casing to prevent the excavation from caving during construction of drilled shaft foundations.

3.3.1.1.2B Peat

Some types of drilled shaft foundations (caissons) are likely to not be constructible in the peat deposits, and other foundation types may need to be considered (helical piles or driven piles). Peat is not suitable for support of transmission tower foundations; therefore, the foundations will need to extend through the peat to suitable bearing soils or bedrock. Foundation types and depths must 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. Crane mats and/or low ground pressure equipment will be used. Construction during the winter months may also alleviate the difficulty of construction within areas of peat, and it will minimize impacts to of the soft, compressible, wet soils found in the wetlands. Construction of temporary haul roads may be necessary along the HVTL corridor in the wetland areas to provide access for material delivery and personnel. These haul roads will be completely removed when vegetation is re-established on the ROW. Figure 2.4-6 shows the locations of peat along the proposed corridor, based on the Itasca County Soil Survey.

3.3.1.1.3 West Range HVTL Alternative 1A

Minimal grading is expected along the West Range HVTL Alternative 1A corridor. Extensive clearing of trees and other vegetation will be required. These towers are typically constructed at existing grade and will be supported by a drilled concrete pier foundation that will require an excavation 15 to 55 feet deep and 7 to 12 feet in diameter. Erosion control practices will be employed during construction.

Areas that are stable and dry can be worked on during summer months, with difficult swampy areas reserved for winter construction. In areas where the frozen ground will not support weight, cribbing or matting will be laid on the ground, to spread the weight. Most vehicle traffic will use the ROW for construction, with possible placement of a few access roads to the ROW. Erosion control measures will be implemented to minimize erosion during construction.

Post-construction reclamation activities will 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 will be restored to their original condition to the extent practicable and as negotiated with landowners.

3.3.1.1.3A Glacial Till and Lacustrine Soils

Transmission line towers are typically constructed at existing grade and will be supported on drilled shaft foundations. The glacial till and lacustrine soils are generally suitable for excavations for the drilled shaft foundations. However, casing will be required in areas where the groundwater table is within the depth of the drilled shaft. Boulders and cobbles in the till could impede the excavations for drilled shafts. The glacial outwash is sandy and will require casing to prevent the excavation from caving during construction of drilled shaft foundations. Some types of drilled shaft foundations (caissons) are likely to not be constructible in the peat deposits, and other foundation types may need to be considered (helical piles or driven piles).

3.3.1.1.3B Peat

Peat is not suitable for support of transmission tower foundations, so the foundations will need to extend through the peat to suitable bearing soils or bedrock. Peat is highly compressible and does not support heavy construction equipment. Crane mats or low ground pressure equipment will be used. Construction during the winter months may also alleviate the difficulty of construction within areas of peat, and will minimize impacts to of the soft, compressible, wet

soils found in the wetlands. Construction of temporary haul roads may be necessary along the HVTL corridor in the wetland areas to provide access for material delivery and personnel. These haul roads will be completely removed when vegetation is re-established on the ROW. Foundation types and depths must be further evaluated once a geotechnical investigation has been performed in the utility corridors. Figure 2.4-6 shows the locations of peat along the proposed corridor, based on the Itasca County Soil Survey.

3.3.1.1.4 West Range Plan B Phase II Alternate Route WRB-2A

Minimal grading is expected along the West Range Plan B Phase II Alternate Route WRB-2A corridor. Extensive clearing of trees and other vegetation will be required. Erosion control practices will be employed during construction. These towers are typically constructed at existing grade and will be supported by a drilled concrete pier foundation that will require an excavation 15 to 55 feet deep and 7 to 12 feet in diameter. Therefore, disturbance of soils is expected to be limited to localized areas around transmission towers and wheel paths for the construction equipment.

Areas that are stable and dry can be worked on during summer months, with difficult swampy areas reserved for winter construction. In areas where the frozen ground will not support weight, cribbing or matting will be laid on the ground, to spread the weight. Most vehicle traffic will use the ROW for construction, with possible placement of a few access roads to the ROW. Erosion control measures will be implemented to minimize erosion during construction.

Post-construction reclamation activities will 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 will be restored to their original condition to the extent practicable and as negotiated with landowners.

3.3.1.1.4A Glacial Till and Lacustrine Soils

Transmission line towers are typically constructed at existing grade and will be supported on drilled shaft foundations. The glacial till and lacustrine soils are generally suitable for excavations for the drilled shaft foundations. However, casing will be required in areas where the groundwater table is within the depth of the drilled shaft. Boulders and cobbles in the till could impede the excavations for drilled shafts. The glacial outwash is sandy and will require casing to prevent the excavation from caving during construction of drilled shaft foundations. Some types of drilled shaft foundations (caissons) are likely to not be constructible in the peat deposits, and other foundation types may need to be considered (helical piles or driven piles).

3.3.1.1.4B Peat

Peat is not suitable for support of transmission tower foundations, so the foundations will need to extend through the peat to suitable bearing soils or bedrock. Peat is highly compressible and does not support heavy construction equipment. Crane mats or low ground pressure equipment will be used. Construction during the winter months may also alleviate the difficulty of construction within areas of peat, and will minimize impacts to of the soft, compressible, wet

soils found in the wetlands. Construction of temporary haul roads may be necessary along the HVTL corridor in the wetland areas to provide access for material delivery and personnel. These haul roads will be completely removed when vegetation is re-established on the ROW. Foundation types and depths must be further evaluated once a geotechnical investigation has been performed in the utility corridors. Figure 2.4-6 shows the locations of peat along the proposed corridor, based on the Itasca County Soil Survey.

3.3.1.1.5 West Range Natural Gas Pipeline Alternative 1

Minimal grading is expected along the West Range Natural Gas Pipeline Alternative 1 corridor. The natural gas pipeline will consist of 16-24 inch diameter steel pipe (16" pipe will provide sufficient gas for Mesaba One and Mesaba Two; a 20" pipe is required to serve Mesaba One and Mesaba Two and MSI). Cathodic protection facilities will be provided to prevent corrosion of the pipe, and welds will be coated or wrapped to prevent corrosion. The pipe will be installed in a trench 72 inches deep, with 60 inches of soil cover over the top of the pipe. Grading and cut-and-fill excavation will be performed to minimize effects on natural drainage and slope stability. On steep terrain or in wet areas where the ROW must be graded at two elevations (i.e., two-toning) or where diversion dams must be built to facilitate construction, the areas 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.

Most trenching will probably be performed using a bucket-wheel ditching machine, although some special techniques will be required to protect the existing pipeline. Conventional tracked backhoes will be used where ground conditions are unsuitable for a ditching machine and where a deeper or wider trench is required. Trench dimensions will comply with applicable land use and regulatory requirements. In wet marshy areas, draglines and clamshells will be used to do the ditching. In areas where there is a need to separate top and subsoil, a two-pass trenching process will be used. The first pass will remove topsoil and the second pass will remove subsoil, with soils from each of the excavations being placed in separate banks. This technique will allow for proper restoration of the soil during the backfilling process. Spoil banks will contain gaps to prevent storm runoff water from backing up or flooding.

To insure the pipe is buried at the proper depth, the trench will be drained or pumped dry where practicable, or concrete coated pipe will be set on weights to overcome any buoyant force. Where the pipe crosses highway or road ditches, the trench or boring will be excavated deep enough to provide a minimum of 54 inches of cover over the pipe. All surfaced road crossings will be bored so that traffic flow will not be interrupted.

After the pipe is lowered into the ditch, the trench will be backfilled. The operation must be performed in a manner that will prevent damage to both the pipe and pipe coating from equipment or backfill material. Excess backfill material will be bermed over the ditch centerline to permit natural settling. Where the ditching process is used to separate top and subsoil, backfill will also be installed by placing the subsoil into the trench prior to placement of the topsoil to maintain the soil segregation.

Post-construction reclamation activities will 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 will be restored to their original condition to the extent practicable and as negotiated with landowners.

3.3.1.1.5A Peat

Peat is highly compressible and does not support heavy construction equipment. Crane mats or low ground pressure equipment will be used. Construction during the winter months may also alleviate the difficulty of construction within areas of peat, and it will minimize impacts to of the soft, compressible, wet soils found in the wetlands. Construction of temporary haul roads may be necessary along the West Range Natural Gas Pipeline Alternative 1 corridor in the wetland areas to provide access for material delivery and personnel. These haul roads will be completely removed when vegetation is re-established on the ROW. Figure 2.4-6 shows the locations of peat along the proposed corridor, based on the Itasca County Soil Survey.

3.3.1.1.5B Trench Excavations

If the natural gas pipeline is installed by open cut trenching, trees and other vegetation will be cleared along the entire corridor and vegetation will need to be re-established after construction. This vegetation will consist of grasses or wetland plants where appropriate. Trees will not be planted in the natural gas pipeline corridor to allow access for repairs or improvements. The glacial till and lacustrine soils are generally suitable for excavations for pipe construction. However, in areas where the ground water table is above the invert of the pipe, the pipe will need to be designed for buoyant forces. Trench dewatering may be necessary to construct the pipeline. Areas of high ground water are shown in Figure 2.4-6. Boulders and cobbles in the till could impede excavations. The glacial outwash is generally suitable for trench excavation. Trench excavation in the peat will be difficult, since the ground water table is shallow and the soils have low strength. The gas pipe installed in the peat must also be designed for buoyant forces.

3.3.1.1.5C Directional Drilling

Directional drilling may be used to install the pipe in specific situations over limited areas. Examples include where the pipe crosses beneath paved roads or streams. Where directional drilling is used to install the pipeline beneath streams, the drilling operation will begin and end 100 feet from the edge of each bank. Special precautions will need to be taken to prevent the pipe from floating in the areas where the groundwater table is higher than the pipe. If further geotechnical investigation encounters areas where bedrock is at or above the proposed pipe elevation, special directional drilling will be performed in those areas or open trench excavation with blasting will be performed.

3.3.1.1.6 West Range Natural Gas Pipeline Alternative 2

Minimal grading is expected along the West Range Natural Gas Pipeline Alternative 2 corridor. The natural gas pipeline will consist of 16 to 24 inch diameter steel pipe (see Section 3.3.1.1.5). Cathodic protection facilities will be provided to prevent corrosion of the pipe, and welds will be

coated or wrapped to prevent corrosion. The pipe will be installed in a trench 72 inches deep, with 60 inches of soil cover over the top of the pipe. Grading and cut-and-fill excavation will be performed to minimize effects on natural drainage and slope stability. On steep terrain or in wet areas where the ROW must be graded at two elevations (i.e., two-toning) or where diversion dams must be built to facilitate construction, the areas 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.

Most trenching will probably be performed using a bucket-wheel ditching machine, although some special techniques will be required to protect the existing pipeline. Conventional tracked backhoes will be used where ground conditions are unsuitable for a ditching machine and where a deeper or wider trench is required. Trench dimensions will comply with applicable land use and regulatory requirements. In wet marshy areas, draglines and clamshells will be used to do the ditching. In areas where there is a need to separate top and subsoil, a two-pass trenching process will be used. The first pass will remove topsoil and the second pass will remove subsoil, with soils from each of the excavations being placed in separate banks. This technique will allow for proper restoration of the soil during the backfilling process. Spoil banks will contain gaps to prevent storm water runoff from backing up or flooding.

To insure the pipe is buried at the proper depth, the trench will be drained or pumped dry where practicable, or concrete coated pipe will be set on weights to overcome any buoyant force. Where the pipe crosses highway or road ditches, the trench or boring will be excavated deep enough to provide a minimum of 54 inches of cover over the pipe. All surfaced road crossings will be bored so that traffic flow will not be interrupted.

After the pipe is lowered into the ditch, the trench will be backfilled. The operation must be performed in a manner that will prevent damage to both the pipe and pipe coating from equipment or backfill material. Excess backfill material will be bermed over the ditch centerline to permit natural settling. Where the ditching process is used to separate top and subsoil, backfill will be installed by placing subsoil into the trench prior to placement of the topsoil to promote regulative growth.

Post-construction reclamation activities will 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 will be restored to their original condition to the extent practicable and as negotiated with landowners.

3.3.1.1.6A Peat

Peat is highly compressible and does not support heavy construction equipment. Crane mats or low ground pressure equipment will be used. Construction during the winter months may also alleviate the difficulty of construction within areas of peat, and it will minimize impacts to of the soft, compressible, wet soils found in the wetlands. Construction of temporary haul roads may be necessary along the West Range Natural Gas Pipeline Alternative 1 corridor in wetland areas to provide access for material delivery and personnel. These haul roads will be completely

removed when vegetation is re-established on the ROW Figure 2.4-6 shows the locations of peat along the proposed corridor, based on the Itasca County Soil Survey.

3.3.1.1.6B Trench Excavations

If the natural gas pipeline is installed by open cut trenching, trees and other vegetation will be cleared along the entire corridor and vegetation will need to be re-established after construction. This vegetation will consist of grasses or wetland plants where appropriate. Trees will not be planted in the natural gas pipeline corridor to allow access for repairs or improvements. The glacial till and lacustrine soils are generally suitable for excavations for pipe construction. However, in areas where the ground water table is above the invert of the pipe, the pipe will need to be designed for buoyant forces. Trench dewatering may be necessary to construct the pipeline. Areas of high ground water are shown in Figure 2.4-6. Boulders and cobbles in the till could impede excavations. The glacial outwash is generally suitable for trench excavation. Trench excavation in the peat will be difficult, since the ground water table is shallow and the soils have low strength. The gas pipe installed in the peat must also be designed for buoyant forces.

3.3.1.1.6C Directional Drilling

Directional drilling may be used to install the pipe in specific situations over limited areas. Examples include where the pipe crosses beneath paved roads or streams. Where directional drilling is used to install the pipeline beneath streams, the drilling operation will begin and end 100 feet from the edge of each bank. Special precautions must be taken to prevent the pipe from floating in the areas where the groundwater table is higher than the pipe. If further geotechnical investigation encounters areas where bedrock is at or above the proposed pipe elevation, special directional drilling or open trench excavation with blasting will be performed.

3.3.1.1.7 West Range Natural Gas Pipeline Alternative 3

Minimal grading is expected along the West Range Natural Gas Pipeline Alternative 3 corridor. The natural gas pipeline will consist of 16-24 inch diameter steel pipe (see Section 3.3.1.1.5). Cathodic protection facilities will be provided to prevent corrosion of the pipe, and welds will be coated or wrapped to prevent corrosion. The pipe will be installed in a trench 72 inches deep, with 60 inches of soil cover over the top of the pipe. Grading and cut-and-fill excavation will be performed to minimize effects on natural drainage and slope stability. On steep terrain or in wet areas where the ROW must be graded at two elevations (i.e., two-toning) or where diversion dams must be built to facilitate construction, the areas 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.

Most trenching will probably be performed using a bucket-wheel ditching machine, although some special techniques will be required to protect the existing pipeline. Conventional tracked backhoes will be used where ground conditions are unsuitable for a ditching machine and where a deeper or wider trench is required. Trench dimensions will comply with applicable land use and regulatory requirements. In wet marshy areas, draglines and clamshells will be used to do the ditching. In areas where there is a need to separate top and subsoil, a two-pass trenching process will be used. The first pass will remove topsoil and the second pass will remove subsoil,

with soils from each of the excavations being placed in separate banks. This technique will allow for proper restoration of the soil during the backfilling process. Spoil banks will contain gaps to prevent storm runoff water from backing up or flooding.

To insure the pipe is buried at the proper depth, the trench will be drained or pumped dry where practicable, or concrete coated pipe will be set on weights to overcome any buoyant force. Where the pipe crosses highway or road ditches, the trench or boring will be excavated deep enough to provide a minimum of 54 inches of cover over the pipe. All surfaced road crossings will be bored so that traffic flow will not be interrupted.

After the pipe is lowered into the ditch, the trench will be backfilled. The operation must be performed in a manner that will prevent damage to both the pipe and pipe coating from equipment or backfill material. Excess backfill material will be bermed over the ditch centerline to permit natural settling. Where the ditching process is used to separate top and subsoil, backfill will also be installed by placing the subsoil into the trench prior to placement of the topsoil to maintain the soil segregation.

Post-construction reclamation activities will 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 will be restored to their original condition to the extent practicable and as negotiated with landowners.

3.3.1.1.7A Trench Excavations

If the natural gas pipeline is installed by open cut trenching, trees and other vegetation will be cleared along the entire corridor and vegetation will need to be re-established after construction. This vegetation will consist of grasses or wetland plants. Trees will not be planted in the natural gas pipeline corridor to allow access for repairs or improvements. The glacial till and lacustrine soils are generally suitable for excavations for pipe construction. However, in areas where the ground water table is above the final level of the pipe, the pipe must be designed for buoyant forces. Trench dewatering may be necessary to construct the pipeline. Areas of high ground water are shown in Figure 2.4-6. Boulders and cobbles in the till could impede excavations. The glacial outwash is generally suitable for trench excavation. Trench excavation in the peat will be difficult, since the ground water table is shallow and the soils have low strength. The gas pipe installed in the peat must also be designed for buoyant forces. Peat soils tend to be corrosive, so if steel or ductile iron pipe is used, the pipe should be adequately protected from corrosion.

3.3.1.1.7B Peat

Peat is highly compressible and does not support heavy construction equipment. Crane mats or low ground pressure equipment will be used. Construction during the winter months may also alleviate the difficulty of construction within areas of peat, and it will minimize impacts to of the soft, compressible, wet soils found in the wetlands. Construction of temporary haul roads may be necessary along the West Range Natural Gas Pipeline Alternative 1 corridor in the wetland areas to provide access for material delivery and personnel. These haul roads will be completely

removed when vegetation is re-established on the ROW. Figure 2.4-6 shows the locations of peat along the proposed corridor, based on the Itasca County Soil Survey.

3.3.1.1.7C Directional Drilling

Directional drilling may be used to install the pipe in specific situations over limited areas. Examples include where the pipe crosses beneath paved roads or streams. Where directional drilling is used to install the pipeline beneath streams, the drilling operation will begin and end approximately 100 feet from the edge of each bank. Special precautions must be taken to prevent the pipe from floating in the areas where the groundwater table is higher than the pipe. If further geotechnical investigation encounters areas where bedrock is at or above the proposed pipe elevation, special directional drilling will be performed in those areas or open trench excavation with blasting will be performed.

3.3.1.1.8 West Range Process Water Supply Pipelines

3.3.1.1.8A Segment 1

The West Range Process Water Supply Pipeline Segment 1 corridor will extend from the LMP to the CMP. This is not currently a utility corridor, so trees and other vegetation must be removed. Vegetation will be re-established after construction. This vegetation will consist of native grasses or wetland plants where appropriate. Trees will not be planted in the utility corridor to allow for future maintenance or repairs.

3.3.1.1.8A(1) Trench Excavations

Trench excavations are likely to be difficult in the extensive mine dump areas along this corridor because of the expected presence of large rock fragments. Rock fragments greater than 3 inches in diameter will need to be screened out of any backfill that is placed around the pipe. Near the CMP, groundwater may be near the ground surface. Construction dewatering will be necessary to excavate the trench in such areas. Minnesota DNR water appropriation permits may be required for the dewatering. Figure 2.4-7 shows where the pipeline corridor crosses areas of high groundwater.

3.3.1.1.8A(2) Topography

No change to the Process Water Supply Pipeline Segment 1 corridor topography is anticipated.

3.3.1.1.8B Segment 2

The West Range Process Water Supply Pipeline Segment 2 will be on the new alignment of Access Road 2 from the plant to new Highway 7 alignment (Access Road 1). The pipeline will then follow the new Highway 7 alignment for a distance of about 1,000 feet before heading south along the existing Highway 7 alignment. It will then head south for about 3300 feet along existing Highway 7 and head west 1600 feet to the Canisteo Mine Pit.

Trees and other vegetation will be cleared along the Process Water Supply Pipeline Segment 2 corridor where it follows Access Roads 1 and 2 due to clearing for those roadways. In areas where existing Highway 7 is disturbed, it will be restored to the same condition (pavement

section, subgrade, etc.) that it was in prior to construction of the Process Water Supply Pipeline Segment 2.

3.3.1.1.8B(1) Trench Excavations

The glacial till and glacial outwash soils are suitable for trench excavations. Cobbles, boulders, and rock fragments greater than 3 inches in diameter must be screened out of any backfill that is placed around the pipe. Some areas of glacial till and the lacustrine deposits have a groundwater table near the ground surface. Construction dewatering will be necessary to excavate the trench in such areas. Minnesota DNR water appropriation permits may be required for the dewatering.

The organic soils along the alignment are highly compressible and will not support heavy construction equipment. Crane mats or low ground pressure equipment will be used. Construction during the winter months may also alleviate the difficulty of construction within areas of peat, and it will minimize impacts to of the soft, compressible, wet soils found in the wetlands. Construction of temporary haul roads may be necessary along the West Range Natural Gas Pipeline Alternative 1 corridor in wetland areas to provide access for material delivery and personnel. These haul roads will be completely removed when vegetation is re-established on the ROW. Figure 2.4-6 shows the locations of peat along the proposed corridor, based on the Itasca County Soil Survey.

3.3.1.1.8B(2) Topography

No change to the Process Water Supply Pipeline Segment 2 corridor topography is anticipated, except where it is placed beneath the proposed Highway 7. The reason for the topographical change is to accommodate the highway, not the Process Water Supply Pipeline.

3.3.1.1.8C Segment 3

The West Range Process Water Supply Pipeline Segment 3 corridor will exit the Gross Mable Pit on its south side and follow an existing mining road to the west for about 7200 feet, where it will turn north and follow another existing mining road for 2500 feet before joining the proposed RR alignment. It will extend about 4500 feet northward along the proposed RR alignment to the alignment of proposed Access Road 1 (which is the proposed new County Road 7). The pipeline will then head westerly along Access Road 1 to existing County Road 7, where the pipeline alignment will turn south. It will extend south along existing County Road 7 for about 3500 feet where it will turn westerly and extend to the Canisteo pit for about 1600 feet on the westerly course.

Access Road 1 and the RR alignment are not currently established corridors, so trees and other vegetation will need to be removed in these areas for construction. Vegetation will need to be re-established after construction. This vegetation will consist of grasses or wetland plants where appropriate. Trees will not be planted in the utility corridor to allow for future maintenance or repairs. In the areas previously disturbed by mining activities, the alignment surface will be restored to its condition prior to pipeline construction or improved with grassy vegetation where suitable.

3.3.1.1.8C(1) Trench Excavations

The glacial till soils are suitable for trench excavations. Cobbles, boulders, and rock fragments greater than 3 inches in diameter must be screened out of any backfill placed around the pipe. Some areas of glacial till have a ground water table near the ground surface. Construction dewatering will be necessary to excavate the trench in such areas. MDNR water appropriation permits may be required at all locations where dewatering is performed. The Proponent may decide to use a trenchless method such as microtunneling in order to minimize damage to highways and/or disruption of traffic.

Vegetation will be re-established after construction. Suitable vegetation will consist of grasses or wetland plants. Trees will not be planted in the utility corridor to allow for future maintenance or repairs. In areas where Scenic Highway 7 is disturbed, it will be restored to the same condition (pavement section, subgrade, etc.) that it was in prior to construction of the water pipeline.

The organic soils along the alignment are highly compressible and not likely to support heavy construction equipment. Peat is highly compressible and does not support heavy construction equipment. Crane mats or low ground pressure equipment will most likely be used to aid equipment access. Construction during the winter months may minimize the difficulty of construction within areas of peat, and it will minimize impacts to of the soft, compressible, wet soils encountered in the wetlands. Figure 2.4-7 shows the locations of peat along the proposed corridor, based on the Itasca County Soil Survey.

3.3.1.1.8C(2) Temporary Access Roads

Construction of temporary haul roads may be necessary along Segment 3 of the West Range Process Water Supply Pipeline corridor in the wetland areas to provide access for material delivery and personnel. These haul roads will be completely removed when vegetation is re-established on the ROW.

3.3.1.1.8C(3) Topography

No change to the Process Water Supply Pipeline corridor topography is anticipated, except where it is placed beneath the proposed Highway 7 and the RR alignment. The reason for the topography change is to accommodate the roadway and RR grades.

3.3.1.1.9 West Range Process Water Blowdown Pipeline 1

The West Range Process Water Blowdown Pipeline 1 will be located on the new Access Road 2 corridor from the IGCC Power Station Footprint to existing Highway 7. The pipeline will then follow the existing Highway 7 alignment to Highway 169, where it will cross beneath Highway 169 and discharge to Holman Lake. The pipeline will be installed at depths ranging from 10 to 30 feet. Trenchless methods will be employed where excavation depths will adversely impact existing infrastructure. In areas where the pipeline is installed in an open trench, vegetation or existing pavement will need to be re-established after construction. The vegetation will consist of grasses or wetland plants where appropriate. Trees will not be planted in the utility corridor to allow for future maintenance or repairs.

The pipeline will cross underneath Highway 169. This will require a Minnesota Department of Transportation Permit for Installation of Utilities or Miscellaneous Work on Trunk Highway ROW. A Minnesota Department of Transportation Traffic Control Plan must be submitted if traffic is to be rerouted on Highway 169. Selection of the appropriate installation method will depend upon whether bedrock is encountered in this portion of the pipeline. This is discussed further in Section 3.3.3. The other alternative will be to excavate an open trench across Highway 169 to install the pipe.

Vegetation and the roadway surface will be re-established after construction. Trees will not be planted in the utility corridor to allow for future maintenance or repairs. Highway 7 and Highway 169 will be restored to the pre-construction condition (pavement section, subgrade, etc.) in areas where they are disturbed as a result of construction activities.

3.3.1.1.9A Trench Excavations

The glacial till soils are suitable for trench excavations. Cobbles, boulders, and rock fragments greater than 3 inches in diameter will need to be screened out of any backfill that is placed around the pipe. Some areas of glacial till have a groundwater table near the ground surface. Construction dewatering will be necessary to excavate the trench in these areas. Minnesota DNR water appropriation permits may be necessary for this dewatering. The organic soils are highly compressible and will not support heavy construction equipment. Crane mats and/or low ground pressure equipment will be used in these areas. Construction during the winter months may also alleviate the difficulty of construction within areas of organic soils. Trenches are generally unstable in the organic soils, and another method such as directional drilling will be considered in these areas. Figure 2.4-7 shows where the pipeline corridor crosses areas of organic soils and high groundwater.

3.3.1.1.10 West Range Process Water Blowdown Pipeline 2

The West Range Process Water Blowdown Pipeline 2 will be located on a new corridor from the southwest corner of the existing plant, southwest to the CMP. The trench will range from 10 to 50 feet deep. Trees and other vegetation will be cleared along the pipeline corridor. Vegetation will be re-established after construction. Trees will not be planted in the utility corridor to allow for future maintenance or repairs. Trenchless installation methods will be considered where the extent of the pipe trench interferes with existing infrastructure.

3.3.1.1.10A Trench Excavations

The glacial till soils are suitable for trench excavations. However, trench excavations in the mine dump areas may encounter large rock fragments, which could make excavation difficult. Cobbles, boulders, and rock fragments greater than 3 inches in diameter must be screened out of any backfill that is placed around the pipe. Some areas of glacial till have a groundwater table near the ground surface. Construction dewatering will be necessary to excavate the trench in these areas. Minnesota DNR water appropriation permits may be necessary for this dewatering.

The organic soils are highly compressible and will not support heavy construction equipment. Crane mats and/or low ground pressure equipment will be used in these areas. Construction

during the winter months may also alleviate the difficulty of construction within areas of organic soils. Trenches are generally unstable in the organic soils, and another method such as directional drilling will be considered in these areas. Figure 2.4-7 shows where the pipeline corridor crosses areas of organic soils and high groundwater.

3.3.1.1.11 West Range Potable Water and Sewer Pipelines

To provide water to Mesaba One and Two, an 8 inch diameter pipeline will be constructed from the City of Taconite utility system to the IGCC Power Station Footprint as shown in Figure 1.5-7 (see Sections 1.12.6 and 1.12.7). The referenced pipeline routing was chosen as the preferred route because it is the most efficient route from the City to the Station Footprint and installation of the pipe at that location will be more economical because it could be bundled along with pipelines serving other processes. The alternate route considered will extend the Potable Water and Sewer Pipeline east from the City to Highway 169, run parallel along the west side of 169 to CR 7, parallel the west side of CR 7, and cross under the highway to the Station Footprint. This route is longer, will require more piping, and impacts a number of wet areas that will increase the cost of installation. A booster station will be needed near the connection point to the City water distribution system in order to provide the required water pressure to the IGCC Power Station.

To dispose of domestic wastewaters produced by the IGCC Power Station, the Station will be connected to the Coleraine-Bovey-Taconite wastewater collection and treatment system. This will require constructing approximately 10,000 feet of 12-inch gravity sewer pipeline, a pump station, and 2,400 feet of force main from the Station Footprint, in a southerly direction, to the City of Taconite's main pump station, located in the northeast corner of the City. The 12-inch sewer pipeline, pump station, and force main will have ample capacity to convey the maximum projected wastewater flow of 30,000 gpd during construction (and the 7,500 gpd expected flows for the operational phase of Mesaba One and Two). The existing Coleraine-Bovey-Taconite waste water treatment facility has capacity available to treat such quantities (*see* Section 1.12.6.2).

The trench will not exceed 8 feet deep. If the required slope cannot be maintained for a gravity sanitary sewer using an 8-foot deep trench, a lift station and force main will be constructed. The potable water pipeline will be 12 inches in diameter, and buried with a minimum 60 inches of cover. The sanitary sewer pipeline will be 12 inches in diameter. It will be pressurized, and along Highway 7, the upper portion of the trench may be wide enough to require removal of some of the pavement on Highway 7.

Trees and other vegetation will be cleared along the water and sewer pipeline corridor. Vegetation and the roadway surface will need to be re-established after construction. Trees will not be planted in the utility corridor to allow for future maintenance or repairs. In areas where Highway 7 is disturbed, it will be restored to the condition (pavement section, subgrade, etc.) that it was in prior to construction activities. Where the pipeline is constructed on City of Taconite street ROW, the streets will be reconstructed to the same structural specification (pavement thickness, subgrade, curb, etc.) that existed prior to construction of the Potable Water and Sewer Pipelines. Soils previously disturbed by construction equipment and past mining

operations are known to be present near Taconite and uncompacted zones or zones of debris and boulders may be encountered.

3.3.1.1.11A Trench Excavations

The glacial till soils are suitable for trench excavations. Cobbles, boulders, and rock fragments greater than 3 inches in diameter must be screened out of any backfill that is placed around the pipe. Some areas of glacial till have a groundwater table near the ground surface. Construction dewatering will be necessary to excavate the trench in these areas. Minnesota DNR water appropriation permits may be necessary for this dewatering. The organic soils are highly compressible and will not support heavy construction equipment. Crane mats and/or low ground pressure equipment will be used in these areas. Construction during the winter months may alleviate the difficulty of construction within areas of organic soils and can minimize their disturbance. Trenches are generally unstable in the organic soils, and another method such as directional drilling will be considered in these areas. Figure 2.4-7 shows where the pipeline corridor crosses areas of organic soils and high groundwater.

3.3.1.1.12 West Range Rail Line Alternative 1A

The alignment for Rail Line Alternative 1A bifurcates from the existing CN and BNSF main lines that run parallel to Highway 169 and then turns to the northwest between Big Diamond Lake and Dunning Lake. The new alignment south of Big Diamond Lake generally follows an old railroad grade around the southern tip of the lake. In order to avoid a large mine dump, Alternative 1-A turns to the northwest to follow a new corridor between Big Diamond Lake and Dunning Lake. To provide an acceptable grade to the IGCC Power Station Footprint for the Alternative 1-A track requires filling low areas located between the two lakes and cutting from terrain obstacles. The rail loop for Alternative 1-A will be mostly on a fill section.

An extensive cut through till and coarse alluvium and into bedrock will be required for Rail Line Alternative 1A. The north end of the rail loop will require up to 50 feet of fill. Some of the fill must occur over organic soils. The till and sand and gravel are considered favorable materials for construction. The boulders will be somewhat problematic for construction and are not considered suitable fill except where blended into the fill for large embankments associated with the railroad grade. The boulders may also be segregated and processed. The granite bedrock, once removed and processed, is also considered suitable construction material. The peat and muck encountered are not good construction materials, except for the application of constructed wetlands.

Bedrock along the West Range Rail Line Alternative 1A corridor consists of Giant's Range Granite, Pokegama Quartzite, and the Biwabik Formation. See Section 2.4.4 for a description of these formations. The profile of rail line alternative 1A shows cuts of 30 to 78 feet below grade in the area from the crossing with proposed Highway 7 to the southeast end of the rail line. It corresponds with the bedrock outcrops shown on Figure 2.4-18. These excavations into bedrock will likely require blasting or tunneling. Rock bolting and anchors may be required to stabilize some slopes in the bedrock. Where the rail line exits the West Range Buffer Land, it crosses a bedrock valley 2,000 feet wide where the bedrock surface ranges from 50 to 150 feet below the ground surface. Excavations in this area are not expected to be deep enough to encounter

bedrock. From where the rail line crosses the proposed Highway 7 alignment (Access Road 1) to the south end of the line, the bedrock is within 50 feet of the ground surface (Meyer, Jennings, and Jirsa, 2004). There are three bedrock outcrops shown in this portion of the rail line. Figure 2.4-18 shows the bedrock topography along the rail line corridor.

Excavations as much as 78 feet deep and embankments as high as 36 feet must be constructed to achieve the required grades for the West Range Rail Line Alternative 1A. Trees and other vegetation must be cleared along the rail line corridor. Vegetation must be re-established after construction. This vegetation will consist of grasses or native herbaceous plants on the embankment slopes and cut slopes in soil.

3.3.1.1.12A Excavations

The glacial till soils are suitable for excavations/cut slopes. Zones of boulders and cobbles are sometimes encountered within the glacial till. These boulders and cobbles can be difficult to excavate. Some areas of glacial till have a groundwater table near the ground surface, which will require dewatering to excavate below the ground water table. Minnesota DNR water appropriation permits may be required for this dewatering. Excavations in the peat and organic soils will be difficult due to high ground water and low soil strength. These soils do not support heavy equipment, so low ground pressure equipment or crane mats will be needed. The peat/organic soils support construction equipment best when they are frozen. Figure 2.4-7 shows the location of organic soils and areas of high ground water.

3.3.1.1.12B Embankments

The glacial till soils are suitable for construction of railroad embankments. In some locations, the material is very wet and extraordinary measures will be required to dry the material and compact it to required density levels. The Itasca County soil survey notes that the material is frost susceptible. Care will be required during detailed design to minimize damage to facilities due to frost action in the natural till or embankments constructed from till. The organic soil/peat is not suitable as railroad embankment fill.

3.3.1.1.12C Organic Soils

West Range Rail Line Alternative 1A crosses organic soil/peat deposits in 3 locations outside the Buffer Land. These areas also correspond to the deeper fill areas. It may be possible to construct railroad embankments over the material if the embankments are built up slowly over time and surcharged or if other improvements are made. The determining factor will be the extent of long-term secondary compression of the peat and the impact of that compression on the project feature in question. It may be desirable to excavate peat and muck deposits and replace the material with competent fill prior to construction of the project feature in question. The organic soils are highly compressible and will not support heavy construction equipment. Crane mats and/or low ground pressure equipment will be used in these areas. Construction during the winter months may also alleviate the difficulty of construction within areas of organic soils.

3.3.1.1.12D Topography

Cuts as deep as 78 feet and embankments as high as 36 feet will be constructed to achieve the required grades for the West Range Rail Line Alternative 1A. The total cut quantity is estimated

to be 3,000,000 cubic yards, and the total fill quantity is estimated to be 2,000,000 cubic yards. Alternative 1A will have a surplus of cut/fill material that will need to be disposed of near the Station Footprint.

3.3.1.1.13 West Range Rail Line Alternative 1B

Alternative 1-B follows the same alignment as 1-A for the first 6,000 feet but then heads due north and to the east of Dunning Lake. At a point north of Dunning Lake, Alternative 1-B curves 90º to the west and follows a straight line to the Station Footprint. To provide an acceptable grade for the Alternative 1-B track requires cutting through a large mine dump east of Big Diamond Lake and Dunning Lake, passage through a large wetland area on the north east corner of Dunning Lake, and significant additional contouring on-route to the rail loop. The rail loop will be mostly on a fill section.

An extensive cut through till and coarse alluvium and into bedrock will be required for Rail Line Alternative 1B. Along the north end of the rail loop extensive filling, up to about 50 feet thick, will take place. Some of the fill will occur over the organic soils. The till and sand and gravel are considered favorable materials for construction. The boulders will be somewhat problematic for construction and are not considered suitable fill except where blended into the fill for large embankments associated with the railroad grade. The boulders may also be segregated and processed (crushed to a particle size range suitable for use as fill). The granite bedrock, once removed and processed is also considered suitable construction material. The peat and muck encountered are not good construction materials, except for the application of constructed wetlands.

Bedrock along the West Range Rail Line Alternative 1B corridor consists of Giant's Range Granite, Pokegama Quartzite, and the Biwabik Formation. See Section 2.4.4 for a description of these formations. The profile of rail line Alternative 1B shows deep cuts of as much as 125 feet below grade within an area approximately 3000 feet north of the location where Alternative 1A and Alternative 1B join together. Figure 2.4-18 shows the bedrock surface to be less than 50 feet below the ground surface in this area. These excavations into bedrock will likely require blasting or tunneling. Rock bolting and anchors may be required to stabilize some slopes in the bedrock. Just northeast of Dunning Lake, the rail line crosses a bedrock valley 2,000 feet wide where the bedrock surface ranges from 50 to 150 feet below the ground surface. Excavations in this area are not expected to be deep enough to encounter bedrock. From where the rail line crosses the proposed Highway 7 alignment (Access Road 1) to the south end of the line, the bedrock is within 50 feet of the ground surface (Meyer, Jennings, and Jirsa, 2004). There are two bedrock outcrops shown in this portion of the rail line. Figure 2.4-18 shows the bedrock topography along the rail line corridor.

Excavations as much as 125 feet deep and embankments as high as 25 feet will need to be constructed to achieve the required grades for the West Range Rail Line Alternative 1B. Trees and other vegetation will be cleared along the rail line corridor. Vegetation will need to be re-established after construction. This vegetation will consist of grasses or native herbaceous plants on the embankment slopes and cut slopes in soil.

3.3.1.1.13A Excavations

The glacial till soils are suitable for excavations/cut slopes. Zones of boulders and cobbles are sometimes encountered within the glacial till. These boulders and cobbles can be difficult to excavate. Some areas of glacial till have a groundwater table near the ground surface, which will require dewatering to excavate below the ground water table. Minnesota DNR water appropriation permits may be required for such dewatering. Excavations in the peat and organic soils will be difficult due to high ground water and low soil strength. These soils do not support heavy equipment, so low ground pressure equipment or crane mats will be needed. The peat/organic soils support construction equipment best when they are frozen. Figure 2.4-7 shows the location of organic soils and areas of high ground water.

3.3.1.1.13B Embankments

The glacial till soils are suitable for construction of railroad embankments. In some locations, the material is very wet and extraordinary measures will be required in order to dry the material and compact it to required density levels. The Itasca County soil survey notes that the material is frost susceptible. Care will be required to minimize damage to facilities due to frost action in the natural till or embankments constructed from till. The organic soil/peat is not suitable as railroad embankment fill.

3.3.1.1.13C Organic Soils

West Range Rail Line Alternative 1B crosses organic soil/peat deposits at the loop along the rail alignment at two locations north and east of Dunning Lake, and one location southeast of Big Diamond Lake. These areas also correspond to the deeper fill areas. It may be possible to construct railroad embankments over the material if the embankments are built up slowly over time and surcharged or if other improvements are made. The determining factor will be the extent of long-term secondary compression of the peat and the impact of that compression on the project feature in question. It may be desirable to excavate peat and muck deposits and replace the material with competent fill prior to construction of the project feature in question. The organic soils are highly compressible and will not support heavy construction equipment. Crane mats and/or low ground pressure equipment will be used in these areas. Construction during the winter months may also alleviate the difficulty of construction within areas of organic soils.

3.3.1.1.13D Topography

Cuts as deep as 125 feet and embankments as high as 25 feet will be constructed to achieve the required grades for the West Range Rail Line Alternative 1B. The total quantity of cut is estimated to be 8,500,000 cubic yards, and the total quantity of fill is estimated to be 2,000,000 cubic yards. Alternative 1B will have a surplus of cut/fill material that will need to be disposed of near the Station Footprint.

3.3.1.1.14 West Range Rail Line Alternative 2

The geology and soil conditions for Alternative 2 were not evaluated. The Proponent determined that this alternative was not feasible due to track curvatures outside the design criteria which resolution would require a large portion of Big Diamond Lake be filled. This determination occurred prior to any investigation of the soils or geology.

3.3.1.1.15 West Range Roads

Excavations as much as 53 feet deep and embankments as high as 56 feet will be performed to achieve the required grades for West Range Access Road 1 and Access Road 2 alignment. Trees and other vegetation will be cleared along the roadway alignment. Vegetation will be re-established after construction. This vegetation will consist of grasses or native herbaceous plants on the embankment slopes and cut slopes in soil where appropriate. Trees should only be planted outside of the clear zone of the roadway and underground utility rights-of-way.

3.3.1.1.15A Excavations

The glacial till soils are suitable for excavations/cut slopes. Zones of boulders and cobbles are sometimes encountered within the glacial till. These boulders and cobbles can be difficult to excavate. Some boulders will require blasting to remove. Some areas of glacial till soils have a groundwater table near the ground surface, which will require dewatering by sumping to excavate below the ground water table. Minnesota DNR water appropriation permits may be required for the dewatering. Excavations in the peat and organic soils will be difficult due to high ground water and low soil strength. These soils do not support heavy equipment, so low ground pressure equipment or crane mats will be needed. The soils that have been disturbed by construction may contain boulders or debris which could make excavation difficult. This debris may be unsuitable for placement in the roadway embankment. Soft or non-compacted zones may be encountered in these areas also. Construction during the winter months may also alleviate the difficulty of construction within areas of peat/organic soils. Figure 2.4.14 shows the location of organic soils and areas of high ground water.

3.3.1.1.15B Embankments

The glacial till soils are suitable for construction of roadway embankments. Boulders and cobbles encountered in the glacial till are not suitable for use in the roadway embankment within 6 feet of the road surface. In some locations, the glacial till is very wet and extraordinary measures will be required in order to dry the material and compact it to required density levels. The Itasca County soil survey notes that the material is frost susceptible. Care will be required in design of project features to minimize damage to facilities due to frost action in the natural till or embankments constructed from till. The soils that have been disturbed by construction equipment may be used as embankment fill, provided that they do not contain organic soils, topsoil, debris, or boulders. The organic soil/peat is not suitable as roadway embankment fill.

3.3.1.1.15C Organic Soils

The roadway alignment crosses organic soil/peat deposits in two locations outside of the plant site. It may be possible to construct roadway embankments over the material if the embankments are built up slowly over time and surcharged or if other improvements are made. The determining factor will be the extent of long-term secondary compression of the peat and the impact of that compression on the project feature in question. It may be desirable to excavate peat and muck deposits and replace the material with competent fill prior to construction of the project feature in question. The organic soils are highly compressible and will not support heavy construction equipment. Crane mats and/or low ground pressure equipment will be used in these areas. Construction during the winter months may also alleviate the difficulty of construction within areas of organic soils.

Access Road 2 leaves the realigned County Road 7 at about elevation 1,425 above msl and descends to the plant site at about elevation 1,400 above ms. The ground surface along the route varies from about elevation 1,420 feet above msl to elevation 1,435 feet above msl. Therefore, the majority of the road will be in a cut section.

The road traverses across Greenwood peat and Nashwauk fine sandy loam (glacial till). The areas constructed through peat will require either removal of the peat or soil improvement in the form of surcharging, staged loading wick drains, embankment reinforcement or a combination of those methods. Depending on the final road cut, it may require that the peat be removed to full depth so that it is not an issue for the road subgrade.

The road cut will extend through the till at boring WR-5 and into coarse alluvium (gravel with silt and sand). The water table in WR-5 was at elevation 1,415 feet above msl, which means that the road cut may extend vertically through the water table in the area. It will be necessary to install subsurface drains to keep the road subgrade dry. By the time the entrance road reaches WR-8 it may be in a rock cut. Boring WR-8 was obstructed twice at about elevation 1,425 above msl and it is likely that the top of bedrock exists at that elevation.

3.3.1.1.16 Prime and Statewide Important Farmland

The following sections describe the impacts to prime farmland and farmland of statewide importance within the West Range IGCC Power Station Footprint, Buffer Land, and Additional Lands. The list of "Prime and other Important Farmlands" in Itasca County, Minnesota (NRCS, 2006) and the Soil Survey of Itasca County, Minnesota (USDA, 1987) provided the soil series, family, and phase descriptions of all areas noted as prime or statewide important farmland.

The U.S. Department of Agriculture tracks conversions of prime or statewide important soils to other uses through their Natural Resources Conservation Service ("NRCS"). Impacts or direct conversions of prime or statewide important farmland will require completion of a Farmland Conversion Impact Rating (Form AD-1006) to be completed by the NRCS in Itasca County, Minnesota through their review of the Environmental Impact Statement prepared for this project during the NEPA review process.

3.3.1.1.16A West Range IGCC Power Station Footprint and Buffer Land

Within the West Range Site ownership boundary, there are two soil types that have been designated as prime farmland – Keewatin silt loam (619) and Nashwauk fine sandy loam (622B). There are 211.51 acres of Keewatin silt loam and 1,063.67 acres of Nashwauk fine sandy loam present within the site ownership boundary, as shown in Figure 2.4-9. Keewatin silt loam is listed as prime farmland if drained and all areas of Nashwauk fine sandy loam are designated as prime farmland. There are no areas that have been designated as farmland of statewide importance.

Of the 1,275.18 acres of prime farmland within the boundary of the West Range Site, impacts to these soil resources will be limited to the footprint of the IGCC Power Station and the utility and transportation corridors that are within the West Range Site boundary. All impacts to prime or

statewide important farmland in the utility and transportation corridors that are outside of the West Range Site ownership boundary are discussed in the following sections.

Within the footprint of the IGCC Power Station, there are 136.83 acres of prime farmland and areas designated as prime farmland if drained that will be impacted due to construction of the facility. Table 3.3-1 below summarizes the impacts on prime farmland within the West Range IGCC Power Station Footprint and Buffer Land.

Table 3.3-1
Prime and Statewide Important Farmland Impacts – West Range IGCC Power Station Footprint and Buffer Land.

Soil Map Unit[1]	Soil Series[1]	Prime Farmland	Statewide Important	Estimated Acres of Impact
619	Keewatin silt loam	Yes, if drained	N/A	20.73
622B	Nashwauk fine sandy loam, 1-10% Slopes	Yes	N/A	116.10
Total				**136.83 acres**

[1] Soil Map Unit/Soil Series given are from the Soil Survey of Itasca County, Minnesota (USDA, 1987).

3.3.1.1.16B West Range HVTL Alternative 1

The alignment for the HVTL Alternative 1 describes permanent impacts as areas where overhead utility poles will be placed within prime or statewide important farmland (the fact that the land will be cleared does not change the status of the land's classification as prime or statewide important farmland). The estimated acreages of prime or statewide important farmland to be converted to permanent ROW for the maintained utility corridor are also provided.

There is a total of 94.89 acres of prime or statewide important farmland that is within the area to be dedicated as permanent ROW for HVTL Alternative 1, as shown in Table 3.3-2 This includes 83.3 acres of prime farmland, 7.57 acres of prime farmland if drained, and 4.02 acres of farmland of statewide importance.

For the West Range HVTL Alternative 1, direct impacts by placement of HVTL poles within those areas designated as prime farmland include 0.025 acres (1129.09 ft^2) of prime farmland, 0.003 acres (84.68 ft^2) of prime farmland if drained, and 0.001 acres (56.46 ft^2) of farmland of statewide importance. Table 3.3-2 below summarizes the impacts and/or conversions on prime farmlands and farmlands of statewide importance for West Range HVTL Alternative 1.

Table 3.3-2
Prime and Statewide Important Farmland – West Range HVTL Alternative 1

Soil Map Unit[1]	Soil Series[1]	Prime Farmland	Statewide Important	Estimated Acres of Impact/Conversion	
				Pole Impacts (sq ft)	Permanent ROW to be maintained
240B	Warba fine sandy loam, 1-8% slopes	Yes	N/A	0.003 (141.14)	6.31
618B	Itasca silt loam, 1-10% slopes	Yes	N/A	0.001 (28.23)	2.33
619	Keewatin silt loam	Yes, if Drained	N/A	0.002 (56.45)	5.15
622B	Nashwauk fine sandy loam, 1-10% slopes	Yes	N/A	0.021 (875.05)	74.66
628	Talmoon silt loam	Yes, if Drained	N/A	0.001 (28.23)	2.42
870C	Itasca-Goodland silt loams, 2-12% slopes	No	Yes	0.001 (56.46)	4.02
Total				**0.029 acres 1185.55 sq ft**	**94.89 acres**

[1] Soil Map Unit/Soil Series given are from the Soil Survey of Itasca County, Minnesota (USDA, 1987).

3.3.1.1.16C West Range HVTL Alternative 1A

The alignment for the HVTL Alternative 1A describes permanent impacts as areas where overhead utility poles will be placed within prime or statewide important farmland (the fact that the land will be cleared does not change the status of the land's classification as prime or statewide important farmland). The estimated acreages of prime or statewide important farmland to be converted to permanent ROW for the maintained utility corridor are also provided.

There is a total of 76.61 acres of prime or statewide important farmland that is within the area to be dedicated as permanent ROW for HVTL Alternative 1A, as shown in Table 3.3-3. This includes 73.81 acres of prime farmland, 0.15 acres of prime farmland if drained, and 2.86 acres of farmland of statewide importance.

For the West Range HVTL Alternative 1A, direct impacts by placement of HVTL poles within those areas designated as prime farmland include 0.023 acres (955.90 ft^2) of prime farmland, 0.001 acres (28.23 ft^2) of prime farmland if drained, and 0.001 acres (28.23 ft^2) of farmland of statewide importance. Table 3.3-3 below summarizes the impacts and/or conversions on prime farmlands and farmlands of statewide importance for West Range HVTL Alternative 1A.

Table 3.3-3
Prime and Statewide Important Farmland – West Range HVTL Alternative 1A

Soil Map Unit[1]	Soil Series[1]	Prime Farmland	Statewide Important	Estimated Acres of Impact/Conversion	
				Pole Impacts (sq ft)	Permanent ROW to be maintained
240B	Warba fine sandy loam, 1-8% slopes	Yes	No	0.004 (165.54)	8.51
268B	Cromwell fine sandy loam, 1-10% slopes	No	Yes	0.001 (28.23)	2.86
618B	Itasca silt loam, 1-10% slopes	Yes	No	0.006 (254.05)	18.55
622B	Nashwauk fine sandy loam, 1-10% slopes	Yes	No	0.013 (536.32)	46.60
628	Talmoon silt loam	Yes, if drained	No	0.001 (28.23)	0.15
Total				**0.025 acres 1012.36 sq ft**	**76.67 acres**

[1] Soil Map Unit/Soil Series given are from the Soil Survey of Itasca County, Minnesota (USDA, 1987).

3.3.1.1.16D West Range Plan B Phase II Alternate Route WRB-2A

The alignment for the Plan B Phase II Alternate Route WRB-2A describes the permanent impacts as areas where overhead utility poles will be placed within prime or statewide important farmland (the fact that the land will be cleared does not change the status of the land's classification as prime or statewide important farmland). The estimated acreages of prime or statewide important farmland to be converted to permanent ROW for the maintained utility corridor are also provided.

There are a total of 262.40 acres of prime or statewide important farmland that are within the area to be dedicated as permanent ROW for Plan B Phase II Alternate Route WRB-2A, as shown in Table 3.3-4. This includes 184.67 acres of prime farmland, 57.37 acres of prime farmland if drained, and 20.36 acres of farmland of statewide importance.

For the West Range Plan B Phase II Alternate Route WRB-2A, direct impacts by placement of HVTL poles within those areas designated as prime farmland include 0.033 acres (1480.99 ft^2) of prime farmland, 0.012 acres (497.91 ft^2) of prime farmland if drained, and 0.004 acres (169.31 ft^2) of farmland of statewide importance. Table 3.3-4 below summarizes the impacts and/or conversions on prime farmlands and farmlands of statewide importance for West Range Plan B Phase II Alternate Route WRB-2A.

Table 3.3-4
Prime and Statewide Important Farmland –
West Range Plan B Phase II Alternate Route WRB-2A

Soil Map Unit[1]	Soil Series[1]	Prime Farmland	Statewide Important	Estimated Acres of Impact/Conversion	
				Pole Impacts (sq ft)	Permanent ROW to be maintained
240B	Warba fine sandy loam, 1-8% slopes	Yes	No	0.001 (56.44)	5.14
243	Stuntz very fine sandy loam	Yes, if drained	No	No Impact	1.39
268B	Cromwell fine sandy loam, 1-10% slopes	No	Yes	0.004 (169.31)	20.36
617B	Goodland silt loam, 1-10% slopes	Yes	No	0.001 (28.22)	2.84
618B	Itasca silt loam, 1-10% slopes	Yes	No	0.008 (366.85)	40.61
619	Keewatin silt loam	Yes, if drained	No	0.007 (282.19)	32.27
621	Morph very fine sandy loam	Yes, if drained	No	0.004 (187.50)	19.33
622B	Nashwauk fine sandy loam, 1-10% slopes	Yes	No	0.023 (1029.48)	136.08
72	Shooker very fine sandy loam	Yes, if drained	No	0.001 (28.22)	4.38
Total				**0.049 acres 2148.21 sq ft**	**262.40 acres**

[1] Soil Map Unit/Soil Series given are from the Soil Survey of Itasca County, Minnesota (USDA, 1987).

3.3.1.1.16E West Range Natural Gas Pipeline Alternative 1

The West Range natural gas pipelines require a temporary ROW to be impacted only during construction. After construction is complete, this area will be restored to pre-construction conditions. Permanent impacts to prime farmland and farmlands of statewide importance will be limited to those areas of the permanent ROW.

The temporary ROW for the West Range Natural Gas Pipeline Alternative 1 will temporarily impact 93.16 acres of prime farmland, 18.76 acres designated as prime farmland if drained, and 4.5 acres of farmland of statewide importance. For the permanent ROW in the West Range Natural Gas Pipeline Alternative 1, permanent impacts will be reduced to 78.33 acres of prime farmland, 13.15 acres of prime farmland if drained, and 3.15 acres of farmland of statewide importance, which are summarized in Table 3.3-5.

Table 3.3-5
Prime and Statewide Important Farmland – Natural Gas Pipeline Alternative 1

Soil Map Unit[1]	Soil Series[1]	Prime Farmland	Statewide Important	Estimated Acres of Impact	
				Temporary ROW	Permanent ROW
158B	Zimmerman loamy fine sand, 1-8% slopes	No	Yes	0.95	0.66
240B	Warba fine sandy loam, 1-8% slopes	Yes	No	33.26	23.33
243	Stuntz very fine sandy loam	Yes, if drained	No	14.40	10.02
618B	Itasca silt loam, 1-10% slopes	Yes	No	1.59	1.11
619	Keewatin silt loam	Yes, if drained	No	4.36	3.13
620B	Cutaway loamy sand, 0-8% slopes	No	Yes	3.55	2.49
622B	Nashwauk fine sandy loam, 1-10% slopes	Yes	No	58.31	40.74
Total				**116.42 acres**	**81.48 acres**

[1] Soil Map Unit/Soil Series given are from the Soil Survey of Itasca County, Minnesota (USDA, 1987).

3.3.1.1.16F West Range Natural Gas Pipeline Alternative 2

The West Range natural gas pipelines require a temporary ROW to be impacted only during construction. After construction is complete, this area will be restored to pre-construction conditions. Permanent impacts to prime farmland and farmlands of statewide importance will be limited to those areas of the permanent ROW.

The temporary ROW for the West Range Natural Gas Pipeline Alternative 2 will temporarily impact 85.85 acres of prime farmland, 22.01 acres designated as prime farmland if drained, and 14.7 acres of farmland of statewide importance. For the permanent ROW in the West Range Natural Gas Pipeline Alternative 2, permanent impacts will be reduced to 60.07 acres of prime farmland, 15.46 acres of prime farmland if drained, and 10.23 acres of farmland of statewide importance, which are summarized in Table 3.3-6.

Table 3.3-6
Prime and Statewide Important Farmland – Natural Gas Pipeline Alternative 2

Soil Map Unit[1]	Soil Series[1]	Prime Farmland	Statewide Important	Estimated Acres of Impact	
				Temporary ROW	Permanent ROW
147	Spooner silt loam	Yes, if drained	No	4.64	3.25

Soil Map Unit[1]	Soil Series[1]	Prime Farmland	Statewide Important	Estimated Acres of Impact	
				Temporary ROW	Permanent ROW
167B	Baudette silt loam, 0-5% slopes	Yes	No	2.51	1.75
240B	Warba fine sandy loam, 1-8% slopes	Yes	No	16.23	11.42
243	Stuntz very fine sandy loam	Yes, if drained	No	3.14	2.14
618B	Itasca silt loam, 1-10% slopes	Yes	No	6.35	4.45
619	Keewatin silt loam	Yes, if drained	No	4.36	3.13
620B	Cutaway loamy sand, 0-8% slopes	No	Yes	2.52	1.79
621	Morph very fine sandy loam	Yes, if drained	No	3.62	2.53
622B	Nashwauk fine sandy loam, 1-10% slopes	Yes	No	58.34	40.76
624B	Rosy very fine sandy loam, 0-6% slopes	Yes	No	2.42	1.69
628	Talmoon silt loam	Yes, if drained	No	4.26	3.02
72	Shooker very fine sandy loam	Yes, if drained	No	1.99	1.39
870C	Itasca-Goodland silt loams, 2-12% slopes	No	Yes	12.18	8.44
Total				**122.56 acres**	**85.76 acres**

[1] Soil Map Unit/Soil Series given are from the Soil Survey of Itasca County (USDA, 1987).

3.3.1.1.16G West Range Natural Gas Pipeline Alternative 3

The West Range natural gas pipelines require a temporary ROW to be impacted only during construction. After construction is complete, this area will be restored to pre-construction conditions. Permanent impacts to prime farmland and farmlands of statewide importance will be limited to those areas of the permanent ROW.

The temporary ROW for the West Range Natural Gas Pipeline Alternative 3 will temporarily impact 72.07 acres of prime farmland, 7.43 acres designated as prime farmland if drained, and 15.09 acres of farmland of statewide importance. For the permanent ROW in the West Range Natural Gas Pipeline Alternative 3, permanent impacts will be reduced to 54.24 acres of prime farmland, 5.2 acres of prime farmland if drained, and 10.59 acres of farmland of statewide importance, which are summarized in Table 3.3-7.

Table 3.3-7
Prime and Statewide Important Farmland – Natural Gas Pipeline Alternative 3

Soil Map Unit[1]	Soil Series[1]	Prime Farmland	Statewide Important	Estimated Acres of Impact	
				Temporary ROW	Permanent ROW
167B	Baudette silt loam, 0-5% slopes	Yes	No	1.19	0.84
240B	Warba fine sandy loam, 1-8% slopes	Yes	No	35.67	24.84
243	Stuntz very fine sandy loam	Yes, if drained	No	0.67	0.45
617B	Goodland silt loam, 1-10% slopes	Yes	No	10.87	7.55
621	Morph very find sandy loam	Yes, if drained	No	3.90	2.74
622B	Nashwauk fine sandy loam, 1-10% slopes	Yes	No	21.66	15.18
624B	Rosy very fine sandy loam, 0-6% slopes	Yes	No	2.68	1.83
628	Talmoon silt loam	Yes, if Drained	No	2.86	2.01
870C	Itasca-Goodland silt loams, 2-12% slopes	No	Yes	15.09	10.59
Total				**94.59 acres**	**66.03 acres**

[1] Soil Map Unit/Soil Series given are from the Soil Survey of Itasca County, Minnesota (USDA, 1987).

3.3.1.1.16H West Range Process Water Blowdown Pipeline 1

The West Range process water blowdown pipelines require a temporary ROW to be impacted only during construction. After construction is complete, this area will be restored to pre-construction conditions. Impacts to prime farmland and farmlands of statewide importance will be reduced after construction to the width of the permanent ROW.

The temporary ROW for West Range Process Water Blowdown Pipeline 1 will temporarily impact 33.26 acres of prime farmland. There are no designated farmlands of statewide importance that will be impacted by West Range Process Water Blowdown Pipeline 1. For the permanent ROW in West Range Process Water Blowdown Alternative 1, permanent impacts to prime farmland will be limited to 22.50 acres, as summarized in Table 3.3-8.

Table 3.3-8
Prime and Statewide Important Farmland – West Range Process Water Blowdown Pipeline 1

Soil Map Unit[1]	Soil Series[1]	Prime Farmland	Statewide Important	Estimated Acres of Impact	
				Temporary ROW	Permanent ROW
240B	Warba fine sandy loam, 1-8% slopes	Yes	No	0.61	0.36
622B	Nashwauk fine sandy loam, 1-10% slopes	Yes	No	32.65	22.14
Total				**33.26 acres**	**22.5 acres**

[1] Soil Map Unit/Soil Series given are from the Soil Survey of Itasca County, Minnesota (USDA, 1987).

3.3.1.1.16I West Range Process Water Blowdown Pipeline 2

The West Range process water blowdown pipelines require a temporary ROW to be impacted only during construction. After construction is complete, this area will be restored to pre-construction conditions. Impacts to prime farmland and farmlands of statewide importance will be reduced after construction to the width of the permanent ROW.

The temporary ROW for West Range Process Water Blowdown Pipeline 2 will temporarily impact 24.46 acres of prime farmland and 0.98 acres designated as prime farmland if drained. There are no designated farmlands of statewide importance that will be impacted by West Range Process Water Blowdown Pipeline 2. For the permanent ROW in the West Range Process Water Blowdown Pipeline 2, permanent impacts will be limited to 16.11 acres of prime farmland and 0.59 acres designated as prime farmland if drained, as summarized in Table 3.3-9.

Table 3.3-9
Prime and Statewide Important Farmland – West Range Process Water Blowdown Pipeline 2

Soil Map Unit[1]	Soil Series[1]	Prime Farmland	Statewide Important	Estimated Acres of Impact	
				Temporary ROW	Permanent ROW
619	Keewatin silt loam	Yes, if drained	No	0.98	0.59
622B	Nashwauk fine sandy loam, 1-10% slopes	Yes	No	24.46	16.11
Total				**25.44 acres**	**16.7 acres**

[1] Soil Map Unit/Soil Series given are from the Soil Survey of Itasca County, Minnesota (USDA, 1987).

3.3.1.1.16J West Range Process Water Supply Pipeline

3.3.1.1.16J(1) Segment 1 – Lind Pit to Canisteo Pit

The West Range Process Water Supply Pipelines require a temporary ROW to be impacted only during construction. After construction is complete, this area will be restored to pre-construction conditions. Impacts to prime farmland and farmlands of statewide importance will be reduced after construction to the width of the permanent ROW.

The temporary ROW for the West Range Process Water Supply Pipeline Segment 1 will temporarily impact 4.01 acres of prime farmland. There are no designated farmlands of statewide importance that will be impacted by the West Range Process Water Supply Pipeline Segment 1. For the permanent ROW associated with West Range Process Water Supply Pipeline Segment 1, permanent impacts to prime farmland will be limited to 2.97 acres, as summarized in Table 3.3-10.

Table 3.3-10
Prime and Statewide Important Farmland – Process Water Supply Pipeline Segment 1 – Lind Pit to Canisteo Pit

Soil Map Unit[1]	Soil Series[1]	Prime Farmland	Statewide Important	Estimated Acres of Impact	
				Temporary ROW	Permanent ROW
240B	Warba fine sandy loam, 1-8% slopes	Yes	No	4.01	2.97
Total				**4.01 acres**	**2.97 acres**

[1] Soil Map Unit/Soil Series given are from the Soil Survey of Itasca County, Minnesota (USDA, 1987).

3.3.1.1.16J(2) Segment 2 – Canisteo Pit to West Range Site

The West Range Process Water Supply Pipelines require a temporary ROW to be impacted only during construction. After construction is complete, this area will be restored to pre-construction conditions. Impacts to prime farmland and farmlands of statewide importance will be reduced after construction to the width of the permanent ROW.

The temporary ROW for the West Range Process Water Supply Pipeline Segment 2 will temporarily impact 28.31 acres of prime farmland. There are no designated farmlands of statewide importance that will be impacted by the West Range Process Water Supply Pipeline Segment 2. For the permanent ROW associated with West Range Process Water Supply Pipeline Segment 2, permanent impacts to prime farmland will be limited to 18.79 acres, as summarized in Table 3.3-11.

Table 3.3-11
Prime and Statewide Important Farmland – West Range Process Water Supply Pipeline Segment 2 – Canisteo Pit to West Range Site

Soil Map Unit[1]	Soil Series[1]	Prime Farmland	Statewide Important	Estimated Acres of Impact	
				Temporary ROW	Permanent ROW
622B	Nashwauk fine sandy loam, 1-10% slopes	Yes	No	28.31	18.79
Total				**28.31 acres**	**18.79 acres**

[1] Soil Map Unit/Soil Series given are from the Soil Survey of Itasca County, Minnesota (USDA, 1987).

3.3.1.1.16J(3) Segment 3 – Gross-Marble Pit to Canisteo Pit

The West Range Process Water Supply Pipelines require a temporary ROW to be impacted only during construction. After construction is complete, this area will be restored to pre-construction conditions. Impacts to prime farmland and farmlands of statewide importance will be reduced after construction to the width of the permanent ROW.

The temporary ROW for the West Range Process Water Supply Pipeline 3 will temporarily impact 51.80 acres of prime farmland and 0.63 acres designated as prime farmland if drained.

There are no designated farmlands of statewide importance that will be impacted by the West Range Process Water Supply Pipeline Segment 3. For the permanent ROW associated with West Range Process Water Supply Pipeline Segment 3, permanent impacts will be limited to 34.58 acres of prime farmland and 0.41 acres designated as prime farmland if drained, as summarized in Table 3.3-12.

Table 3.3-12
Prime and Statewide Important Farmland – West Range Process Water Supply Pipeline Segment 3 – Gross-Marble Pit to Canisteo Pit

Soil Map Unit[1]	Soil Series[1]	Prime Farmland	Statewide Important	Estimated Acres of Impact	
				Temporary ROW	Permanent ROW
619	Keewatin silt loam	Yes, if drained	No	0.63	0.41
622B	Nashwauk fine sandy loam, 1-10% slopes	Yes	No	51.80	34.58
Total				**52.43 acres**	**34.99 acres**

[1] Soil Map Unit/Soil Series given are from the Soil Survey of Itasca County, Minnesota (USDA, 1987).

3.3.1.1.16K West Range Railroad Alternative 1A and Center Loop

Impacts to prime farmland and farmland of statewide importance for the railroad alternatives are based on the actual construction limits and the permanent impacts for placement of the railroad. The railroad alternatives are the only corridors that have actual construction limits established, whereas all other corridors (except HVTL) have a modeled temporary ROW used to estimate temporary impacts due to construction.

The temporary impacts in the construction limits for the West Range Railroad Alternative 1A will impact 70.11 acres of prime farmland, and an additional 5.54 acres of area designated as prime farmland if drained. There are no designated farmlands of statewide importance that will be impacted by the West Range Railroad Alternative 1A or its center loop.

In the permanent ROW for the West Range Railroad Alternative 1A, impacts to prime farmland will be reduced to 35.99 acres. Permanent impacts to areas designated as prime farmland if drained will be limited 2.29 acres of Keewatin silt loam (619). The center loop of Railroad Alternative 1A will include an additional 5.56 acres of permanent impacts to prime farmland and 22.74 acres of area designated as prime farmland if drained. The total permanent impact on prime farmland for the West Range Railroad Alternative 1A and its associated center loop is 66.58 acres, which are summarized in Table 3.3-13.

Table 3.3-13
Prime and Statewide Important Farmland – West Range Railroad
Alternative 1A and Center Loop

Soil Map Unit[1]	Soil Series[1]	Prime Farmland	Statewide Important	Estimated Acres of Impact	
				Temporary Impacts in Construction Limits	Permanent ROW
619	Keewatin silt loam	Yes, if drained	No	5.54	2.29
622B	Nashwauk fine sandy loam, 1-10% slopes	Yes	No	70.11	35.99
			Subtotal	**75.65 acres**	**38.28 acres**
Center Loop					
619	Keewatin silt loam	Yes, if drained	No	N/A	22.74
622B	Nashwauk fine sandy loam, 1-10% slopes	Yes	No	N/A	5.56
			Total	**75.65 acres**	**66.58 acres**

[1] Soil Map Unit/Soil Series given are from the Soil Survey of Itasca County, Minnesota (USDA, 1987).

3.3.1.1.16L West Range Railroad Alternative 1B and Center Loop

Impacts to prime farmland and farmland of statewide importance for the railroad alternatives are based on the actual construction limits and the permanent impacts for placement of the railroad. The railroad alternatives are the only corridors that have actual construction limits established, whereas all other corridors (except HVTL) have a modeled temporary ROW used to estimate temporary impacts due to construction.

The temporary impacts in the construction limits for the West Range Railroad Alternative 1B will impact 93.00 acres of prime farmland, and an additional 5.75 acres of area designated as prime farmland if drained. There are no designated farmlands of statewide importance that will be impacted by the West Range Railroad Alternative 1B or its center loop.

In the permanent ROW for the West Range Railroad Alternative 1B, impacts to prime farmland will be reduced to 40.01 acres. Permanent impacts to areas designated as prime farmland if drained will be limited 4.00 acres. The center loop of Railroad Alternative 1B will include an additional 21.27 acres of permanent impacts to prime farmland and 18.83 acres of area designated as prime farmland if drained. The total permanent impact on prime farmland for the West Range Railroad Alternative 1B and its associated center loop is 84.11 acres, which are summarized in Table 3.3-14.

Table 3.3-14
Prime and Statewide Important Farmland – West Range Railroad
Alternative 1B and Center Loop

Soil Map Unit[1]	Soil Series[1]	Prime Farmland	Statewide Important	Estimated Acres of Impact	
				Temporary Impacts in Construction Limits	Permanent ROW
619	Keewatin silt loam	Yes, if drained	No	5.75	4.00
622B	Nashwauk fine sandy loam, 1-10% slopes	Yes	No	93.00	40.01
			Subtotal	**98.75 acres**	**44.01 acres**
Center Loop					
619	Keewatin silt loam	Yes, if drained	No	N/A	18.83
622B	Nashwauk fine sandy loam, 1-10% slopes	Yes	No	N/A	21.27
			Total	**98.75 acres**	**84.11 acres**

[1] Soil Map Unit/Soil Series given are from the Soil Survey of Itasca County, Minnesota (USDA, 1987).

3.3.1.1.16M West Range Potable Water and Sewer Pipelines

The West Range Potable Water and Sewer Pipelines require a temporary ROW to be impacted only during construction. After construction is complete, this area will be restored to pre-construction conditions. Permanent impacts to prime farmland and farmlands of statewide importance will be limited to the width of the permanent ROW.

The temporary ROW for the West Range water and sewer lines will impact 19.58 acres of Nashwauk fine sandy loam (622B), which is prime farmland in all areas. There are no designated farmlands of statewide importance that will be impacted by the West Range Water and Sewer Lines.

For the permanent ROW associated with West Range Potable Water and Sewer Pipelines, impacts to prime farmland will be reduced to 7.83 acres. Table 3.3-15 below summarizes the impacts West Range water and sewer lines will have on prime farmlands.

Table 3.3-15
Prime and Statewide Important Farmland – West Range Sewer and Water Lines

Soil Map Unit[1]	Soil Series[1]	Prime Farmland	Statewide Important	Estimated Acres of Impact	
				Temporary ROW	Permanent ROW
622B	Nashwauk fine sandy loam, 1-10% slopes	Yes	No	19.58	7.83
Total				**19.58 acres**	**7.83 acres**

[1] Soil Map Unit/Soil Series given are from the Soil Survey of Itasca County, Minnesota (USDA, 1987).

3.3.1.1.16N West Range Roads

The West Range roads require a temporary ROW to be impacted only during construction. After construction is complete, this area will be restored to pre-construction conditions. Permanent impacts to prime farmland and farmlands of statewide importance will be limited to the width of the permanent ROW.

The temporary ROW for the West Range roads will impact 89.75 acres of prime farmland and 0.92 acres of area designated prime farmland if drained. There are no designated farmlands of statewide importance that will be impacted by the West Range roads.

In the permanent ROW for the West Range roads, permanent impacts to prime farmland will be reduced to 54.45 acres. Permanent impacts to areas designated as prime farmland if drained will be reduced to 0.55 acres. Table 3.3-16 below summarizes the impacts West Range roads will have on prime farmlands.

Table 3.3-16
Prime and Statewide Important Farmland – West Range Roads

Soil Map Unit[1]	Soil Series[1]	Prime Farmland	Statewide Important	Estimated Acres of Impact	
				Temporary ROW	Permanent ROW
619	Keewatin silt loam	Yes, if drained	No	0.92	0.55
622B	Nashwauk fine sandy loam, 1-10% slopes	Yes	No	89.75	54.45
Total				**90.67 acres**	**55.00 acres**

[1] Soil Map Unit/Soil Series given are from the Soil Survey of Itasca County, Minnesota (USDA, 1987).

3.3.1.2 East Range

3.3.1.2.1 East Range IGCC Power Station Footprint

The East Range IGCC Power Station Footprint is located on the end moraine of the Culver Association of the Des Moines Lobe, which is described in Section 2.4.6 of this document and shown on the Figure 2.4-8.

3.3.1.2.1A Topsoil

The majority of the East Range IGCC Power Station Footprint is currently covered in forest. After clearing and grubbing, the topsoil will be stockpiled for later use.

3.3.1.2.1B Glacial Till

The glacial till (affiliated with the Culver Association of the Des Moines Lobe) is generally a sandy lean clay or clayey sand. The till will be removed (excavated) where necessary for the facility. These soils are sensitive to changes in moisture content and are difficult to place and compact when they become wet. Wet glacial till is generally unsuitable for founding structures and will require replacement with suitable material beneath foundations. The glacial till also

tends to be frost susceptible. Care will be required in design of project features to minimize damage to facilities and roads due to frost action in the natural till or embankments constructed from till.

The till is also noted to be easily eroded when exposed and difficult to re-vegetate. In order to minimize soil erosion and sediment transport, it will be necessary to use techniques described in the MPCA's Best Management Practices for Dealing with Storm Water Runoff from Urban, Suburban and Developing Areas of Minnesota, dated March 1, 2000. Where soils are replaced as a result of constructing the IGCC Power Station or its Associated Facilities, the material will not again support vegetation until the facilities are demolished and restoration initiated. Development of vegetative cover on the till will require placement of topsoil.

Glacial till is generally suitable for excavation. However, boulders and cobbles are commonly encountered within the glacial till.

In general, the glacial till is suitable for use as structural fill if it is not wet. Glacial till may contain boulders and cobbles. These materials must be screened out of any soils that will be placed as structural fill. Another option is to process (crush to a suitable particle gradation) the boulders and cobbles prior to incorporating them into a structural fill.

3.3.1.2.2 East Range HVTL Alternative 1

Minimal grading is expected along the East Range HVTL Alternative 1 corridor. Extensive clearing of trees and other vegetation will be required. Erosion control practices will be employed during construction. These towers are typically constructed at existing grade and will be supported by a drilled concrete pier foundation that will require an excavation 15 to 55 feet deep and 7 to 12 feet in diameter. Therefore, disturbance of soils is expected to be limited to localized areas around transmission towers and wheel paths for the construction equipment.

Construction methods at the water crossings will vary depending on the particular facility in question. HVTL lines are suspended and will avoid any direct impacts to the water resources. Construction methods have been evaluated to minimize impacts. Guidance published by the U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, Federal Energy Regulatory Commission, and MDNR will be consulted and evaluated once final alignments have been determined. These sources will allow a minimally invasive construction method to be used depending on the type of crossing required.

Areas that are stable and dry can be worked on during summer months, with difficult swampy areas reserved for winter construction. In areas where the frozen ground will not support weight, cribbing or matting is laid on the ground, to spread the weight. Most vehicle traffic will use the ROW for construction, with possible placement of a few access roads to the ROW. Erosion control measures will be implemented to minimize erosion during construction.

Post-construction reclamation activities will 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 will be restored to their original condition to the extent practicable and as negotiated with landowners.

3.3.1.2.2A Glacial Till and Lacustrine Soils

Transmission line towers are typically constructed at existing grade and will be supported on drilled shaft foundations. The glacial till and lacustrine soils are generally suitable for excavations for the drilled shaft foundations. However, casing will be required in areas where the groundwater table is within the depth of the drilled shaft. Boulders and cobbles in the till could impede the excavations for drilled shafts. The glacial outwash is sandy and will require casing to prevent the excavation from caving during construction of drilled shaft foundations. Some types of drilled shaft foundations (caissons) are likely to not be constructible in the peat deposits, and other foundation types may need to be considered (helical piles or driven piles). If bedrock is encountered prior to reaching the required depth for lateral fixity of the caisson, it may be necessary to bore into the bedrock or to install post-tensioned rock anchors through the concrete caisson.

3.3.1.2.2B Peat

Some types of drilled shaft foundations (caissons) are likely to not be constructible in the peat deposits, and other foundation types may need to be considered (helical piles or driven piles). Peat is not suitable for support of transmission tower foundations, so the foundations will need to extend through the peat to suitable bearing soils or bedrock. Peat is highly compressible and does not support heavy construction equipment. Crane mats or low ground pressure equipment will be used. Construction during the winter months may also alleviate the difficulty of construction within areas of peat, and it will minimize impacts to of the soft, compressible, wet soils found in the wetlands. Construction of temporary haul roads may be necessary along the HVTL corridor in the wetland areas to provide access for material delivery and personnel. These haul roads will be completely removed when vegetation is re-established on the ROW. Foundation types and depths need to be further evaluated once a geotechnical investigation has been performed in the utility corridors. Figure 2.8-4 shows the locations of bogs, wetlands, marsh and fens along the proposed corridor, based on the 1996 Manitoba Remote Sensing Database.

3.3.1.2.3 East Range HVTL Alternative 2

Minimal grading is expected along the EAST Range HVTL Alternative 2 corridor. Extensive clearing of trees and other vegetation will be required. Erosion control practices will be employed during construction. These towers are typically constructed at existing grade and will be supported by a drilled concrete pier foundation that will require an excavation 15 to 55 feet deep and 7 to 12 feet in diameter. Therefore, disturbance of soils is expected to be limited to localized areas around transmission towers and wheel paths for the construction equipment.

Construction methods at the water crossings will vary depending on the particular facility in question. HVTL lines are suspended and will avoid any direct impacts to the water resources. Construction methods have been evaluated to minimize impacts. Guidance published by the U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, Federal Energy Regulatory

Commission, and MDNR will be consulted and evaluated once final alignments have been determined. These sources will allow a minimally invasive construction method to be used depending on the type of crossing required.

Areas that are stable and dry can be worked on during summer months, with difficult swampy areas reserved for winter construction. In areas where the frozen ground will not support weight, cribbing or matting will be laid on the ground, to spread the weight. Most vehicle traffic will use the ROW for construction, with possible placement of a few access roads to the ROW. Erosion control measures will be implemented to minimize erosion during construction.

Post-construction reclamation activities will 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 will be restored to their original condition to the extent practicable and as negotiated with landowners.

3.3.1.2.3A Glacial Till and Lacustrine Soils

Transmission line towers are typically constructed at existing grade and will be supported on drilled shaft foundations. The glacial till and lacustrine soils are generally suitable for excavations for the drilled shaft foundations. However, casing will be required in areas where the groundwater table is within the depth of the drilled shaft. Boulders and cobbles in the till could impede the excavations for drilled shafts. The glacial outwash is sandy and will require casing to prevent the excavation from caving during construction of drilled shaft foundations. Some types of drilled shaft foundations (caissons) are likely to not be constructible in the peat deposits, and other foundation types may need to be considered (helical piles or driven piles). If bedrock is encountered prior to reaching the required depth for lateral fixity of the caisson, it may be necessary to bore into the bedrock or to install post-tensioned rock anchors through the concrete caisson.

3.3.1.2.3B Peat

Some types of drilled shaft foundations (caissons) are likely to not be constructible in the peat deposits, and other foundation types may need to be considered (helical piles or driven piles). Peat is not suitable for support of transmission tower foundations, so the foundations will need to extend through the peat to suitable bearing soils or bedrock. Peat is highly compressible and does not support heavy construction equipment. Crane mats or low ground pressure equipment will be used. Construction during the winter months may also alleviate the difficulty of construction within areas of peat, and it will minimize impacts to of the soft, compressible, wet soils found in the wetlands. Construction of temporary haul roads may be necessary along the HVTL corridor in the wetland areas to provide access for material delivery and personnel. These haul roads will be completely removed when vegetation is re-established on the ROW. Foundation types and depths must be further evaluated once a geotechnical investigation has been performed in the utility corridors. Figure 2.8-4 shows the locations of bogs, wetlands, marsh and fens along the proposed corridor, based on the 1996 Manitoba Remote Sensing Database.

3.3.1.2.3C Mine Pits and Dumps

Where the HVTL alignment encounters mine pits, it will most likely be necessary to route the alignment around the pit(s) in question. Where mine dumps are encountered, special foundations will be required to accommodate the variable soil and rock material within the dump. Best management practices will be necessary to control erosion of the loose surficial materials during construction on the mine dump materials.

3.3.1.2.4 East Range Natural Gas Pipeline Alternative 1

Minimal grading is expected along the East Range Natural Gas Pipeline Alternative 1 corridor. The natural gas pipeline will consist of new 16 to 24 inch diameter steel pipe placed alongside the existing CE 10-inch pipeline. Cathodic protection facilities will be provided to prevent corrosion of the pipe, and welds will be coated or wrapped to prevent corrosion. The pipe will be installed in a trench 72 inches deep, with 60 inches of soil cover over the top of the pipe. Grading and cut-and-fill excavation will be performed to minimize effects on natural drainage and slope stability. On steep terrain or in wet areas where the ROW must be graded at two elevations (i.e., two-toning) or where diversion dams must be built to facilitate construction, the areas 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.

Most trenching will probably be performed using a bucket-wheel ditching machine, although some special techniques will be required to protect the existing pipeline. Conventional tracked backhoes will be used where ground conditions are unsuitable for a ditching machine and where a deeper or wider trench is required. Trench dimensions will comply with applicable land use and regulatory requirements. In wet marshy areas, draglines and clamshells will be used to do the ditching. In areas where there is a need to separate top and subsoil, a two-pass trenching process will be used. The first pass will remove topsoil and the second pass will remove subsoil, with soils from each of the excavations being placed in separate banks. This technique will allow for proper restoration of the soil during the backfilling process. Spoil banks will contain gaps to prevent storm runoff water from backing up or flooding.

To insure the pipe is buried at the proper depth, the trench will be drained or pumped dry where practicable, or concrete coated pipe will be set on weights to overcome any buoyant force. Where the pipe crosses highway or road ditches, the trench or boring will be excavated deep enough to provide a minimum of 54 inches of cover over the pipe. All surfaced road crossings will be bored so that traffic flow will not be interrupted.

After the pipe is lowered into the ditch, the trench will be backfilled. The operation must be performed in a manner that will prevent damage to both the pipe and pipe coating from equipment or backfill material. Excess backfill material will be bermed over the ditch centerline to permit natural settling. Where the ditching process is used to separate top and subsoil, backfill will also be installed by placing the subsoil into the trench prior to placement of the topsoil to maintain the soil segregation.

Post-construction reclamation activities will 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 will be restored to their original condition to the extent practicable and as negotiated with landowners.

Construction methods at the water crossings will vary depending on the particular facility in question. Gas, water, and sewer pipelines, will be buried, and have the potential to directly impact aquatic resources. Construction methods have been evaluated to minimize impacts with the primary solution being to directionally drill beneath the aquatic resource. If directional drilling cannot be utilized, an open cut will be used. This method can be timed to coincide with low water levels, and can be done using coffer dams, bypass flumes, diversionary channels, or other short-term methods for undertaking work in a dry channel. Guidance published by the U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, Federal Energy Regulatory Commission, and MDNR will be consulted and evaluated once final alignments have been determined. These sources will allow a minimally invasive construction method to be used depending on the type of crossing required.

If the East Range is selected, the natural gas pipeline for the East Route will be constructed by an interstate pipeline company and will not require a state pipeline routing permit. Details on the route are provided in Section 1.5.3.4. There are 19 crossings of streams and other bodies of water associated with East Range HVTL Alternative 1. Colby Lake (249P) is protected by the MDNR Protected Waters Inventory ("PWI"). There are also 12 rivers and streams that are protected by the MDNR PWI. The crossings will require either directional drilling or an open cut trench to install the gas line. The crossing of protected waters will require a License for Utility Crossings of Public Lands and Waters to be granted by the MDNR Division of Lands and Minerals.

3.3.1.2.4A Peat

Peat is highly compressible and does not support heavy construction equipment. Crane mats or low ground pressure equipment will be used. Construction during the winter months may also alleviate the difficulty of construction within areas of peat, and it will minimize impacts to of the soft, compressible, wet soils found in the wetlands. Construction of temporary haul roads may be necessary along the West Range Natural Gas Pipeline Alternative 1 corridor in the wetland areas to provide access for material delivery and personnel. These haul roads will be completely removed when vegetation is re-established on the ROW. Figure 2.8-4 shows the locations of bogs, wetlands, marsh and fens along the proposed corridor, based on the 1996 Manitoba Remote Sensing Database.

3.3.1.2.4B Trench Excavations

If the natural gas pipeline is installed by open cut trenching, trees and other vegetation will be cleared along the entire corridor and vegetation will be re-established after construction. This vegetation will consist of grasses or wetland plants where appropriate. Trees will not be planted in the natural gas pipeline corridor to allow access for repairs or improvements. The glacial till and lacustrine soils are generally suitable for excavations for pipe construction. However, in

areas where the ground water table is above the invert of the pipe, the pipe may need to be designed for buoyant forces. Trench dewatering may be necessary to construct the pipeline. Boulders and cobbles in the till could impede excavations. The glacial outwash is generally suitable for trench excavation. Trench excavation in the peat will be difficult, since the ground water table is shallow and the soils have low strength. The gas pipe installed in the peat must also be designed for buoyant forces.

3.3.1.2.4C Directional Drilling

Directional drilling may be used to install the pipe in specific situations over limited areas. Examples include where the pipe crosses beneath paved roads, streams, or Colby Lake. Where directional drilling is used to install the pipeline beneath streams or Colby Lake, the drilling operation will begin and end 100 feet from the edge of each bank. Special precautions will need to be taken to prevent the pipe from floating in the areas where the groundwater table is higher than the pipe. If further geotechnical investigation encounters areas where bedrock is at or above the proposed pipe elevation, special directional drilling will be performed in those areas or open trench excavation with blasting will be performed.

3.3.1.2.5 East Range Process Water Supply Pipeline 9N-6

The corridor for East Range Process Water Supply Pipeline 9N-6 is currently covered by mine pits and dumps. These soils are described in Section 2.4.6.2.5, and Figure 2.4-8 shows the Quaternary geology at the Process Water Supply Pipeline 9S-6.

East Range Process Water Supply Pipeline 9N-6 will be on a new corridor shown on Figure 2.4-8. The trench is expected to be 10 feet deep. Trees and other vegetation will be cleared along the water and sewer pipeline corridor. Vegetation and will need to be re-established after construction. Trees will not be planted in the utility corridor to allow for future maintenance or repairs.

3.3.1.2.5A Trench Excavations

Trench excavations in the mine dump areas may be difficult due to the presence of large rock fragments. Rock fragments greater than 3 inches in diameter will need to be screened out of any backfill that is placed around the pipe. Some areas adjacent to abandoned mine pits may have a ground water table close to the ground surface. Construction dewatering will be necessary to excavate the trench in these areas. Minnesota DNR water appropriation permits may be necessary for this dewatering.

3.3.1.2.6 East Range Process Water Supply Pipeline 9S-6

The corridor for East Range Process Water Supply Pipeline 9S-6 is currently covered by mine pits and dumps. The trench is expected to be 10 feet deep. These soils are described in Section 2.4.6.2.6, and Figure 2.4-8 shows the Quaternary geology at the Process Water Supply Pipeline 9S-6.

East Range Process Water Supply Pipeline 9N-6 will be on a new corridor shown on Figure 2.4-8. The trench is expected to be 10 feet deep. Trees and other vegetation will be cleared along

the water and sewer pipeline corridor. Vegetation will be re-established after construction. Trees will not be planted in the utility corridor to allow for future maintenance or repairs.

3.3.1.2.6A Trench Excavations

Trench excavations in the mine dump areas may be difficult due to the presence of large rock fragments. Rock fragments greater than 3 inches in diameter will need to be screened out of any backfill that is placed around the pipe. In areas where excavated material from the mine dump consists primarily of particles 3 inches in diameter or greater, sand backfill may need to be imported as bedding around the pipe.

Some areas adjacent to abandoned mine pits may have a ground water table close to the ground surface. Construction dewatering will be necessary to excavate the trench in these areas. Minnesota DNR water appropriation permits may be necessary for this dewatering.

3.3.1.2.7 East Range Process Water Supply Pipeline 6-S-2WX

The corridor for East Range Process Water Supply Pipeline 6-S-2WX is currently covered by mine pits and dumps, and by the Culver Moraine of the Des Moines Lobe. These soils are described in Section 2.4.6.2.7, and Figure 2.4-8 shows the Quaternary geology at the Process Water Supply Pipeline 6-S-2WX. The trench is expected to be 10 feet deep.

3.3.1.2.7A Topsoil

In portions of the corridor covered by natural glacial till, clearing and grubbing of the existing vegetation will take place. The topsoil will be removed from the construction area and will be stockpiled for later use.

3.3.1.2.7B Glacial Till

The glacial till is generally a sandy lean clay or clayey sand. These soils are sensitive to changes in moisture content and are difficult to place and compact when they become wet. Glacial till is generally suitable for excavation. However, boulders and cobbles are commonly encountered within the glacial till.

The till is noted to be easily eroded when exposed and difficult to re-vegetate. In order to minimize soil erosion and sediment transport, it will be necessary to use techniques described in the MPCA's Best Management Practices for Dealing with Storm Water Runoff from Urban, Suburban and Developing Areas of Minnesota, dated March 1, 2000. Development of vegetative cover on the till will require placement of topsoil.

Glacial till is generally suitable for excavation. However, boulders and cobbles are commonly encountered within the glacial till.

In general, the glacial till is suitable for use as pipe trench backfill if it is not wet. The glacial till may encounter boulders and cobbles. These materials must be screened out of any soils that will be placed around the pipe. Another available option is to process (crush to a suitable particle gradation) the boulders and cobbles prior to incorporating them into pipe trench backfill.

3.3.1.2.7C Mine Pits and Dumps

Trench excavations in the mine dump areas may be difficult due to the presence of large rock fragments. Rock fragments greater than 3 inches in diameter will need to be screened out of any backfill that is placed around the pipe. In areas where excavated material from the mine dump consists primarily of particles 3 inches in diameter or greater, sand backfill may need to be imported as bedding around the pipe.

Some areas adjacent to abandoned mine pits may have a ground water table close to the ground surface. Construction dewatering will be necessary to excavate the trench in these areas. Minnesota DNR water appropriation permits may be necessary for this dewatering.

3.3.1.2.8 East Range Process Water Supply Pipeline K-2WX

The corridor for East Range Process Water Supply Pipeline K-2WX is currently covered by the Culver Moraine of the Des Moines Lobe. These soils are described in Section 2.4.6.2.8, and Figure 2.4-8 shows the Quaternary geology at the Process Water Supply Pipeline K-2WX. The trench is expected to be 10 feet deep.

3.3.1.2.8A Topsoil

In portions of the corridor covered by natural glacial till, clearing and grubbing of the existing vegetation will take place. The topsoil will be removed from the construction area and will be stockpiled for later use.

3.3.1.2.8B Glacial Till

The glacial till is generally a sandy lean clay or clayey sand. These soils are sensitive to changes in moisture content and are difficult to place and compact when they become wet. Glacial till is generally suitable for excavation. However, boulders and cobbles are commonly encountered within the glacial till.

The till is noted to be easily eroded when exposed and difficult to re-vegetate. In order to minimize soil erosion and sediment transport, it will be necessary to use techniques described in the MPCA's Best Management Practices for Dealing with Storm Water Runoff from Urban, Suburban and Developing Areas of Minnesota, dated March 1, 2000. Development of vegetative cover on the till will require placement of topsoil.

Glacial till is generally suitable for excavation. However, boulders and cobbles are commonly encountered within the glacial till.

In general, the glacial till is suitable for use as pipe trench backfill if it is not wet. The glacial till may encounter boulders and cobbles. These materials must be screened out of any soils that will be placed around the pipe. As noted earlier, another available option is to process (crush to a suitable particle gradation) the boulders and cobbles prior to incorporating them into pipe trench backfill.

3.3.1.2.9 East Range Process Water Supply Pipeline Segment 2WX-Site

The corridor for East Range Process Water Supply Pipeline Segment 2WX-Site is currently covered by the Culver Moraine of the Des Moines Lobe. These soils are described in Section 2.4.6.2.9, and Figure 2.4-8 shows the Quaternary geology at the Process Water Supply Pipeline 2WX-Site. The trench is expected to be 10 feet deep.

3.3.1.2.9A Topsoil

In portions of the corridor covered by natural glacial till, clearing and grubbing of the existing vegetation will take place. The topsoil will be removed from the construction area and will be stockpiled for later use.

3.3.1.2.9B Glacial Till

The glacial till is generally a sandy lean clay or clayey sand. These soils are sensitive to changes in moisture content and are difficult to place and compact when they become wet. Glacial till is generally suitable for excavation. However, boulders and cobbles are commonly encountered within the glacial till.

The till is noted to be easily eroded when exposed and difficult to re-vegetate. In order to minimize soil erosion and sediment transport, it will be necessary to use techniques described in the MPCA's Best Management Practices for Dealing with Storm Water Runoff from Urban, Suburban and Developing Areas of Minnesota, dated March 1, 2000. Development of vegetative cover on the till will require placement of topsoil.

Glacial till is generally suitable for excavation. However, boulders and cobbles are commonly encountered within the glacial till.

In general, the glacial till is suitable for use as pipe trench backfill if it is not wet. The glacial till may encounter boulders and cobbles. These materials must be screened out of any soils that will be placed around the pipe. Another option is to process (crush to a suitable particle gradation) the boulders and cobbles prior to incorporating them into pipe trench backfill.

3.3.1.2.10 East Range Process Water Supply Pipeline Segment 2WX-2W

The corridor for East Range Process Water Supply Pipeline Segment 2WX–2W is currently covered by the Culver Moraine of the Des Moines Lobe. These soils are described in Section 2.4.6.2.10, Figure 2.4-8 shows the Quaternary geology at the Process Water Supply Pipeline 2WX–2W. The trench is expected to be 10 feet deep.

3.3.1.2.10A Topsoil

In portions of the corridor covered by natural glacial till, clearing and grubbing of the existing vegetation will take place. The topsoil will be removed from the construction area and will be stockpiled for later use.

3.3.1.2.10B Glacial Till

The glacial till is generally a sandy lean clay or clayey sand. These soils are sensitive to changes in moisture content and are difficult to place and compact when they become wet. Glacial till is generally suitable for excavation. However, boulders and cobbles are commonly encountered within the glacial till.

The till is noted to be easily eroded when exposed and difficult to re-vegetate. In order to minimize soil erosion and sediment transport, it will be necessary to use techniques described in the MPCA's Best Management Practices for Dealing with Storm Water Runoff from Urban, Suburban and Developing Areas of Minnesota, dated March 1, 2000. Development of vegetative cover on the till will require placement of topsoil.

Glacial till is generally suitable for excavation. However, boulders and cobbles are commonly encountered within the glacial till.

In general, the glacial till is suitable for use as pipe trench backfill if it is not wet. The glacial till may encounter boulders and cobbles. These materials must be screened out of any soils that will be placed around the pipe. Another option is to process (crush to a suitable particle gradation) the boulders and cobbles prior to incorporating them into pipe trench backfill.

3.3.1.2.11 East Range Process Water Supply Pipeline Segment 2W-2E

The corridor for East Range Process Water Supply Pipeline Segment 2W-2E is currently covered by mine pits and dumps. These soils are described in Section 2.4.6.2.11, and Figure 2.4-8 shows the Quaternary geology at the Process Water Supply Pipeline 2W-2E. The trench is expected to be 10 feet deep.

3.3.1.2.11A Mine Pits and Dumps

Trench excavations in the mine dump areas may be difficult due to the presence of large rock fragments. Rock fragments greater than 3 inches in diameter will need to be screened out of any backfill that is placed around the pipe. In areas where excavated material from the mine dump consists primarily of particles 3 inches in diameter or greater, sand backfill may need to be imported as bedding around the pipe.

Some areas adjacent to abandoned mine pits may have a ground water table close to the ground surface. Construction dewatering will be necessary to excavate the trench in these areas. Minnesota DNR water appropriation permits may be necessary for this dewatering.

3.3.1.2.12 East Range Process Water Supply Pipeline Segment 3-2E

The corridor for East Range Process Water Supply Pipeline Segment 3-2E is currently covered by mine pits and dumps. These soils are described in Section 2.4.6.2.12, and Figure 2.4-8 shows the Quaternary geology at the Process Water Supply Pipeline 3-2E. The trench is expected to be 10 feet deep.

3.3.1.2.12A Mine Pits and Dumps

Trench excavations in the mine dump areas may be difficult due to the presence of large rock fragments. Rock fragments greater than 3 inches in diameter will need to be screened out of any backfill that is placed around the pipe. In areas where excavated material from the mine dump consists primarily of particles 3 inches in diameter or greater, sand backfill may need to be imported as bedding around the pipe.

Some areas adjacent to abandoned mine pits may have a ground water table close to the ground surface. Construction dewatering will be necessary to excavate the trench in these areas. Minnesota DNR water appropriation permits may be necessary for this dewatering.

3.3.1.2.13 East Range Potable Water and Sewer Pipelines

The potable water pipeline will consist of a 6-inch diameter pipe approximately 11,000 feet from the East Range IGCC Power Station to the 12-inch water main that serves MP. The proposed routing will require a portion of the water main to cross Colby Lake.

To dispose of domestic wastewater produced by the IGCC Power Station, the Station will be connected to the City of Hoyt Lakes' wastewater collection and treatment system. This will require constructing approximately 9,500 feet of 12-inch gravity sewer pipeline, a pump station, and about 2,500 feet of 4-inch force main. The wastewater piping will parallel the existing high voltage power line easement along the west side of the proposed property boundary, south to Colby Lake. A pump station will be located on the north side of Colby Lake. The force main will 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 pipe will have ample capacity to convey the estimated wastewater flow of 30,000 gpd during construction. The existing Hoyt Lakes wastewater treatment facility has capacity available to treat the estimated flow from the proposed project.

The East Range Potable Water and Sewer Pipelines will be in the same corridor, which extends southeast from the IGCC site to Colby Lake Road. This corridor is located on the end moraine of the Culver Association of the Des Moines Lobe, which is described in Section 2.4.6.2.13 of this document and shown on the Figure 2.4.17. As of the writing of this report, the excavation depths required for construction of these utilities has not been determined.

3.3.1.2.13A Topsoil

The majority of the East Range Potable Water and Sewer Pipelines are currently covered in forest. After clearing and grubbing, the topsoil will be stockpiled for later use.

3.3.1.2.13B Glacial Till

The glacial till (affiliated with the Culver Association of the Des Moines Lobe) is generally a sandy lean clay or clayey sand. These soils are sensitive to changes in moisture content and are difficult to place and compact when they become wet. Wet glacial till is generally unsuitable for founding structures and will require replacement with suitable material beneath foundations. The glacial till also tends to be frost susceptible. Care will be required in design of project

features to minimize damage to facilities and roads due to frost action in the natural till or embankments constructed from till.

The till is also noted to be easily eroded when exposed and difficult to re-vegetate. In order to minimize soil erosion and sediment transport, it will be necessary to use techniques described in the MPCA's Best Management Practices for Dealing with Storm Water Runoff from Urban, Suburban and Developing Areas of Minnesota, dated March 1, 2000. Where soils are replaced by plant facilities, the material will not again support vegetation until the facilities are demolished and restoration initiated. Development of vegetative cover on the till will require placement of topsoil.

Glacial till is generally suitable for excavation. However, boulders and cobbles are commonly encountered within the glacial till.

In general, the glacial till is suitable for use as structural fill if it is not wet. The glacial till may encounter boulders and cobbles. These materials must be screened out of any soils that will be placed as structural fill. Another option is to process (crush to a suitable particle gradation) the boulders and cobbles prior to incorporating them into a structural fill.

3.3.1.2.14 East Range Rail Line Alternative 1

The East Rail Line Alternative 1 is shown on Figure 2.4-8. This corridor is located on the end moraine of the Culver Association of the Des Moines Lobe, which is described in Section 2.4.6.2.14. The East Range Site is divided between upland and wetland areas. Most of the southern area is wetland. The railroad loop will impact this wetland area and the most significant rail routing issue of the site is to maintain the rail elevation high enough to minimize wetland impacts, but low enough to achieve acceptable grades. The wetland elevation is about 1,470-1,475 feet msl.

The track will be about 17,800 feet long plus additional plant track for miscellaneous chemicals and products. The track will begin at about elevation 1,455 feet and the coal loop will be at set at about 1,465-1,470 msl. The track is near the base of a waste rock dump that may require special treatment to avoid sloughing onto the rail track. Total cuts required to achieve these grades are estimated to be 2,300,000 cubic yards, and total fills are estimated to be 60,000 cubic yards.

3.3.1.2.14A Topsoil

The majority of the East Rail Line Alternative 1 is currently covered in forest. After clearing and grubbing, the topsoil will be stockpiled for later use.

3.3.1.2.14B Glacial Till

The glacial till (affiliated with the Culver Association of the Des Moines Lobe) is generally a sandy lean clay or clayey sand. These soils are sensitive to changes in moisture content and are difficult to place and compact when they become wet. Wet glacial till is generally unsuitable for founding structures and will require replacement with suitable material beneath foundations. The glacial till also tends to be frost susceptible. Care will be required in design of project

features to minimize damage to facilities and roads due to frost action in the natural till or embankments constructed from till.

The till is also noted to be easily eroded when exposed and difficult to re-vegetate. In order to minimize soil erosion and sediment transport, it will be necessary to use techniques described in the MPCA's Best Management Practices for Dealing with Storm Water Runoff from Urban, Suburban and Developing Areas of Minnesota, dated March 1, 2000. Where soils are replaced by plant facilities, the material will not again support vegetation until the facilities are demolished and restoration initiated. Development of vegetative cover on the till will require placement of topsoil.

Glacial till is generally suitable for excavation. However, boulders and cobbles are commonly encountered within the glacial till.

In general, the glacial till is suitable for use as structural fill if it is not wet. The glacial till may encounter boulders and cobbles. These materials must be screened out of any soils that will be placed as structural fill. Another option is to process (crush to a suitable particle gradation) the boulders and cobbles prior to incorporating them into a structural fill.

3.3.1.2.14C Wetland Construction

East Range Rail Line Alternative 1 will cross wetlands. These areas also correspond to fill areas. It may be possible to construct railroad embankments over the material if the embankments are built up slowly over time and surcharged or if other improvements are made. The determining factor will be the extent of long-term secondary compression of the peat and the impact of that compression on the project feature in question. It may be desirable to excavate peat and muck deposits and replace the material with competent fill prior to construction of the rail line. The organic soils are highly compressible and will not support heavy construction equipment. Crane mats and/or low ground pressure equipment will be used in these areas. Construction during the winter months may also alleviate the difficulty of construction within areas of organic soils.

3.3.1.2.15 East Range Rail Line Alternative 2

The East Rail Line Alternative 2 is shown on Figure 2.4-8. This corridor is located on the end moraine of the Culver Association of the Des Moines Lobe, which is described in Section 2.4.6.2.15. 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 msl, climb to a dumper elevation of about 1,465-1,470 feet msl and continue to climb to the about 1,485 feet msl at the north-south CN track. To maintain a workable grade, this track would have to cross under CR 666, requiring construction of a roadway bridge. Total cuts required to achieve these grades is estimated to be 2,100,000 cubic yards, and required fills are estimated to total 65,000 cubic yards.

3.3.1.2.15A Topsoil

The majority of the East Rail Line Alternative 2 is currently covered in forest. After clearing and grubbing, the topsoil will be stockpiled for later use.

3.3.1.2.15B Glacial Till

The glacial till (affiliated with the Culver Association of the Des Moines Lobe) is generally a sandy lean clay or clayey sand. These soils are sensitive to changes in moisture content and are difficult to place and compact when they become wet. Wet glacial till is generally unsuitable for founding structures and would require replacement with suitable material beneath foundations. The glacial till also tends to be frost susceptible. Care will be required in design of project features to minimize damage to facilities and roads due to frost action in the natural till or embankments constructed from till.

The till is also noted to be easily eroded when exposed and difficult to re-vegetate. In order to minimize soil erosion and sediment transport, it will be necessary to use techniques described in the MPCA's Best Management Practices for Dealing with Storm Water Runoff from Urban, Suburban and Developing Areas of Minnesota, dated March 1, 2000. Where soils are replaced by plant facilities, the material will not again support vegetation until the facilities are demolished and restoration initiated. Development of vegetative cover on the till will require placement of topsoil.

Glacial till is generally suitable for excavation. However, boulders and cobbles are commonly encountered within the glacial till.

In general, the glacial till is suitable for use as structural fill if it is not wet. The glacial till may encounter boulders and cobbles. These materials must be screened out of any soils that will be placed as structural fill. Another option is to process (crush to a suitable particle gradation) the boulders and cobbles prior to incorporating them into a structural fill.

East Range Rail Line Alternative 2 crosses wetland areas. These areas also correspond to fill areas. It may be possible to construct railroad embankments over the material if the embankments are built up slowly over time and surcharged or if other improvements are made. The determining factor will be the extent of long-term secondary compression of the peat and the impact of that compression on the rail line. It may be desirable to excavate peat and muck deposits and replace the material with competent fill prior to construction of the project feature in question. The organic soils are highly compressible and will not support heavy construction equipment. Crane mats and/or low ground pressure equipment will be used in these areas. Construction during the winter months may also alleviate the difficulty of construction within areas of organic soils.

3.3.1.2.16 East Range Roads

The East Range Roads are shown on Figure 2.4-8. These corridors are located on the end moraine of the Culver Association of the Des Moines Lobe, which is described in Section 2.4.6.2.16. As of the writing of this report, the excavation depths and embankment heights required for construction have not been determined.

3.3.1.2.16A Topsoil

The majority of the East Range Roads are currently covered in forest. After clearing and grubbing, the topsoil will be stockpiled for later use.

3.3.1.2.16B Glacial Till

The glacial till (affiliated with the Culver Association of the Des Moines Lobe) is generally a sandy lean clay or clayey sand. These soils are sensitive to changes in moisture content and are difficult to place and compact when they become wet. Wet glacial till is generally unsuitable for founding structures and would require replacement with suitable material beneath foundations. The glacial till also tends to be frost susceptible. Care will be required in design of project features to minimize damage to facilities and roads due to frost action in the natural till or embankments constructed from till.

The till is also noted to be easily eroded when exposed and difficult to re-vegetate. In order to minimize soil erosion and sediment transport, it will be necessary to use techniques described in the MPCA's Best Management Practices for Dealing with Storm Water Runoff from Urban, Suburban and Developing Areas of Minnesota, dated March 1, 2000. Where soils are replaced by plant facilities, the material will not again support vegetation until the facilities are demolished and restoration initiated. Development of vegetative cover on the till will require placement of topsoil.

Glacial till is generally suitable for excavation. However, boulders and cobbles are commonly encountered within the glacial till.

In general, the glacial till is suitable for use as structural fill if it is not wet. The glacial till may encounter boulders and cobbles. These materials must be screened out of any soils that will be placed as structural fill. Another option is to process (crush to a suitable particle gradation) the boulders and cobbles prior to incorporating them into a structural fill.

3.3.2 Bedrock

3.3.2.1 West Range

3.3.2.1.1 IGCC Power Station Footprint

Bedrock will need to be removed for the West Range IGCC Power Station Footprint. Borings WR-5, WR-7, WR-14 and WR-8 may include top of bedrock elevations above the proposed level of the plant site (See Section 2.4.9.1). The material is generally hard competent granite. Blasting will be required to remove most of the bedrock.

3.3.2.1.2 West Range HVTL Alternative 1

The depth of the HVTL tower foundations is not known at this time, since the size/height of the towers has not yet been finally determined. However, since the bedrock topography map shows bedrock at depths of less than 50 feet in portions of the HVTL corridor, some of the tower foundations are expected to bear on or in bedrock. Excavations into the bedrock may require

blasting. In areas where the bedrock is shown to be more than 50 feet below the ground surface, bedrock will not be impacted by excavations for tower foundations.

3.3.2.1.3 West Range HVTL Alternative 1A

The depth of the HVTL tower foundations is not known at this time, since the size/height of the towers has not yet been finally determined. However, since the bedrock topography map shows bedrock at depths of less than 50 feet in portions of the HVTL corridor, some of the tower foundations are expected to bear on or in bedrock. Excavations into the bedrock may require blasting. In areas where the bedrock is shown to be more than 50 feet below the ground surface, bedrock will not be impacted by excavations for tower foundations.

3.3.2.1.4 West Range Plan B Phase II Alternate Route WRB-2A

The depth of the HVTL tower foundations is not known at this time, since the size/height of the towers has not finally been determined. However, since the bedrock topography map shows 2 bedrock outcrops in the HVTL corridor, some of the tower foundations are expected to bear on or in bedrock. Excavations into the bedrock may require blasting. In areas where the bedrock is shown to be more than 50 feet below the ground surface, bedrock will not be impacted by excavations for tower foundations.

3.3.2.1.5 West Range Natural Gas Pipeline Alternative 1

The depth of West Range Natural Gas Pipeline Alternative 1 is expected to be 7 to 8 feet below the ground surface. Excavations for construction of the pipeline may impact bedrock in the shallow bedrock areas shown in red on Figure 2.4-17. Excavations into the bedrock may require blasting. In areas where the bedrock is shown to be more than 20 feet below the ground surface, bedrock will likely not be impacted by excavations for the natural gas pipeline.

3.3.2.1.6 West Range Natural Gas Pipeline Alternative 2

The depth of West Range Natural Gas Pipeline Alternative 1 is expected to be 7 to 8 feet below the ground surface. Excavations for construction of the pipeline may impact bedrock in the shallow bedrock areas shown in red on Figure 2.4-17. Excavations into the bedrock may require blasting. In areas where the bedrock is shown to be more than 20 feet below the ground surface, bedrock will likely not be impacted by excavations for the natural gas pipeline.

3.3.2.1.7 West Range Natural Gas Pipeline Alternative 3

The depth of West Range Natural Gas Pipeline Alternative 1 is expected to be 7 to 8 feet below the ground surface. Excavations for construction of the pipeline may impact bedrock in the shallow bedrock areas shown in red on Figure 2.4-17. One such area of shallow bedrock exists just east of the City of Taconite. Excavations into the bedrock may require blasting. In areas where the bedrock is shown to be more than 20 feet below the ground surface, bedrock will likely not be impacted by excavations for the natural gas pipeline.

3.3.2.1.8 West Range Process Water Supply Pipeline

3.3.2.1.8A Segment 1

The Process Water Supply Pipeline Segment 1will be pressurized and buried at a consistent depth of 7 to 8 feet. In the eastern 1500 feet of Segment 1, the bedrock surface is less than 50 feet below the ground surface. Trench excavations may extend into bedrock in this area. Blasting will be required to complete these excavations in areas where bedrock is encountered. Along the remainder of the Process Water Supply Pipeline Segment 1 east to the, the bedrock is greater than 50 feet below the ground surface. Excavations for the pipeline are not expected to extend into bedrock. The bedrock topography is shown on Figure 2.4-18 (Meyer, Jennings, and Jirsa, 2004).

3.3.2.1.8B Segment 2

In this portion of the water pipeline corridor, various utilities will be in the same trench. The water pipeline will be pressurized and buried at a consistent depth of 7 to 8 feet. Excavations in this area which encounter bedrock may require blasting. The remainder of the corridor, which extends 1600 feet west of Scenic Highway 7 to the CMP, is not expected to be impacted by bedrock.

3.3.2.1.8C Segment 3

The Process Water Supply Pipeline will be pressurized and buried at a consistent depth of 7 to 8 feet. From the CMP to existing Highway 7 and about 1,200 feet north along Highway 7, trench excavations are not expected to extend into bedrock. From that point north to the proposed new Highway 7 alignment and for 3,400 feet east along new Highway 7 alignment, bedrock is noted as being 50 feet or less from the ground surface. Blasting will be required to complete excavations where bedrock is encountered in these areas.

East of this area to the proposed railroad alignment there is a bedrock valley where the bedrock ranges from 50 to 150 feet below the ground surface. Trench excavations for the Process Water Supply Pipeline are not expected to extend into bedrock in this area. East of the bedrock valley, bedrock is less than 50 feet deep for a distance of 5300 feet. The Process Water Supply Pipeline corridor crosses 3 bedrock outcrops in this area, along with a zone where the bedrock surface is less than 20 feet deep. Trench excavations in this area are expected to encounter bedrock, and blasting will be required to excavate in the bedrock. Along the remainder of the Process Water Supply Pipeline extending east to the Gross Marble Mine Pit, the bedrock is greater than 50 feet below the ground surface. Excavations for the pipeline are not expected to extend into bedrock. The bedrock topography is shown on Figure 2.4-13 (Meyer, Jennings, and Jirsa, 2004).

3.3.2.1.9 West Range Process Water Blowdown Pipeline 1

Bedrock along the West Range Process Water Blowdown Pipeline 1 alignment consists of Pokegama Quartzite and the Biwabik Formation. See Section 2.4.9.1for a description of these formations. Bedrock is less than 50 feet below the ground surface throughout the pipeline alignment, and there is a bedrock outcrop 1800 feet north of Highway 169. Figure 2.4-18 shows the depth to contours in this area (Meyer, Jennings, and Jirsa, 2004). Trench excavations will

extend into bedrock in some areas. Blasting will be required to complete these excavations in areas where bedrock is encountered.

3.3.2.1.10 West Range Process Water Blowdown Pipeline 2

Bedrock along the West Range Process Water Blowdown Pipeline 2 alignment consists of Pokegama Quartzite and the Biwabik Formation. See Section 2.4.9.1 for a description of these formations. Bedrock is less than 50 feet below the ground surface throughout the pipeline alignment, as shown in Figure 2.4-18 (Meyer, Jennings, and Jirsa, 2004). Trench excavations will extend into bedrock in some areas. Blasting will be required to complete these excavations in areas where bedrock is encountered.

3.3.2.1.11 West Range Potable Water and Sewer Pipelines

The West Range Potable Water Pipeline will be buried at a constant depth of 7 to 8 feet below the ground surface. The West Range Sewer Pipeline will be buried at depths ranging from 11 to 32.5 feet below existing grade. It should be anticipated that at least some of the trench from the plant site to 3,400 feet south of the proposed Highway 7 (Access Road 1) will extend into bedrock. (Section 2.4.9.1.1 discusses borings performed at the plant site that encountered bedrock at depths as shallow as 7 feet.) These excavations into bedrock may require blasting. From 3,400 feet south of the proposed Highway 7 (Access Road 1) to Taconite, the wastewater pipeline trench is not expected to be impacted by bedrock.

3.3.2.1.12 West Range Rail Line Alternative 1A

A significant bedrock cut will be required for the West Range Rail Line Alternative 1A in the vicinity of Boring WR-3 continuing east to beyond Boring WR-12 and west to beyond Boring WR-6 (See Section 2.4.9.1.12). The bedrock is hard competent granite. Blasting will be required to make the cut for the railroad line from west of Boring WR-6 to east of Boring WR-12.

Cuts of 30 to 78 feet below grade will be needed from the crossing with proposed Highway 7 (Access Road 1) to the southeast end of the rail line. It corresponds with the bedrock outcrops shown on Figure 2.4-18. These excavations into bedrock will likely require blasting or tunneling. Rock bolting and anchors may be required to stabilize some slopes in the bedrock. Where the rail line crosses the bedrock valley just outside of the plant site, excavations are not expected to encounter bedrock.

3.3.2.1.13 West Range Rail Line Alternative 1B

From the West Range IGCC Power Station Footprint to the west end of the curve around Dunning Lake, the bedrock surface is less than 50 feet below the ground surface. However, west of the IGCC Power Station Footprint Rail Line Alternative 1B crosses 2 bedrock outcrops and an area where the bedrock is less than 20 feet below the ground surface. Grading in this area will include cuts on the order of 125 feet and fills on the order of 25 feet.

Where Rail Line Alternative 1B curves around Dunning Lake, it crosses a bedrock valley where the bedrock surface ranges from 50 to 150 feet below the ground surface. Embankments up to 25 feet high will be constructed through this area, so bedrock will not be impacted by construction of the rail line.

From 2000 feet south of the curve around Dunning Lake to the location where Alternative 1B matches up with Alternative 1A, significant bedrock cut will be required. Total cuts in this area are as much as 125 feet, and the bedrock surface is less than 50 feet below existing grade according to Figure 2.4-18 (Meyer, Jennings, and Jirsa, 2004). A bedrock outcrop occurs where Alternative 1B matches into alternative 1A. The bedrock is hard competent granite. Blasting will be required to make the cut for the railroad line in this area.

Where Alternative 1B and 1A meet, south for a distance of 1500 feet, the bedrock is less than 50 feet below existing grade. Further south beyond 1500 feet, the bedrock surface slopes downward to the south and ranges from 50 to 200 feet below the ground surface.

3.3.2.1.14 West Range Rail Line Alternative 2

The geology and soil conditions for West Range Rail Line Alternative 2 were not evaluated. It was determined that this alternative was not feasible because the geometrics required filling a large portion of Big Diamond Lake. This occurred prior to any investigation of the soils or geology for this rail line alternative and it is discussed in more detail in Section 1.12.3 of this report.

3.3.2.1.15 West Range Roads

From the west end of the proposed Highway 7 alignment (Access Road 1) to the east 6000 feet, the bedrock surface is less than 50 feet below existing grade. Excavations of 1 to 53 feet are expected in this area, so some of these excavations will likely encounter bedrock. From 6,000 feet to 8,500 feet east of the west end of the realignment, there is a bedrock valley where the surface of the bedrock is as much as 150 feet below the ground surface. Even though excavations for the roadway will be up to 62 feet deep in this area, they are not expected to encounter bedrock, since the bedrock surface is shown to be deeper than the anticipated excavations. Topographic contours of the bedrock surface are shown in Figure 2.4-18 (Meyer, Jennings, and Jirsa, 2004).

From 8,500 feet to 12,500 feet east of the west end of the realignment, the bedrock surface is less than 50 feet below the ground surface, and the road alignment crosses 3 bedrock outcrops and a zone where bedrock is less than 20 feet deep. However, this portion of the roadway will be largely constructed on embankments (fill), so the bedrock will not be impacted. The exception is at the bedrock outcrop 12,500 feet east of the west end of the realignment, where excavation 10 feet deep will impact bedrock. From 12,500 feet to the proposed Highway 7/Highway 169 intersection, the bedrock surface is more than 50 feet below the ground surface, and the excavations for the roadway will be on foot or less. Therefore, excavations in this area are not expected to be impacted by bedrock. Excavations that encounter bedrock will likely require blasting. Excavation side slopes in bedrock will require pre-splitting. A set-back from the edge

of the roadway to the toe of the cut slope in bedrock will be required to provide an area for falling rock.

3.3.2.2 East Range

The bedrock geology in the immediate vicinity of the IGCC Power Station is shown in Figure 2.4-19. The depth to bedrock for the corridors is shown in Figure 2.4-20.

3.3.2.2.1 IGCC Power Station Footprint

The bedrock at the East Range IGCC Power Station Footprint is the greywacke of the Virginia Formation as described in Section 2.4.8.

Figure 2.4-19 shows the plant site and the corridors for road, rail, sanitary sewer, and potable water. Bedrock is exposed at the extreme southeast corner of the plant site and is 1 to 50 feet below the ground surface throughout most of the plant site. However, there are two areas – one in the center and one in the southwest corner of the plant site where the depth to bedrock is 50 to 100 feet below the ground surface. Beneath the plant building, the bedrock surface slopes downward from northwest to southeast.

Trench excavations will extend into bedrock in some areas. Blasting will be required to complete these excavations in areas where bedrock is encountered.

3.3.2.2.2 East Range HVTL Alternative 1

The depth to bedrock is typically less than 50 feet in the vicinity of the IGCC plant footprint and buffer area and outward within about a mile of the footprint. Outside of that distance, the depth to bedrock gradually increases to 200 feet in a bedrock valley west of Aurora, Minnesota. HVTL Alternative 1 generally follows this bedrock valley to the southwest, where the depth to bedrock is between 50 and 200 feet below the ground surface.

Therefore, within 1 mile of the IGCC plant, excavation into bedrock is expected to be required for some of the structure foundations. Bedrock is not expected to impact HVTL structure foundations in the other areas of the HVTL Alternative 1 corridor.

3.3.2.2.3 East Range HVTL Alternative 2

The depth to bedrock is typically less than 50 feet in the vicinity of the IGCC plant footprint and buffer area and outward within about a mile of the footprint. Outside of that distance, the depth to bedrock gradually increases to 200 feet in a bedrock valley west of Aurora, Minnesota. Heading west from this valley, the depth to bedrock decreases gradually and is within 50 feet of the ground surface due south of Gilbert, Minnesota. From Gilbert, Minnesota to approximately 1 mile west of Eveleth, Minnesota, several areas of exposed bedrock are shown, and the bedrock is generally less than 50 feet below the ground surface. The bedrock surface is more than 50 feet below the ground surface from 1 mile west of Eveleth to the west limits of the bedrock contour map. The HVTL Alternative 2 corridor extends 3.5 miles west of the limits of the bedrock contour map.

Excavation into bedrock is expected to be required for some of the structure foundations within 1 mile of the IGCC plant and from Gilbert, Minnesota to 1 mile west of Eveleth, Minnesota.

3.3.2.2.4 East Range Natural Gas Pipeline Alternative 1

The depth to bedrock is typically less than 50 feet in the vicinity of the IGCC plant footprint and buffer area and outward within about a mile of the footprint. Outside of that distance, the depth to bedrock gradually increases to 200 feet in a bedrock valley west of Aurora, Minnesota. The Natural Gas Pipeline Alternative 1 corridor follows the west slope of this bedrock valley to the southwest, where the depth to bedrock ranges from 50 to 150 feet below the ground surface. South of Eveleth, Minnesota, the corridor turns west, and the depth to bedrock ranges from 50 to 150 feet below the ground surface. The western 1 mile of the natural gas pipeline corridor is beyond the west limits of the bedrock contour map.

Therefore, within 1 mile of the IGCC plant, excavation into bedrock is expected to be required for construction of the Alternative 1 natural gas pipeline. Bedrock is not expected to impact the natural gas pipeline construction in the other areas of the corridor.

3.3.2.2.5 East Range Process Water Supply Pipeline 9N-6

Along the eastern 1200 feet of the pipeline and at the extreme west end of the pipeline, the bedrock surface is exposed at the ground surface. Along the remainder of the pipeline, the bedrock surface is less than 50 feet below the ground surface.

The Process Water Supply Pipeline 9N-6 is expected to be pressurized and buried in a trench 10 feet deep. Trench excavations will extend into bedrock in a large portion of the pipeline corridor. Blasting will be required to complete these excavations in areas where bedrock is encountered.

3.3.2.2.6 East Range Process Water Supply Pipeline 9S-6

Bedrock at the East Range Process Water Supply Pipeline 9S-6 consists of the Biwabik Formation described in Section 2.4.7. The bedrock types are shown in Figure 2.4-19. Figure 2.4-20 shows contours of depth to the bedrock surface. The bedrock surface ranges from 51 to 100 feet below the ground surface along the middle 1500 feet of the pipeline. Along the western 600 feet of the pipeline and at the extreme east end of the pipeline, the bedrock surface is less than 50 feet below the ground surface.

The Process Water Supply Pipeline 9S-6 is expected to be pressurized and buried in a trench 10 feet deep. Trench excavations may extend into bedrock at the western and eastern ends of the corridor. The depth of excavation along the middle 1500 feet of the pipeline is expected to be less than the depth to bedrock, so this portion of the pipeline is not expected to impact bedrock.

Blasting will be required to complete these excavations in areas where bedrock is encountered.

3.3.2.2.7 East Range Process Water Supply Pipeline 6-S-2WX

Bedrock at the East Range Process Water Supply Pipeline 6S-2WX consists of the Biwabik Formation described in Section 2.4.7. The bedrock types are shown in Figure 2.4-19.

Figure 2.4-20 shows contours of depth to the bedrock surface. The bedrock surface is less than 50 feet below the ground surface throughout the east-west oriented portion of the pipeline. Along the northern 900 feet of the north-south portion of the pipeline, the bedrock is 51 to 100 feet below the ground surface. Along the remainder of the north-south pipeline, the bedrock surface is less than 50 feet below the ground surface.

The Process Water Supply Pipeline 6-S-2WX is expected to be buried in a trench 10 feet deep. Trench excavations may extend into bedrock at intermittent locations along the east-west pipeline and in the southern portion of the north-south pipeline. The depth of excavation along the northern 900 feet of the north-south pipeline is expected to be less than the depth to bedrock and therefore is not expected to impact bedrock.

Blasting will be required to complete these excavations in areas where bedrock is encountered.

3.3.2.2.8 East Range Process Water Supply Pipeline K-2WX

Bedrock at the East Range Process Water Supply Pipeline K-2WX consists of the Biwabik Formation described in Section 2.4.7. The bedrock types are shown in Figure 2.4-19.
Figure 2.4-20 shows contours of depth to the bedrock surface. Along the entire pipeline corridor, the bedrock surface is 51 to 100 feet below the ground surface.

The Process Water Supply Pipeline K-2WX is expected to be buried in a trench 10 feet deep. The depth of excavation along this pipeline is expected to be less than the depth to bedrock, so this pipeline is not expected to impact the bedrock.

3.3.2.2.9 East Range Process Water Supply Pipeline Segment 2WX-Site

Bedrock at the East Range Process Water Supply Pipeline Segment 2WX-Site consists of the Biwabik Formation along the western ½ of the corridor and Virginia formation along the eastern ½ of the corridor. The bedrock types are described in detail in Section 2.4.7. The bedrock types are shown in Figure 2.4-19. Figure 2.4-20 shows contours of depth to the bedrock surface. The bedrock surface is less than 50 feet below the ground surface throughout the entire pipeline corridor.

The Process Water Pipeline 2WX-Site is expected to be buried in a trench 10 feet deep. Trench excavations may extend into bedrock at intermittent locations along the pipeline. Blasting will be required to complete these excavations in areas where bedrock is encountered.

3.3.2.2.10 East Range Process Water Supply Pipeline Segment 2WX-2W

Bedrock at the East Range Process Water Supply Pipeline Segment 2WX-2W consists of the Biwabik Formation described in Section 2.4.7. The bedrock geology is shown in Figure 2.4-19.

Figure 2.4-20 shows contours of depth to the bedrock surface. The bedrock is exposed at the ground surface at the east and west ends of the pipeline corridor, and at one location in the middle of the corridor. Along the remainder of the pipeline corridor, the bedrock surface is less than 50 feet below the ground surface.

The Process Water Supply Pipeline 2WX-Site is expected to be buried in a trench 10 feet deep. Trench excavations in some areas will extend into bedrock along the pipeline. Blasting will be required to complete these excavations in areas where bedrock is encountered.

3.3.2.2.11 East Range Process Water Supply Pipeline Segment 2W-2E

Bedrock at the East Range Process Water Supply Pipeline Segment 2W-2E consists of the Biwabik Formation described in Section 2.4.7. The bedrock geology is shown in Figure 2.4-19.
Figure 2.4-20 shows contours of depth to the bedrock surface. The bedrock is exposed at the ground surface at the east and west ends of the pipeline corridor. Along the remainder of the pipeline corridor, the bedrock surface is less than 50 feet below the ground surface.

The Process Water Supply Pipeline 2W-2E is expected to be buried in a trench 10 feet deep. Trench excavations are expected to extend into bedrock throughout most of this pipeline corridor. Blasting will be required to complete these excavations in areas where bedrock is encountered.

3.3.2.2.12 East Range Process Water Supply Pipeline Segment 3-2E

Bedrock at the East Range Process Water Supply Pipeline Segment 3-2E consists of the Biwabik Formation described in Section 2.4.7. The bedrock geology is shown in Figure 2.4-19.
Figure 2.4-20 shows contours of depth to the bedrock surface. The bedrock is exposed at along the southern 1800 feet of the pipeline corridor and at its northern end. Along the remainder of the pipeline corridor, the bedrock surface is less than 50 feet below the ground surface.

The Process Water Supply Pipeline 3-2E is expected to be buried in a trench 10 feet deep. Trench excavations are expected to extend into bedrock throughout most of this pipeline corridor. Blasting will be required to complete these excavations in areas where bedrock is encountered.

3.3.2.2.13 East Range Potable Water and Sewer Pipelines

The proposed East Range Potable Water and Sewer Pipelines will use the same corridor, which exits the plant site on the west side and follows the existing utility corridor southwest across one set of railroad tracks to Colby Lake. They will be extended beneath Colby Lake to Colby Lake Drive, where they will connect to existing City of Hoyt Lakes water and sanitary mains. Figure 2.4-20 shows that the bedrock surface is 1 to 50 feet below the ground surface in all areas except along Colby Lake Drive, where the depth to bedrock is 51 to 100 feet.

Trench excavations will extend into bedrock in some areas. Blasting will be required to complete these excavations in areas where bedrock is encountered.

3.3.2.2.14 East Range Rail Line Alternative 1

As shown on Figure 2.4-20, the bedrock surface is 1 to 50 feet below the ground surface along the rail corridor to the plant building. The exception is where the corridor extends along the southeast side of the building. The bedrock surface there is 50 to 100 feet below the ground surface in that area.

Excavations may extend into bedrock in some areas. Blasting will be required to complete these excavations in areas where bedrock is encountered.

3.3.2.2.15 East Range Rail Line Alternative 2

As shown in Figure 2.4-20, the bedrock from the west end of the rail corridor to the plant building, the bedrock surface is 1 to 50 feet below the ground surface. Where the corridor extends along the southeast side of the building, the bedrock surface is 50 to 100 feet below the ground surface. From the east corner of the building to the east boundary of the plant site, the bedrock surface is 1 to 50 feet below the ground surface. From the east boundary of the plant site to the east end of the rail corridor, several bedrock outcrops exist, and the bedrock surface is generally shallow.

Excavations may extend into bedrock in some areas. Blasting will be required to complete these excavations in areas where bedrock is encountered.

3.3.2.2.16 East Range Roads

As shown on Figure 2.4-20, the bedrock surface is 1 to 50 feet below the ground surface along this corridor. The exceptions are two isolated areas on the northeast side of the plant building, where the bedrock surface is 51 to 100 feet below the ground surface.

Excavations may extend into bedrock in some areas. Blasting will be required to complete these excavations in areas where bedrock is encountered.

3.3.2.2.17 East Range Prime and Statewide Important Farmland

The U.S. Department of Agriculture tracks conversions of prime or statewide important soils to other uses through their NRCS. Impacts or direct conversions of prime or statewide important farmland will require completion of a Farmland Conversion Impact Rating (Form AD-1006) to be completed by the NRCS in St. Louis County, Minnesota through their review of the Environmental Impact Statement prepared for this project during the NEPA review process. The NRCS in St. Louis County will calculate specific impacts on farmlands of statewide importance with their most up to date available data, which will be used to complete the Farmland Conversion Impact Rating.

Only preliminary soils data exist for portions of St. Louis County, Minnesota because the soil survey is currently in progress. Available data were analyzed qualitatively, and farmland designated as statewide important that occurs within the vicinity of the East Range Site are listed in Table 2.4-2. However, there are no areas designated as prime farmland or farmland of statewide importance within the East Range Site boundary itself.

The associated transportation and utility corridors that will serve the East Range Site have not been evaluated entirely for prime or statewide important farmland because this preliminary data is not available for all corridors in the project area. The entire corridors will be evaluated by the NRCS in St. Louis County, Minnesota with their most current available data through the NEPA review process. The East Range Natural Gas Pipeline Alternative 1 was the only transportation or utility corridor for which an impact to farmland of statewide importance was detected during the qualitative analysis.

3.3.2.2.17A East Range Natural Gas Pipeline

The East Range Natural Gas Pipeline requires a temporary ROW to be impacted only during construction. After construction is complete, this area will be restored to pre-construction conditions. Permanent impacts to farmlands of statewide importance will be limited to those areas of the permanent ROW. The widths of the ROWs will be 70 feet for the permanent ROW and 100 feet for the temporary ROW.

The Natural Gas Pipeline Alternative 1 corridor was analyzed qualitatively in the immediate area surrounding the East Range Site boundary where soil data were available, and one impact area was identified. Natural Gas Pipeline Alternative 1 will impact an area of Cloquet loam (Soil Map Unit F9B) as it has been preliminarily mapped by the NRCS. Although the preliminary mapping data are not rectified for use in GIS, nor do the mapping data include a scale, a rough estimate of approximate scale (1:24,000, 1”= 2,000’) was determined though known widths of road and railroad corridors near the East Range Site. Based on this approximate 1:24,000 scale for the preliminary mapping data, it appears that 0.25 acres of Cloquet loam (farmland of statewide importance) will be impacted within the permanent ROW for Natural Gas Pipeline Alternative 1. However, because this estimate is based on the preliminary mapping data that is not confirmed, the NRCS should determine the actual acreage of this impact to farmland of statewide importance within the East Range project area upon its review of the EIS through the NEPA process.

3.3.3 Mitigation Measures

3.3.3.1 West Range Soils

In order to minimize soil erosion and sediment transport, it will be necessary to use techniques described in the MPCA’s Best Management Practices for Dealing with Storm Water Runoff from Urban, Suburban, and Developing Areas of Minnesota, dated March 1, 2000. Development of vegetative cover on the till and glacial outwash will require replacement of topsoil.

Where soils are replaced by transmission towers, the material will not again support vegetation until the facilities are demolished and restoration initiated.

Blowdown alternative 3 - Development of vegetative cover on the till, glacial outwash, and near the Arcturus Mine Pit will require placement of topsoil.

3.3.3.2 East Range Soils

3.3.3.3 Mitigation of Impacts to Prime or Statewide Important Farmlands

Impacts to prime farmland or farmlands of statewide importance have been considered, and all practical and feasible minimization measures (e.g. alignment shifts) have been incorporated into the design where possible. Impacts to prime or statewide important farmland (or conversions to alternate uses) are recorded by the USDA NRCS through a Farmland Conversion Impact Rating (Form AD-1006). The Farmland Conversion Impact Rating will be completed by the NRCS through review of the Environmental Impact Statement. No mitigation measures are formally defined to reduce impacts to prime or statewide important farmlands; however, recommendations to reduce impacts could be provided by the NRCS through review of the project during the formal review as defined by the NEPA process.

3.4 Water Resources and Water Quality

Section 1.12.4 of this EIV identifies the sources of water to be used in support of Mesaba One and Two on the West Range and East Range sites. In justifying a particular source of water as a resource, the Proponent provided information regarding the sustainable quantity of water available at that source under the specified pumping rates anticipated. The information presented in Section 1.12.4 will not be reiterated here. The following sections outline the impacts of the water withdrawals and the implications of effluent discharges on receiving waters.

3.4.1 Water Appropriation Impacts

The water management plans for the West and East Sites are discussed in Section 1.12.4 and 1.12.5. Competing uses of the Water Resources proposed at each location are discussed in this subsection.

3.4.1.1 West Range

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 in order to keep features of past mining operations from being flooded and thereby interfering with State Park programs, although such water levels have risen to a point of significant concern. No such direct outflow of the CMP has occurred since various mining operations ceased in the mid 1980's, although such water levels have risen to a point of significant concern.

3.4.1.1.1 Water Management Plan Impacts

The following paragraphs weigh the benefits and the negative impacts of the West Range WMP on the affected Water Resources and current receiving waters.

3.4.1.1.1A Canisteo Mine Pit

Benefits of the West Range WMP include controlling water levels in the pit to the benefit of the surrounding communities.

3.4.1.1.1B Hill-Annex Mine Pit

Benefits of the West Range WMP include reducing water levels in the HAMP Complex allowing the State Park to maintain lower, more consistent water levels. The additional pumping required for Mesaba One and Mesaba Two would help prevent flooding of historic structures and provide better public access to and views of the historic mine pit. As pointed out in the DNR management plan for the Hill-Annex State Park, the water level in the pit has inundated several historic structures and negatively impacts views. High water levels destabilize the pit walls and threaten the historic structures around the pit rim. The DNR plan for the State Park is available on line at http://files.dnr.state.mn.us/input/mgmtplans/parks/hillannexmine/plan.pdf

3.4.1.1.1C Holman Lake Benefits

The water management plan for Mesaba One and Mesaba Two calls for cooling tower blowdown to be released to the CMP and Holman Lake. Water previously pumped from the HAMP complex to Upper Panasa Lake would ultimately be diverted to Holman Lake. Increased flows through Holman Lake will be of benefit to recreational users of the Gibbs Park swimming beach as stagnation of the water in the lake will be reduced. The geomorphology of the Swan River is not expected to be significantly affected since the peak rate of water discharged from the IGCC Power Station will be less than that pumped by the Park Service during the seasonal pumping of water from the HAMP complex (see Tables 1.8-17 and 1.12-30 for a comparison of the peak pumping rates) into Upper Panasa Lake (water introduced into this lake goes through Lower Panasa Lake and then into the Swan River at a point 9.8 river miles upstream of Holman Lake).

3.4.1.1.1D Upper and Lower Panasa Lakes

Eliminating the seasonal input of water from Upper and Lower Panasa Lakes could be expected to have negative impacts on algae blooms reported in the lake survey reports for both lakes (DNR, 1998). This competing use will be dealt with in the Water Appropriation Permit Application process by the MDNR in accordance with water allocation priorities established under Minn. Stat. § 103G.261.

3.4.1.1.1E Trout Lake

Siphoning water from the CMP to improve water quality in Trout Lake has been proposed to address rising water levels in the CMP. This competing use will be dealt with in the Water Appropriation Permit Application process by the MDNR in accordance with water allocation priorities established under Minn. Stat. § 103G.261.

3.4.1.1.1F Recreation

Recreational users of the CMP, Hill-Annex State Park, Holman Lake and Upper and Lower Panasa Lakes represent the predominant users of the Water Resources identified for Mesaba One and Mesaba Two, with the competing use of water to Holman Lake versus water to Upper Panasa Lake being the principal question. There are no known current recreational uses of the HAMP Complex or the LMP

As noted in the previous paragraph and in other sections of this ES, 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 IGCC Power Station in accordance with the provisions identified in Sections 1.12.4, 1.12.5, the Water Appropriation Permit Application, and the NPDES Permit Application will assure that the aesthetic and recreational uses are minimally affected.

In instances of prolonged drought, potential recreational uses of the CMP could compete with the water requirements of Mesaba One and Mesaba Two. Specifically, under conditions of extreme drought, Mesaba One and Mesaba Two 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 event would involve i) the absence of any precipitation input into the pit on the order of 5 years in duration and ii) peak power production from Mesaba One and Two over the entire period. These conditions are not likely to occur. For operational, plant security, and safety reasons, Proponent is proposing that the current recreational boat landing on the CMP be removed and that recreational uses of the CP be eliminated.

3.4.1.2 East Range

The East Range IGCC Power Station Footprint and Buffer Land is part of a 61,600 acre tract of land formerly owned by LTV Steel Mining Company. Of this former LTV property, 8,000 acres were used for active mining operations (USEPA, 1994). Outside the Buffer Land, the rest of the LTV Site is located on privately owned lands, Federal lands (Forest Service and Bureau of Land Management), and State lands located in St. Louis, Lake, and Cook Counties of Minnesota. The land around the perimeter of the Buffer Land is predominantly undeveloped multiple use forest land.

On December 29, 2000 LTV filed for Chapter 11 bankruptcy protection, and on February 22, 2001 LTV-SMC officially closed the mine (Business Journal, 2001). Along with MP and Iron Range Resources, Cliffs Erie purchased the LTV assets associated with the Hoyt Lakes operation and entered into a reclamation plan with the State to close the existing mine pits.

Within the 61,600 acre tract of former LTV land, First Creek, Second Creek (Knox Creek), Longnose Creek, Wyman Creek, and Colby Lake are the immediate receiving waters for the mining operations. These creeks are all tributaries of the Partridge River. When the mines were active, the pits were dewatered, and the water pumped from the pits contributed substantially to the levels in these receiving waters.

When the mines shut down, dewatering activities were terminated and the mine pits began to fill. As part of the reclamation plan for the mining operations, the MDNR conducted a hydrologic study which predicted future points in time when mine pits 2WX, 2W, and 2E would begin to overflow. None of the pits has reached that point at this time.

3.4.1.2.1A Impacts on Immediate Receiving Waters

Since no flow has been diverted to the immediate receiving waters since February of 2001, any negative impact associated with elimination of such flows has already occurred. Baseload operation of Mesaba One and Mesaba Two can be expected to keep the East Range Water Resources from overflowing during the Power Station's operational lifetime. This is not expected to compound any negative impact already incurred.

3.4.1.2.1B Recreational Use of Water Resources

The land that is part of the LTV bankruptcy proceeding has been closed to the public. Further, no residential development has occurred on any of the abandoned mine pits. Therefore, no recreational uses will be affected by the construction and operation of Mesaba One and Mesaba Two.

3.4.1.2.1C Wildlife Management Programs

Formerly, LTV had cooperatively participated with the MDNR in wildlife management/enhancement programs on the site to benefit moose, deer, and ruffed grouse. The loss of land associated with construction of Mesaba One and Mesaba Two will reduce a small amount of habitat for these species.

3.4.2 Existing Permits

3.4.2.1 West Range Site

The Minnesota DNR currently holds a Minnesota DNR 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 on-going data collection and cooperative study of the mine pit by the Proponent and the Minnesota DNR will be covered under the existing permits.

3.4.2.2 East Range Site

CE holds numerous permits, among which include permits for discharging water from mine dewatering activities and for appropriating water from Colby Lake (the appropriation from Colby Lake indirectly held in association with MP). MP holds air permits and water appropriation permits for Laskin. Mesabi Nugget holds air and NPDES permits for their new operation within CEs.

3.4.3 New Permits

New permits will contain conditions required to balance competing uses of Water Resources. The principal permits to be issued for such purposes are discussed below. A comprehensive list of permits is provided in Table 1.2-1.

3.4.3.1 West Range Site

Different types of water-related permits will be required to construct and operate the West Range IGCC Power Station and its Associated Facilities. This section identifies the types of permits required and introduces the process required to obtain them. The permits that are issued will be premised on minimizing water-related impacts associated with the construction and operation of Mesaba One and Mesaba Two.

3.4.3.1.1 Minnesota DNR Water Appropriation Permit

A MDNR Water Appropriation Permit for Non-Irrigation (FORM #A-02623-06) is required for appropriations from the CMP, Hill-Annex Mine Pit, Lind Pit and the Prairie River. A separate permit application will 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 MDNR for all Water Appropriations Permits.

3.4.3.1.2 Minnesota DNR Public Waters Work Permit

A Minnesota DNR Public Waters Work Permit (FORM #NA-026620-03B) will be required for temporary and permanent impacts to Public Waters.

The Canisteo Mine Pit and the Hill Annex Mine Pit are Waters of the State, but are not classified by the Minnesota DNR as Public Waters. Since they are not Public Waters, a Minnesota DNR Public Waters Work Permit is not required for work that is done below the Ordinary High Water Level ("OHWL") within these water bodies.

A Minnesota DNR Public Waters Work Permit will be required for work that takes place in any of the identified public waters (See Table 2.5-1). For stream crossings, the Minnesota DNR must review and approve any proposed hydraulic changes to the stream.

The following proposed activities will require coverage under a Minnesota DNR 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 3.6.1.

3.4.3.1.3 MPCA NPDES/SDS Permit for Cooling Tower Blowdown

Process water discharges of cooling tower blowdown are discussed in detail in the NPDES Permit Application and in Sections 1.8.2.2.2 and 1.12.5.2. Potential impacts on water quality criteria resulting from the proposed four process water outfalls are summarized in these sections. 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 will not be problematic. Increased flows through Holman Lake will be of benefit to recreational users of the Gibbs Park swimming beach as stagnation of the water in the lake will be reduced. The geomorphology of the downstream reaches of the Swan River will not be significantly affected since the peak rate of water discharged from the IGCC Power Station will be less than that pumped by the Park Service during the seasonal pumping conducted at Hill-Annex State Park (see Tables 1.8-17 and 1.12-30 in Section 1 for a comparison of the peak pumping rates).

Figure 1.8-9 shows the location of each of the four outfalls receiving process water discharges. The outfalls associated with discharges of stormwater are also shown on this figure.

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

See Section 1.12.4.1.2 for a discussion of rules applicable to Mesaba One and Mesaba Two.

3.4.3.1.5 Industrial Storm Water Permitting

Discharge of storm water associated with industrial activities from the Project area to waters of the United States and the State of Minnesota will be permitted as part of the NPDES/SDS permit described in Section 3.4.3.1.3 above.

3.4.3.1.6 Construction Storm Water Permitting

This permit is required for storm water discharges associated with construction activity. The NPDES Construction Permit requires a Storm Water Pollution Prevention Plan ("SWPPP") to address erosion and sediment control during and after construction. Best management practices ("BMP") will be followed in accordance with the NPDES Permit and MPCA BMP Manual, 2000. Temporary and permanent erosion control features include timely re-vegetation of disturbed areas, silt fence, inlet protection, ditch checks, and sedimentation ponds.

The SWPPP will address erosion prevention measures, sediment control measures, permanent storm water management, dewatering, environmental inspection and maintenance, and final stabilization.

The project will create more than one acre of new impervious surfaces, and therefore a permanent storm water management system is required under the NPDES permit. The permanent storm water 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 the permanent storm water management structures need to be analyzed in order to finally determine potential impacts from increased rates of surface water runoff.

If a 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 will need to incorporate measures to meet the TMDL requirements.

3.4.3.2 East Range Site

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 IGCC Power Station there will be no such discharge (*see* Section 1.12.5.3).

3.4.3.2.1 Minnesota DNR Water Appropriations Permit

A Minnesota DNR Water Appropriations Permit for Non-Irrigation (FORM #A-02623-06) is required for water appropriations from the Water Resources identified in Section 1.12.4.3.1.

A separate permit application will be completed for each water source, but the applications and supporting data will be submitted in one document. The MDNR would issue one permit to the Proponent that covers all of the water sources.

An annual Water Use Report is required by the Minnesota DNR for all Water Appropriation Permits.

3.4.3.2.2 Minnesota DNR Public Waters Work Permit

A Minnesota DNR Public Waters Work Permit (FORM #NA-026620-03B) will be required for temporary and permanent impacts to Public Waters.

A Minnesota DNR Public Waters Work Permit will be required for work that takes place in any of the identified public waters (*see* Table 2.5-2). For stream crossings, the Minnesota DNR must review and approve any proposed hydraulic changes to the stream.

The following proposed activities will require coverage under a Minnesota DNR Public Waters Work Permit:

3.4.3.2.2A East Range HVTL

- Embarrass River (2 crossings)
- Cedar Island Lake
- Norcund River
- Colby Lake
- Whitewater Lake
- Partridge River (2 crossings)
- St. Louis River (3 crossings)
- Two River (2 crossings)

3.4.3.2.2B 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

3.4.3.2.2C East Range Rail Line Alternative 1

- Unnamed Creek

3.4.3.2.2D East Range Rail Line Alternative 2

- Unnamed Creek
- Colby Lake

More detailed discussions of these utility corridors are provided in Section 3.6.2.

3.4.3.2.3 MPCA NPDES/SDS Permit

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

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

See Section 1.12.4.1.2 for a discussion of rules applicable to Mesaba One and Mesaba Two. 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.

3.4.3.2.5 Industrial Storm Water Permitting

Discharge of storm water associated with industrial activities from the Project area to waters of the United States and the State of Minnesota will be permitted as part of the NPDES/SDS permit described in Section 3.4.3.2.3 above.

3.4.3.2.6 Construction Storm Water Permitting

Permitting requirements will mirror those for the West Range Site described in Section 3.4.3.1.6.

3.4.4 Recreational Activities

3.4.4.1 West Range Site

Several historic structures and other mining features within the Hill Annex Mine Pit are currently under water, but could be exposed and available for programs and tours if the pit is dewatered to the levels discussed in the Hill Annex State Park Draft Management Plan.

There is the potential to impact municipal water supply wells within the cities of Marble and Calumet as a result of significantly reducing the water levels in the Hill Annex Mine Pit.

The Proponent is proposing that recreational activities cease in the CMP for operational, security, and safety reasons.

3.4.4.2 East Range Site

Table 3.4-1 is a summary of the surface waters that are used for recreational purposes.

Table 3.4-1.
Recreational Surface Waters*

Surface Water	Public Boat Access	Fishing	Recreational Area (Campground, picnic areas, etc.)
Colby Lake	X	X	
Whitewater Reservoir	X	X	X
St. James Mine	X	X	
Little Mesaba Lake		X	

*Source: Minnesota Department of Natural Resources 'Lake Finder' Website

3.4.5 Surface/Groundwater Resources

3.4.5.1 West Range Site

The project may be dependent upon the City of Taconite public water supply system to provide drinking and potable water for the workers during construction, as well as its workforce when in operation. If this alternative is selected, the water supply will originate from Taconite's two municipal wells open to the Biwabik Formation bedrock aquifer. It will not be necessary for the city to drill additional wells to meet the potable water demand of the facility; the two existing public water supply wells appear to be capable of supplying the quantity and quality of drinking and potable water necessary for the facility. It is estimated that during the construction of the facility, 20,000 gallons per day of potable water will be needed per day (5 million gallons per year). Once the facility is in operation this amount is predicted to drop to 4,000 gallons per day (1.5 million gallons per year). The capacity of the Taconite public water supply wells is sufficient to meet this additional demand.

The cities of Bovey, Calumet, Coleraine, Marble, and Taconite rely on groundwater resources for public water supplies. Each city has public water supply wells open to either the shallow sand and gravel aquifer (Bovey and Coleraine) or the Biwabik Formation bedrock aquifer (Calumet, Coleraine, Marble, and Taconite). Because of the close proximity of these local public water supply wells to surface water bodies, a hydrologic connection may exist between the groundwater captured by the wells and local surface waters. Because of the relatively high tritium concentrations detected by the Minnesota Department of Health in the groundwater pumped from some of these public water supply wells, the source water aquifers (Quaternary sand and gravel deposits and the Biwabik Formation) appear to recharge quickly (50 years or less) and are therefore more sensitive to land surface activities and more vulnerable to potential contamination.

Public water supply systems are required by the Minnesota Department of Health to complete a Wellhead Protection Plan in accordance with MN Rules Chapter 4720. Public water supply systems are also required to have a Source Water Assessment. Source Water Assessments for these communities have been completed, but none of them currently have completed and approved Wellhead Protection Plans.

Private residences and businesses in the vicinity of the proposed facility also rely on wells for drinking water and agricultural, commercial, or industrial use.

3.4.5.2 East Range Site

The project may be dependent upon the City of Hoyt Lakes public water supply system to provide drinking and potable water for the workers during construction, as well as its workforce when in operation. If this alternative is selected, the water supply will originate from Colby Lake which is the surface water source for the City's water treatment plant. It is estimated that during the construction of the facility, 45,000 gallons of potable water will be needed per day (assuming this demand would occur five days a week, the total need would be approximately 12 million gallons per year). Once the facility is in operation this amount is predicted to drop to 7,500 gallons per day (assuming this demand would be 365 days per year, the total need would be approximately 3 million gallons per year). It will not be necessary to increase the capacity of the existing intake structure and water treatment plant to supply the quantity of potable water for the facility. The capacity of the Hoyt Lakes public water supply treatment plant is sufficient to meet this additional demand.

Hoyt Lakes is permitted to use 160 million gallons a year based on its water appropriation permit and is currently using 120 million gallons a year. During construction the total water use would increase to approximately 132 million gallons a year and then drop to 123 million gallons per year during normal operation of the facility. The City has excess intake capacity and can provide the required water during and after construction without the need to modify its existing water permit.

Appropriation of water from Colby Lake would be expected occur principally during times of high water flow, thereby reducing concerns that Mesaba One and Mesaba Two would represent a competing use to the Hoyt Lakes' municipal water supply.

3.4.6 Potable Water Supply

See Section 3.4.5 above for a discussion on impacts to the nearby potable water supply systems.

3.4.7 Stream Diversions, Dredging, and Dumping

Permanent stream diversions, dredging, and/or dumping are not expected.

3.4.8 Aquifers

3.4.8.1 West Range Site

No high-capacity groundwater wells will 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 will not be altered or impacted by operation of the facility. Significant impacts to the local aquifers are not expected from this project. The facility will 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 will be properly managed in accordance with the NPDES permits issued for plant, and applicable state and local regulations to prevent degradation of source water aquifers used for public water supplies.

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 is 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 2.5.2.2), 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 will 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 is pumped out for the facility's process water.

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

3.4.8.2 East Range Site

No wells are currently located on the site. However, numerous wells are located on surrounding properties. A well inventory of Sections 27, 28, 29, 30, 31, 32, 33, and 34 in Township 59 North, Range 14 West and Sections 3, 4, 5, 6, in Township 58 North, Range 14 West was performed using the January 12, 2005 Minnesota Geological Survey-Minnesota Department of Health County Well Index.

3.4.9 Wastewater

3.4.9.1 West Range Site

3.4.9.1.1 Characteristics

Approximately 45,000 gpd of domestic strength wastewater will be generated during the construction of the proposed IGCC Power Station and about 7,500 gpd will be generated from the operational staff at the IGCC Power Station. Wastewater will contain 200 to 250 mg/l BOD, 220 to 270 mg/l TSS and 6 to 8 mg/l Total Phosphorous. During construction, the projected daily flow of wastewater will be generated over a period of 10 to 14 hours. During IGCC Power Station operation the daily flow of wastewater will be generated over a 24 hour period.

3.4.9.1.2 Treatability

Domestic strength wastewater can be treated by a number of different types of WWTFs to produce effluent meeting the limits set forth by the MPCA. The Coleraine-Bovey-Taconite ("CBT") WWTF is a conventional activated sludge facility designed to treat normal strength domestic wastewater. The CBT WWTF has ample capacity to treat the project domestic wastewater flow.

3.4.9.1.3 Disposition

Domestic wastewater generated at the IGCC Power Station will be conveyed to the City of Taconite's main pump station. The Taconite pump station will be upgraded to increase the pumping capacity to handle the flow rates resulting from extraneous water entering the sewer system during rainfall and snow melt events. From Taconite's main pump station the raw wastewater is pumped to the City of Coleraine and then into the CBT WWTF. The NPDES permit for the CBT WWTF allows a discharge of 499,000 gpd of treated effluent to the Swan River. The CBT WWTF currently receives an average of 334,000 gpd.

3.4.9.1.4 Effect

There will be little net effect from the domestic wastewater discharged from the IGCC Power Station. The domestic wastewater will 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 Swan River water quality.

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

3.4.9.2 East Range Site

3.4.9.2.1 Characteristics

The characteristics of the domestic wastewater generated by activities undertaken and the East Range Site will mirror those specified for the West Range Site.

3.4.9.2.2 Treatability

Domestic strength wastewater can be treated by a number of different types of WWTFs to produce effluent meeting the limits set forth by the MPCA. The Hoyt Lakes WWTF is a trickling filter facility designed to treat normal strength domestic wastewater. The Hoyt Lakes WWTF has ample capacity to treat the project domestic wastewater flow from the IGCC Power Station.

3.4.9.2.3 Disposition

Domestic wastewater generated at the IGCC Power Station will be conveyed to the City of Hoyt Lakes' existing sanitary sewer. Connection will be made near the north end of Colby Lake Road. From this location the raw wastewater is conveyed by pumps and gravity sewers to the City of Hoyt Lakes WWTF. The NPDES permit for the Hoyt Lakes WWTF allows a discharge of 680,000 gpd of treated effluent to Whitewater Lake. The Hoyt Lakes WWTF currently receives an average of 300,000 gpd.

3.4.9.2.4 Effect

There will be little net effect from the domestic wastewater discharged from the IGCC Power Station. The domestic wastewater will 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.

3.5 Floodplains

There are no anticipated permanent impacts to FEMA regulated floodplains associated with either the West Range or East Range Sites. See Section 2.6. Although there will be some construction required within the Associated Facilities (for both sites), this construction activity will not affect the flood profiles or flood elevations. Neither plant IGCC Power Station is located within a floodplain.

3.5.1 Obstruction or Diversion of Flow

At both West Range and East Range Sites, impacts to floodplains will be minimized by ensuring that river flows can be maintained during construction and by restoring floodway contours after construction is complete. There are no diversions or obstructions of flow that will permanently impact FEMA regulated floodplains associated with the West Range Site or associated utilities. Culverts and bridges will be used where needed in order to maintain existing runoff flow patterns.

3.5.2 Contacts with Agencies

All affected communities at the West Range Site, including Itasca County, Minnesota DOT, and Minnesota DNR will be contacted during the design and permitting phases of the project in order to ensure all flood control requirements are met. Likewise, at the East Range Site, St. Louis County, the City of Hoyt Lakes, Minnesota DOT, and Minnesota DNR will be contacted during the design phases of the project in order to ensure all flood control requirements are met. Each community has discretion as to requiring flood control measures that exceed Federal and State requirements.

3.5.3 Effects on Project Facilities

Although the IGCC Power Station itself is not in a floodplain at either the West Range or East Range Sites, several factors will need to be considered for roadway and rail crossings of streams. Bridge and/or culvert crossings will need to be assessed for flood damage potential, average daily traffic, emergency vehicle access, fish passage, and any other potential environmental impacts. Culvert and bridge design criteria will be based on the guidelines shown in the Minnesota DOT Drainage Manual, along with input from the railroad and Minnesota DNR.

In addition, utility crossings of streams and water bodies will need to be constructed so that they are protected from erosive flows and the utility itself does not impact stream flows or flood elevations. Depending on the site conditions and the presence of bedrock, utilities will either be installed by open cut or directional drilling.

3.5.4 Mitigation Measures

There are no Federal requirements relating to floodplains at either the West Range or East Range Sites. Should the Project be modified in such a manner as to impact a FEMA defined flood hazard boundary at the selected site, it may become necessary to submit the proposed plans to FEMA for incorporation into the community's FIRM panel.

FEMA involvement will occur should the project increase an existing one-percent annual chance flood elevation by more than one foot. However, Minnesota has more stringent rules than FEMA. According to Minnesota rules, an increase of the existing 1-percent annual chance flood elevation by more than one-half foot will require FEMA and MDNR involvement.

The MDNR becomes involved at the same time as FEMA. The MDNR is the state floodplain administrator and will need to review and approve any plans or models that would be submitted to FEMA.

3.6 Wetlands

The following sections describe the wetland impacts, wetland regulatory agency implications and requirements, wetland permitting processes, and wetland mitigation for the West and East Range Sites.

3.6.1 Impacts and Consequences – Preferred Site (West Range)

3.6.1.1 West Range IGCC Power Station

Table 3.6-1 provides a summary of impacts from the IGCC Power Station Footprint. This table identifies impacts per wetland as identified by its unique number assigned when delineated. Impacts by wetland classification are also summarized. Descriptions of the wetlands found within the West Range Site are provided in Section 2.7 of this report. Wetland impacts for utility and transportation corridors are provided in the following sections.

Table 3.6-1
West Range IGCC Power Station – Summary of Permanent Wetland Impacts

Basin ID	Total Area within Site (acres)	Wetland Classification		Proposed Permanent Impact Area (acres)		
		Cowardin	Circular 39	Phase 1	Phase 2	Total
A1	78.26	PEMB/PSS1/PFO4	Type 3/6/8	0	11.52	11.52
A4	96.34	PFO1C/F	Type 7	15.74	1.51	17.25
A13	0.45	PFO1B	Type 7	0.24	0	0.24
A14	0.44	PFO1B	Type 7	0.41	0	0.41
A20	0.19	PFO1C	Type 7	0.19	0	0.19
A21	0.01	PEMC/PFO1C	Type 3/7	0.01	0	0.01
A23	0.24	PEMC/PFO1C	Type 3/7	0.24	0	0.24
A25	0.18	PFO1C	Type 7	0.18	0	0.18
A26	0.03	PFO1C	Type 7	0.03	0	0.03
A27	0.07	PFO1C	Type 7	0.07	0	0.07
A28	0.22	PEMC/PFO1C	Type 3/7	0.22	0	0.22
A29	0.08	PEMC/PFO1C	Type 3/7	0	0.08	0.08
A30	0.04	PEMC	Type 3	0	0.04	0.04
A31	0.48	PFO1C	Type 7	0	0.48	0.48
Total Acres	**177.03**			**17.33**	**13.62**	**30.95**

The preliminary layout of the IGCC Power Station was planned to minimize wetland impacts through avoidance and minimization, followed by mitigation as necessary. Wetland impact avoidance and minimization will be refined through the final design process for the facility and other elements of the project. The early planning stages will involve general “big picture” efforts to avoid and minimize wetland impacts followed by additional steps that refine and detail sequencing measures later in the planning and design of the project.

Wetland impacts for the West Range IGCC Power Station Footprint are estimated at 30.95 acres. These wetlands are primarily Type 3/7 or Type 7 basins, most of which are isolated. The greatest amount of impacts for the facility site would be to Wetlands A1 and A4, which are large wetland complexes that extend beyond the site boundary. Estimated impacts for Wetland A1 are 11.52 acres; Wetland A4 would receive an estimated 17.25 acres of impacts for the facility site. Wetland A1 is a combination of Type 3/6/8 wetlands (i.e., shallow marsh, scrub-shrub alder swamp, and spruce/larch bog). Wetland A4 is predominantly Type 7 (i.e., forested black ash swamp).

As shown above in Table 3.6-1, Type 7 wetlands are the most abundant wetland type present within the project limits and have the most impacts for both phases. Phase 2 involves less wetland impact acreage and affects Type 3 and Type 3/6/8 (bog habitat) wetlands, which are not impacted by Phase 1. Phase 1 will have the majority of wetland impacts for the facility, most of which are Type 7 wetlands. Phase 1 wetland impacts total of 17.33 acres and Phase 2 impacts 13.62 acres of wetland. Minimization of wetland impact is discussed in Section 3.6.4.1. Mitigation of wetland impact is discussed in Section 3.6.5.

Table 3.6-2 provides a summary of the wetland types impacted by the West Range Site facility.

Table 3.6-2
Permanent Wetland Impacts by Type at West Range IGCC Power Station Footprint

Wetland Classification		Permanent Wetland Impacts		
Circular 39 Type	**Cowardin Type**	**Phase 1**	**Phase 2**	**Total (acres)**
Type 3	PEMC	0	0.04	0.04
Type 3/6/8	PEMB/PSS1/PFO4	0	11.52	11.52
Type 3/7	PEMC/PFO1C	0.47	0.08	0.56
Type 7	PFO1B/C/F	16.86	1.99	18.84
Total		17.33	13.62	30.95 acres

3.6.1.2 West Range HVTL Alternative 1

Section 1.5.2.3.1A of the ES describes the proposed alignment for HVTL Alternative 1. Table 3.6-3, below, summarizes the wetlands that would be impacted for proposed HVTL Alternative 1. The alignment for the HVTL describes the 100-foot wide permanent ROW. The ROW used during construction activities will be contained within this 100-foot wide permanent corridor. Permanent wetland impacts will be limited to those areas where overhead utility poles will be placed within wetland habitat. To the extent practicable, wetlands will be avoided for installation of the HVTL, and construction activities will be planned during the winter months to further minimize direct impacts to wetlands.

HVTL Alternative 1 is proposed within an existing 100-foot power utility ROW that extends south of the West Range to approximately Trunk Highway ("TH") 169. South of TH 169 a new 100-foot ROW will need to be established, which will require clearing of trees and shrubs,

including wetland areas. Typically, this clearing would be anticipated in Type 6, 7, and 8 wetlands, but wet meadow, emergent marsh, and open water wetlands (Types 1-5) would not require clearing of vegetation. Clearing of trees and shrubs is not anticipated to include grubbing of stumps or roots and, therefore, soils will not be disturbed in these areas and direct wetland impacts (e.g., draining, excavating, filling) will be avoided to establish the permanent HVTL ROW. Ultimately some wetland areas may be converted to different types (e.g., Type 6 scrub-shrub habitat may convert to Type 2/3 wet meadow/shallow marsh); however, direct loss of wetland is not anticipated. Also, clearing of trees and shrubs is planned to occur during the winter months to avoid impacts to wetlands from equipment and also to avoid the nesting season for birds, in compliance with the federal Migratory Bird Treaty Act. In the future, maintenance of the ROW would likely include clearing of trees and shrubs that re-establish in wetlands, but would be completed during the winter months to avoid direct impacts to wetland or nesting birds.

As shown below in Table 3.6.-3., wetlands anticipated to be cleared of trees and shrubs to establish HVTL Alternative 1 include approximately 30.21 acres of Types 6-8 wetlands south of TH 169. Those wetlands identified during the 2005 field survey (Wetlands A1 and E1-E7) are already maintained free of trees and shrubs in an existing ROW. A summary of permanent impacts to these wetlands for placement of HVTL poles is provided in the following paragraphs.

Table 3.6-3
West Range HVTL Alternative 1 Tree and Shrub Clearing in Wetlands

Basin ID	Total Wetland Area within ROW	Wetland Classification		Total Tree and Shrub Clearing Area within ROW
		Cowardin	Circular 39	
A1	0.09	PEMB/PSS1 B/PFO4	Type 3/6/8	0 (already cleared)
E1	1.13	PEMC	Type 3	0 (already cleared)
E2	0.65	PEMB	Type 2	0 (already cleared)
E4	0.63	PEMC	Type 3	0 (already cleared)
E5	0.62	PEMH	Type 8	0 (already cleared)
E6	0.27	PEMC	Type 3	0 (already cleared)
E7	0.95	PEMC	Type 3	0 (already cleared)
NWI Basin* (7 basins)	8.63	n/a	Type 6	8.63
NWI Basin* (3 basins)	7.37	n/a	Type 7	7.37
NWI Basin* (7 basins)	14.21	n/a	Type 8	14.21
Total	**34.55 acres**			**30.21 acres**

* Note: NWI basins are those areas that have not been field investigated. Cowardin classifications are not provided due to variability in codes for wetlands of the same type.

A total of 0.01 acres of wetland habitat would be permanently impacted by HVTL Alternative 1, as described in the Table 3.6-4, below. This is based on an alignment with power poles being placed every 800 feet and the footprint of each power pole requiring approximately 28 ft^2 of fill.

A total of 16 power poles would be placed in wetland areas for this alternative. If possible, wetland impacts will be further minimized by adjusting the pole placement during the final design phase of the project. The maximum expanse length between poles is approximately 1,000 linear feet. Further minimization of impacts for particularly small wetlands may be possible where a pole location may be adjusted by a few hundred feet or less. Minimization of wetland impacts during construction and operation is discussed in Section 3.6.4.2. Mitigation of wetland impact is discussed in Section 3.6.5.

Table 3.6-4
West Range HVTL Alternative 1 Wetland Impacts

Basin ID	Total Wetland Area Delineated (acres)	Wetland Classification		Proposed Permanent Impact Area	
		Cowardin	**Circular 39**	**# Poles**	**Acres**
E1	1.37	PEMC	Type 3	1	0.0006
E2	0.70	PEMB	Type 2	1	0.0006
E4	0.67	PEMC	Type 3	1	0.0006
NWI Basin*	2 basins	n/a	Type 6	2	0.0013
NWI Basin*	3 basins	n/a	Type 7	4	0.0026
NWI Basin*	3 basins	n/a	Type 8	7	0.0045
			Total	**16**	**0.01**

* Note: NWI basins are those areas that have not been field investigated, therefore total acreage is not available, only an estimate of impacts to the wetland area. Cowardin classifications are not provided due to variability in codes for wetlands of the same type.

Table 3.6-5 below summarizes the permanent impacts to wetlands by classification.

Table 3.6-5
Wetland Impacts by Type for West Range HVTL Alternative 1

Wetland Classification	**Permanent Wetland Impacts**
Circular 39 Type	**Acres**
Type 1	0
Type 2	0.0006
Type 3	0.0012
Type 4	0
Type 5	0
Type 6	0.0013
Type 7	0.0026
Type 8	0.0045
Total	**0.01 acres**

There are two water crossings associated with HVTL Alternative 1. (See Figures 1.5-28 through 1.5-30). These crossings include a perennial stream between Big & Little Diamond Lakes and the Swan River. Wetland impacts within the bed of either water body will be avoided. The total

length of water crossings for HVTL Alternative 1 is estimated at 123 linear feet. A summary of the length of each water body crossing for HVTL Alternative 1 is provided in the following table.

Of the two water crossings associated with HVTL Alternative 1, one is listed on the MDNR Protected Waters Inventory. That water crossing will require a License for Utility Crossings of Public Lands and Waters granted by the MDNR Division of Lands and Minerals.

A summary of the length of each water body crossing for HVTL Alternative 1 is provided in the following Table 3.6-6.

Table 3.6-6
Water Crossings for West Range HVTL Alternative 1

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

Placement of the power poles supporting the HVTL will be designed to avoid direct impacts to streams, rivers, or other bodies of water within the project area. The average expanse between poles will be approximately 800 feet, but in sensitive or otherwise important areas that should be avoided, the expanse between power poles can be shortened to whatever length necessary or lengthened to a maximum of approximately 1,000 feet.

3.6.1.3 West Range HVTL Alternative 1A

Section 1.5.2.3.1B describes the proposed alignment for HVTL Alternative 1A. Table 3.6-7, below, summarizes the wetlands that would be impacted for the proposed HVTL. The alignment for the HVTL describes the 100-foot wide permanent ROW. The ROW used during construction activities will be contained within this 100-foot wide corridor. Permanent wetland impacts will be limited to those areas where overhead utility poles will be placed within wetland habitat. To the extent practicable, wetlands will be avoided for installation of the HVTL, and construction activities will be planned during the winter months to further minimize direct impacts to wetlands.

HVTL Alternative 1A is proposed within an existing 100-foot power utility ROW that extends south of the West Range to approximately TH 169. This is the same corridor that is proposed for HVTL Alternative 1. South of TH 169 a new 100-foot ROW will need to be established, which is slightly east of the corridor proposed for HVTL Alternative 1. The new corridor established south of TH 169 will require clearing of trees and shrubs, including wetland areas. Typically this clearing would be anticipated in Type 6, 7, and 8 wetlands, but wet meadow, emergent marsh,

and open water wetlands (Types 1-5) would not require clearing of vegetation. Clearing of trees and shrubs is not anticipated to include grubbing of stumps or roots therefore soils will not be disturbed in these areas and direct wetland impacts (e.g., draining, excavating, filling) will be avoided to establish the permanent HVTL ROW. Ultimately some wetland areas may be converted to different types (e.g., Type 6 scrub-shrub habitat may convert to Type 2/3 wet meadow/shallow marsh); however, direct loss of wetland is not anticipated. Also, clearing of trees and shrubs is planned to occur during the winter months to avoid impacts to wetlands from equipment and also to avoid the nesting season for birds, in compliance with the federal Migratory Bird Treaty Act. In the future, maintenance of the ROW would likely include clearing of trees and shrubs that re-establish in wetlands, but this would be completed during the winter months to avoid direct impacts to wetlands or nesting birds.

The total acres of wetlands within the permanent ROW for HVTL Alternative 1A are summarized below in Table 3.6.-7. Wetlands anticipated to be cleared of trees and shrubs to establish HVTL Alternative 1 include approximately 24.53 acres of Types 6-8 wetlands south of TH 169. As noted in Table 3.6-7, those wetlands identified during the 2005 field survey (Wetlands A1 and E1-E7) are already maintained free of trees and shrubs in an existing ROW. A summary of permanent impacts to these wetlands for placement of HVTL poles is provided in the following paragraphs.

Table 3.6-7
West Range HVTL Alternative 1A Tree and Shrub Clearing in Wetlands

Basin ID	Total Wetland Area within ROW	Wetland Classification		Total Tree and Shrub Clearing Area within ROW
		Cowardin	Circular 39	
A1	0.09	PEMB/PSS1 B/PFO4	Type 3/6/8	0 (already cleared)
E1	1.13	PEMC	Type 3	0 (already cleared)
E2	0.65	PEMB	Type 2	0 (already cleared)
E4	0.63	PEMC	Type 3	0 (already cleared)
E5	0.62	PEMH	Type 8	0 (already cleared)
E6	0.27	PEMC	Type 3	0 (already cleared)
E7	0.95	PEMC	Type 3	0 (already cleared)
NWI Basin* (3 basins)	1.38	n/a	Type 6	1.38
NWI Basin* (2 basins)	5.54	n/a	Type 7	5.54
NWI Basin* (9 basins)	17.61	n/a	Type 8	17.61
Total	**30.20 acres**			**24.53 acres**

* Note: NWI basins are those areas that have not been field investigated. Cowardin classifications are not provided due to variability in codes for wetlands of the same type.

Similar to HVTL Alternative 1, a total of 0.01 acres of wetland habitat would be impacted by HVTL Alternative 1A, as described in the Table 3.6-8, below. This is based on an alignment

with power poles being placed every 800 feet and the footprint of each power pole requiring approximately 28 ft^2 of fill. A total of 16 power poles would be placed in wetland areas for this alternative. If possible, wetland impacts will be further minimized by adjusting the pole placement during the final design phase of the project. The maximum expanse length between poles is approximately 1,000 linear feet. Further minimization of impacts for particularly small wetlands may be possible where a pole location may be adjusted by a few hundred feet or less. Minimization of wetland impacts during construction and operation is discussed in Section 3.6.4.3. Mitigation of wetland impact is discussed in Section 3.6.5.

Table 3.6-8
West Range HVTL Alternative 1A Wetland Impacts

Basin ID	Total Wetland Area Delineated (acres)	Wetland Classification		Proposed Permanent Impact Area	
		Cowardin	Circular 39	# Poles	Acres
E1	1.37	PEMC	Type 3	1	0.0006
E2	0.70	PEMB	Type 2	1	0.0006
E4	0.67	PEMC	Type 3	1	0.0006
NWI Basin*	1 basin	n/a	Type 5	1	0.0006
NWI Basin*	2 basins	n/a	Type 6	2	0.0012
NWI Basin*	2 basins	n/a	Type 7	3	0.0019
NWI Basin*	3 basins	n/a	Type 8	7	0.0045
			Total	**16**	**0.01 acres**

* Note: NWI basins are those areas that have not been field investigated, therefore total acreage is not available, only an estimate of impacts to the wetland area. Cowardin classifications are not provided due to variability in codes for wetlands of the same type.

Table 3.6.9 summarizes the permanent impacts to wetlands by classification.

Table 3.6-9
Wetland Impacts by Type for West Range HVTL Alternative 1A

Wetland Classification	Permanent Wetland Impacts
Circular 39 Type	Acres
Type 1	0
Type 2	0.0006
Type 3	0.0012
Type 4	0
Type 5	0.0006
Type 6	0.0012
Type 7	0.0019
Type 8	0.0045
Total	**0.01 acres**

There are six water crossings associated with HVTL Alternative 1A, five of which are over the Swan River, a protected water listed by the MDNR Protected Waters Inventory. Figures 1.5-31 through 1.5-33 show the locations of water crossings for this route. The water crossings over the Swan River will require a License for Utility Crossings of Public Lands and Waters granted by the MDNR Division of Lands and Minerals. 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 & Little Diamond Lakes and the Swan River. There are four additional water crossings over the Swan River along the southern portion of the HVTL Alternative 1A alignment. Wetland impacts within the bed of any portions of these water bodies will be avoided. The total length of water crossings for HVTL Alternative 1A is estimated at 533 linear feet. A summary of the length of each water body crossing for HVTL Alternative 1A is provided in Table 3.6-10.

Table 3.6-10
Water Crossings for West Range HVTL Alternative 1A

Water Crossing Location	Milepost (mile + linear ft)	MDNR PWI?	Length of Crossing (linear ft)	Permanent Wetland Impacts (acres)
Perennial stream between Big & Little Diamond Lakes (Basin E1)	0+3980	No	3	0
Swan River	3+1700	Yes	60	0
Swan River	3+2960	Yes	60	0
Swan River	3+3575	Yes	50	0
Swan River	3+4400	Yes	270	0
Swan River	4+360	Yes	90	0
		Total	**533 linear ft**	**0 acres**

3.6.1.4 West Range Plan B Phase II Alternate Route WRB-2A

Section 1.5.2.3.2B describes the proposed alignment for HVTL Phase II. Table 3.6-11, below, summarizes the wetlands that would be impacted for the proposed HVTL. The alignment for the HVTL describes the 200-foot wide permanent ROW, which is within the existing MP ROW. The ROW used during construction activities will be contained within this 200-foot wide corridor. Permanent wetland impacts will be limited to those areas where overhead utility poles will be placed within wetland habitat. To the extent practicable, wetlands will be avoided for installation of the HVTL, and construction activities are planned during the winter months to further minimize direct impacts to wetlands.

HVTL Phase II is proposed within an existing 200-foot power utility ROW that extends east of the West Range site to approximately TH 169 near Nashwauk, then follows existing 200-foot ROW southwest to the Blackberry substation. Typically, clearing of vegetation would be anticipated throughout the corridor, including wetlands. However, because this corridor is already established and maintained free of trees and shrubs, vegetation clearing in wetlands is not anticipated. In the future, maintenance of the ROW would likely include clearing of trees and shrubs such as in Types 6, 7, and 8 wetlands as needed. Wet meadow, emergent marsh, and open water wetlands (Types 1-5) would not require clearing of vegetation. ROW maintenance would be completed during the winter months to avoid direct impacts to wetlands or nesting birds. Clearing of trees and shrubs in the future is not anticipated to include grubbing of stumps or roots and, therefore, soils would not be disturbed in these areas and direct wetland impacts (e.g., draining, excavating, filling) will be avoided to maintain the permanent HVTL ROW.

The total acres of wetlands within the permanent ROW for HVTL Phase II are summarized below in Table 3.6.-11. Wetlands are not anticipated to be cleared of trees and shrubs for Plan B Phase II Alternate Route WRB-2A because the existing ROW is already maintained free of trees and shrubs. A summary of permanent impacts to these wetlands for placement of HVTL poles is provided in the following paragraphs.

Table 3.6-11
West Range Plan B Phase II Alternate Route WRB-2A Tree and Shrub Clearing in Wetlands

Basin ID	Total Wetland Area within ROW	Wetland Classification		Total Tree and Shrub Clearing Area within ROW
		Cowardin	Circular 39	
A1	0.09	PEMB/PSS1B/ PFO4	Type 3/6/8	0 (already cleared)
B15	0.71	PEMB/PSS1C/ PFO14	Type 2/6/7	0 (already cleared)
E11	18.34	PEMC	Type 3	0 (already cleared)
E12	5.65	PEMH	Type 8	0 (already cleared)
E13	0.13	PEMC	Type 3	0 (already cleared)
E14	0.49	PEMC/PEMG	Type 3/4	0 (already cleared)
E15	0.14	PEMC	Type 3	0 (already cleared)

Basin ID	Total Wetland Area within ROW	Wetland Classification		Total Tree and Shrub Clearing Area within ROW
		Cowardin	Circular 39	
E16	0.15	PEMC	Type 3	0 (already cleared)
E17	0.76	PEMC	Type 3	0 (already cleared)
E18	8.24	PEMC	Type 3	0 (already cleared)
NWI Basin* (3 basins)	20.28	n/a	Type 2	0 (already cleared)
NWI Basin* (2 basins)	8.44	n/a	Type 3	0 (already cleared)
NWI Basin* (3 basins)	1.60	n/a	Type 4	0 (already cleared)
NWI Basin* (25 basins)	46.64	n/a	Type 6	0 (already cleared)
NWI Basin* (15 basins)	14.38	n/a	Type 7	0 (already cleared)
NWI Basin* (18 basins)	14.45	n/a	Type 8	0 (already cleared)
Total	**140.49 acres**			**0 acres**

* Note: NWI basins are those areas that have not been field investigated. Cowardin classifications are not provided due to variability in codes for wetlands of the same type.

A total of 0.03 acres of wetland habitat would be impacted by HVTL Phase II, as described in the Table 3.6-12 below. This is based on an alignment with power poles being placed every 800 feet and the footprint of each power pole requiring approximately 28 ft^2 of fill. A total of 39 power poles would be placed in wetland areas for this alternative. If possible, wetland impacts will be further minimized by adjusting the pole placement during the final design phase of the project. The maximum expanse length between poles is approximately 1,000 linear feet. Further minimization of impacts for particularly small wetlands may be possible where a pole location may be adjusted by a few hundred feet or less. Minimization of wetland impacts during construction and operation is discussed in Section 3.6.4.4. Mitigation of wetland impact is discussed in Section 3.6.5.

Table 3.6-12
West Range HVTL Phase II Wetland Impacts

Basin ID	Total Wetland Area Delineated (acres)	Wetland Classification		Proposed Permanent Impact Area	
		Cowardin	Circular 39	# Poles	Acres
A1	78.26	PFO4	Type 3/6/8	1	0.0006
E11	18.34	PEMC	Type 3	11	0.0071
E12	5.65	PEMH	Type 8	3	0.0019
E18	8.24	PEMC	Type 3	3	0.0019
NWI Basin*	3 basins	n/a	Type 2	6	0.0039
NWI Basin*	1 basin	n/a	Type 3	3	0.0019

NWI Basin*	4 basins	n/a	Type 6	11	0.0071
NWI Basin*	1 basin	n/a	Type 7	1	0.0006
			Total	**39**	**0.03 acres**

* Note: NWI basins are those areas that have not been field investigated, therefore total acreage is not available, only an estimate of impacts to the wetland area. Cowardin classifications are not provided due to variability in codes for wetlands of the same type.

Table 3.6-13 summarizes the permanent impacts to wetlands by classification.

Table 3.6-13
Wetland Impacts by Type for West Range Plan B Phase II Alternate Route WRB-2A

Wetland Classification	**Permanent Wetland Impacts**
Circular 39 Type	**Acres**
Type 1	0
Type 2	0.0039
Type 3	0.0109
Type 3/6/8	0.0006
Type 4	0
Type 5	0
Type 6	0.0071
Type 7	0.0006
Type 8	0.0019
Total	**0.03 acres**

There are five water crossings associated with Plan B Phase II Alternate Route WRB-2A, all of which are protected waters listed in the MDNR Protected Water Inventory. Figures 1.5-34 through 1.5-37 show the locations of these water crossings. All of these water crossings will require a License for Utility Crossings of Public Lands and Waters granted by the MDNR Division of Lands and Minerals. These crossings include the Swan River and one of its tributaries, Snowball Creek, Oxhide Creek, and Oxhide Lake. Wetland impacts within the bed of any portions of these water bodies will be avoided. The total length of water crossings for Plan B Phase II Alternate Route WRB-2A is estimated at 283 linear feet. A summary of the length of each water body crossing for Plan B Phase II Alternate Route WRB-2A is provided in the following table.

Table 3.6-14
Water Crossings for West Range Plan B Phase II Alternate Route WRB-2A

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

3.6.1.5 West Range Natural Gas Pipeline Alternative 1

Wetlands within the proposed Natural Gas Pipeline Alternative 1 corridor include six basins that were delineated during the 2005 field surveys and 23 basins identified by NWI that have not been field investigated. In the area of the proposed 100-foot temporary ROW, a total of 24.69 acres of wetland habitat would be impacted due to Natural Gas Pipeline Alternative 1. However, for the 70-foot permanent ROW, these wetland impacts would be reduced to 17.47 acres. Temporary impacts are needed for construction, but would be mitigated by restoring the habitat upon completion of construction activities. A summary of wetlands and proposed impacts is provided in the following tables. Minimization of wetland impacts during construction and operation is discussed in Section 3.6.4.5. Mitigation of wetland impact is discussed in Section 3.6.5.

Table 3.6-15
West Range Natural Gas Pipeline Alternative 1 Wetland Impacts

Basin ID	Total Wetland Area Delineated (acres)	Wetland Classification		Proposed Impact Area	
		Cowardin	Circular 39	Temporary ROW	Permanent ROW
				Acres	Acres
E1	1.37	PEMC	Type 3	0.18	0.13
E2	0.70	PEMB	Type 2	0.43	0.30
E4	0.67	PEMC	Type 3	0.43	0.32
E5	0.65	PEMH	Type 8	0.39	0.29
E6	0.42	PEMC	Type 3	0.29	0.22
E7	1.44	PEMC	Type 3	0.67	0.47
NWI Basin*	1 basin	n/a	Type 1	0.18	0.12
NWI Basin*	3 basins	n/a	Type 2	1.40	0.98
NWI Basin*	8 basins	n/a	Type 6	5.54	3.98
NWI Basin*	4 basins	n/a	Type 7	9.77	6.94

Basin ID	Total Wetland Area Delineated (acres)	Wetland Classification		Proposed Impact Area	
		Cowardin	Circular 39	Temporary ROW	Permanent ROW
				Acres	Acres
NWI Basin*	7 basins	n/a	Type 8	5.41	3.72
			Total	**24.69**	**17.47**

* Note: NWI basins are those areas that have not been field investigated, therefore total acreage is not available, only an estimate of impacts to the wetland area. Cowardin classifications are not provided due to variability in codes for wetlands of the same type.

Table 3.6-16 summarizes the permanent impacts to wetlands by classification.

Table 3.6-16
Wetland Impacts by Type at West Range Natural Gas Pipeline Alternative 1

Wetland Classification	Total Area (Acres)	
Circular 39 Type	Temporary ROW	Permanent ROW
Type 1	0.18	0.12
Type 2	1.83	1.28
Type 3	1.57	1.14
Type 4	0	0
Type 5	0	0
Type 6	5.54	3.98
Type 7	9.77	6.94
Type 8	5.80	4.01
Total	**24.69**	**17.47**

The natural gas pipelines will be directionally drilled under waterbodies starting at approximately 100 feet from the edge of each waterbody. This will minimize impacts to wetlands associated with water crossings. Section 1.9.2.1.3 describes general natural gas pipeline construction methods and Section 3.3.1.1.5 describes construction methods specific to the soils along the pipeline corridor. There are four water crossings associated with Natural Gas Pipeline Alternative 1. The Swan River will be crossed twice by Natural Gas Pipeline Alternative 1 at approximate Mileposts 4+2170 (ft) and 9+4560, as shown in Figures 1.5-37 through 1.5-40. Other water crossings include a tributary of the Swan River at Milepost 5+1460 and a perennial stream between Big Diamond and Little Diamond Lakes at Milepost 12+2000.

Wetland impacts are limited to those areas on either side of the waterbody where the pipeline emerges. A summary of these impacts is provided in Table 3.6-17. The total length of water crossings is 133 linear feet (excluding adjacent wetland habitat). Impacts to wetlands due to the water crossings are based on a 100-foot temporary ROW and 70-foot permanent ROW and are included within the total wetland impacts presented in Table 3.6-15 and Table 3.6-16. Wetland

habitats associated with the water crossings that will be affected where the pipeline emerges on either side of the crossing include 58,500 ft^2 (1.34 acres) in the temporary ROW and 40,950 ft^2 (0.94 acres) in the permanent ROW.

The Swan River is a protected water as listed in the MDNR Protected Waters Inventory. A License for Utility Crossings of Public Lands and Waters granted by the MDNR Division of Lands and Minerals will be required to complete the water crossings over the Swan River for Natural Gas Pipeline Alternative 1.

Table 3.6-17
Wetland Impacts at Water Crossings for
West Range Natural Gas Pipeline Alternative 1

Water Crossing Location	Milepost (mile + linear ft)	MDNR PWI?	Length of Crossing (linear ft)	Wetland Impacts			
				Temporary ROW		Permanent ROW	
				Square Ft	Linear Ft	Square Ft	Linear Ft
Swan River – North side	4+2170	Yes	60	5,500	20	3,850	20
Swan River – South side				2,000	55	1,400	55
Tributary of Swan River – North side	5+1460	No	10	18,000	140	12,600	140
Tributary of Swan River – South side				14,000	180	9,800	180
Swan River – North side	9+4560	Yes	60	0	0	0	0
Swan River – South side				11,000	110	7,700	110
Perennial stream between Big & Little Diamond Lakes – North side	12+2000	No	3	8,000	80	5,600	80
Perennial stream between Big & Little Diamond Lakes – South side				0	0	0	0
		Total	**133 lf**	**58,500**	**585**	**40,950**	**585**
				1.34 acres		**0.94 acres**	

3.6.1.6 West Range Natural Gas Pipeline Alternative 2

Wetlands within the Natural Gas Pipeline Alternative 2 corridor include six basins that were delineated during the 2005 field surveys and 24 basins identified by NWI that have not been field investigated. In the area of the proposed 100-foot temporary ROW, a total of 28.86 acres of

wetland habitat would be impacted due to Natural Gas Pipeline Alternative 2. However, for the 70-foot permanent ROW, these wetland impacts would be reduced to 18.13 acres. Temporary impacts are needed for construction, but would be mitigated by restoring the habitat upon completion of construction activities. A summary of wetlands and proposed impacts is provided in the following tables. Minimization of wetland impacts during construction and operation is discussed in Section 3.6.4.6. Mitigation of wetland impact is discussed in Section 3.6.5.

Table 3.6-18
West Range Natural Gas Pipeline Alternative 2 Wetland Impacts.

Basin ID	Total Wetland Area Delineated (acres)	Wetland Classification		Proposed Impact Area	
		Cowardin	Circular 39	Temporary ROW	Permanent ROW
				Acres	Acres
E1	1.37	PEMC	Type 3	0.18	0.13
E2	0.70	PEMB	Type 2	0.43	0.30
E4	0.67	PEMC	Type 3	0.43	0.32
E5	0.65	PEMH	Type 8	0.39	0.29
E6	0.42	PEMC	Type 3	0.29	0.22
E7	1.44	PEMC	Type 3	0.67	0.47
NWI Basin*	2 basins	n/a	Type 2	0.10	0.01
NWI Basin*	2 basins	n/a	Type 3	0.21	0.15
NWI Basin*	12 basins	n/a	Type 6	19.40	11.58
NWI Basin*	2 basins	n/a	Type 7	2.94	2.09
NWI Basin*	6 basins	n/a	Type 8	3.82	2.57
			Total	**28.86**	**18.13**

* Note: NWI basins are those areas that have not been field investigated, therefore total acreage is not available, only an estimate of impacts to the wetland area. Cowardin classifications are not provided due to variability in codes for wetlands of the same type.

Table 3.6-19 summarizes the permanent impacts to wetlands by classification.

Table 3.6-19
Wetland Impacts by Type at West Range Natural Gas Pipeline Alternative 2

Wetland Classification	Total Area (Acres)	
Circular 39 Type	Temporary ROW	Permanent ROW
Type 1	0	0
Type 2	0.53	0.31
Type 3	1.78	1.29
Type 4	0	0
Type 5	0	0

Type 6	19.40	11.58
Type 7	2.94	2.09
Type 8	4.21	2.86
Total	**28.86**	**18.13**

The natural gas pipelines will be directionally drilled under waterbodies starting at approximately 100 feet from the edge of each waterbody. This will minimize impacts to wetlands associated with water crossings. Section 1.9.2.1.3 describes natural gas pipeline construction methods and Section 3.3.1.1.6 describes construction methods specific to the soils along the pipeline corridor. There are four water crossings associated with Natural Gas Pipeline Alternative 2. The Swan River will be crossed twice by Natural Gas Pipeline Alternative 2 at approximate Mileposts 5+4330 (ft) and 10+4180, as shown in Figures 1.5-41 through 1.5-44. Other water crossings include the Prairie River at Milepost 0+1980 and a perennial stream between Big Diamond and Little Diamond Lakes at Milepost 13+1690.

Wetland impacts are limited to those areas on either side of the waterbody where the pipeline emerges. A summary of these impacts is provided in Table 3.6-20. The total length of water crossings is 313 linear feet (excluding adjacent wetland habitat). (Impacts to wetlands due to the water crossings are based on a 100-foot temporary ROW and 70-foot permanent ROW and are included within the total wetland impacts presented in Table 3.6-18 and Table 3.6-19.) Wetland habitats associated with the water crossings that will be affected where the pipeline emerges on either side of the crossing include 95,000 ft^2 (2.18 acres) in the temporary ROW and 66,500 ft^2 (1.53 acres) in the permanent ROW.

The Prairie River and Swan River are both protected waters as listed in the MDNR Protected Waters Inventory. A License for Utility Crossings of Public Lands and Waters granted by the MDNR Division of Lands and Minerals will be required to complete these water crossings for Natural Gas Pipeline Alternative 2.

Table 3.6-20
Wetland Impacts at Water Crossings for
West Range Natural Gas Pipeline Alternative 2

Water Crossing Location	Milepost (mile + linear ft)	MDNR PWI?	Length of Crossing (linear ft)	Wetland Impacts			
				Temporary ROW		Permanent ROW	
				Square Ft	Linear Ft	Square Ft	Linear Ft
Prairie River – West side	0+1980	Yes	210	48,000	480	33,600	480
Prairie River – East side				28,000	280	19,600	280
Swan River – North side	5+4330	Yes	50	0	0	0	0
Swan River – South side				0	0	0	0
Swan River – North side	10+4180	Yes	50	0	0	0	0
Swan River –				11,000	110	7,700	110

South side							
Perennial stream between Big & Little Diamond Lakes – North side	13+1690	No	3	8,000	80	5,600	80
Perennial Stream between Big & Little Diamond Lakes – South side				0	0	0	0
			Total	**313 lf**	**95,000**	**950**	**66,500**	**950**
					2.18 acres		**1.53 acres**

3.6.1.7 West Range Natural Gas Pipeline Alternative 3

Wetlands within the Natural Gas Pipeline Alternative 3 corridor include six basins that were delineated during the 2005 field surveys and 18 basins identified by NWI that have not been field investigated. In the area of the proposed 100-foot temporary ROW, a total of 12.82 acres of wetland habitat would be impacted due to Natural Gas Pipeline Alternative 3. However, for the 70-foot permanent ROW, these wetland impacts would be reduced to 9.12 acres. Temporary impacts are needed for construction limits, but would be mitigated by restoring the habitat upon completion of construction activities. A summary of wetlands and proposed impacts is provided in Tables 3.6-21. Minimization of wetland impacts during construction and operation is discussed in Section 3.6.4.7. Mitigation of wetland impact is discussed in Section 3.6.5.

Table 3.6-21
West Range Natural Gas Pipeline Alternative 3 Wetland Impacts.

Basin ID	Total Wetland Area Delineated (acres)	Wetland Classification		Proposed Impact Area	
		Cowardin	Circular 39	Temporary ROW	Permanent ROW
				Acres	Acres
E1	1.37	PEMC	Type 3	0.18	0.13
E2	0.70	PEMB	Type 2	0.43	0.30
E4	0.67	PEMC	Type 3	0.43	0.32
E5	0.65	PEMH	Type 8	0.39	0.29
E6	0.42	PEMC	Type 3	0.29	0.22
E7	1.44	PEMC	Type 3	0.67	0.47
NWI Basin*	6 basins	n/a	Type 3	5.93	4.38
NWI Basin*	1 basin	n/a	Type 4	0.29	0.20
NWI Basin*	6 basins	n/a	Type 6	2.51	1.69
NWI Basin*	1 basin	n/a	Type 7	0.44	0.31
NWI Basin*	4 basins	n/a	Type 8	1.26	0.81

Total	**12.82**	**9.12**

* Note: NWI basins are those areas that have not been field investigated, therefore total acreage is not available, only an estimate of impacts to the wetland area. Cowardin classifications are not provided due to variability in codes for wetlands of the same type.

Table 3.6-22 summarizes the permanent impacts to wetlands by classification.

Table 3.6-22
Wetland Impacts by Type at West Range Natural Gas Pipeline Alternative 3

Wetland Classification	Total Area (Acres)	
Circular 39 Type	**Temporary ROW**	**Permanent ROW**
Type 1	0	0
Type 2	0.43	0.30
Type 3	7.50	5.52
Type 4	0.29	0.20
Type 5	0	0
Type 6	2.51	1.69
Type 7	0.44	0.31
Type 8	1.65	1.10
Total	**12.82**	**9.12**

Natural Gas Pipeline Alternative 3 will be directionally drilled under waterbodies starting at approximately 100 feet from the edge. This will minimize impacts to wetlands associated with water crossings. Section 1.9.2.1.3 describes natural gas pipeline construction methods and Section 3.3.1.1.7 describes construction methods specific to the soils along the pipeline corridor. There are four water crossings associated with Natural Gas Pipeline Alternative 3. The Prairie River will be crossed by Natural Gas Pipeline Alternative 3 at approximate Milepost 0+2300 (ft), as shown in Figures 1.5-45 through 1.5-47. Other water crossings include a tributary of the Prairie River at Milepost 2+880, a perennial stream that drains to Holman Lake at Milepost 9+3200, and a perennial stream between Big Diamond and Little Diamond Lakes at Milepost 11.

Wetland impacts are limited to those areas on either side of the waterbody where the pipeline emerges. A summary of these impacts is provided in Table 3.6-23. The total length of water crossings is 236 linear feet (excluding adjacent wetland habitat). Wetland habitats associated with the water crossings that will be affected where the pipeline emerges on either side of the crossing include 101,000 ft^2 (2.32 acres) in the temporary ROW and 70,700 ft^2 (1.62 acres) in the permanent ROW.

The Prairie River and the perennial stream draining to Holman Lake are both protected waters as listed in the MDNR Protected Waters Inventory. A License for Utility Crossings of Public

Lands and Waters granted by the MDNR Division of Lands and Minerals will be required to complete the water crossings over both of these water bodies for Natural Gas Pipeline Alternative 3.

Table 3.6-23
Wetland Impacts at Water Crossings for
West Range Natural Gas Pipeline Alternative 3

Water Crossing Location	Milepost (mile + linear ft)	MDNR PWI?	Length of Crossing (linear ft)	Wetland Impacts			
				Temporary ROW		Permanent ROW	
				Square Ft	Linear Ft	Square Ft	Linear Ft
Prairie River – West side	0+2300	Yes	210	48,000	480	33,600	480
Prairie River – East side				28,000	280	19,600	280
Tributary of Prairie River – North side	2+880	No	20	0	0	0	0
Tributary of Prairie River – South side				0	0	0	0
Perennial stream, drains to Holman Lake – North side	9+3200	Yes	3	6,000	60	4,200	60
Perennial stream, drains to Holman Lake – South side				11,000	110	7,700	110
Perennial stream between Big & Little Diamond Lakes – North side	11	No	3	8,000	80	5,600	80
Perennial stream between Big & Little Diamond Lakes – South side				0	0	0	0
		Total	**236 lf**	**101,000**	**1,010**	**70,700**	**1,010**
				2.32 acres		**1.62 acres**	

3.6.1.8 West Range Process Water Supply Pipelines

3.6.1.8.1 Segment 1 - Lind Pit to Canisteo Pit

Process Water Supply Pipeline Segment 1 will be constructed from the Lind Pit to the Canisteo Pit, as shown in Figure 1.5-1. This alignment was not evaluated for wetlands during the 2005 field surveys due to access limitations, therefore wetland impacts are based on the NWI coverage within the alignment. No NWI wetlands were identified within the 150-foot wide ROW required during construction activities; however, field verification will be required to confirm this. There are no water crossings associated with the Process Water Supply Pipeline Segment 1.

3.6.1.8.2 Segment 2 - Canisteo Pit to West Range Site

Wetlands within the proposed Process Water Supply Pipeline Segment 2 corridor include four basins that were delineated during the 2005 field surveys. Process Water Supply Pipeline Segment 2 will be constructed from the Canisteo Pit to the IGCC Power Station as shown in Figures 1.5-1 and 1.5-7. This alignment includes a total of 5.48 acres of wetland impacts in the 150-foot wide temporary ROW. However, these impacts would be reduced to 3.73 acres for the 100-foot wide permanent ROW. The largest impact for the Process Water Supply Pipeline Segment 2 is within Wetland A1, the large wetland complex near the southern boundary of the West Range Buffer Land. There are no water crossings associated with Process Water Supply Pipeline Segment 2. A summary of wetlands and proposed impacts is provided in Tables 3.6-24 and 3.6-25. Minimization of wetland impacts during construction and operation is discussed in Section 3.6.4.8.2. Mitigation of wetland impact is discussed in Section 3.6.5.

Table 3.6-24
West Range Process Water Supply Pipeline
Segment 2 – Canisteo Pit to West Range Site

Basin ID	Total Wetland Area Delineated (acres)	Wetland Classification		Proposed Impact Area	
		Cowardin	Circular 39	Temporary ROW	Permanent ROW
				Acres	Acres
A1	78.26	PEMB/ PSS1B/PFO4	Type 3/6/8	4.20	2.81
A13	0.45	PFO1B	Type 7	0.06	0.02
C10	4.89	PSS1A	Type 6	0.17	0.04
C28	1.77	PFO1C	Type 7	1.05	0.86
			Total	**5.48**	**3.73**

Table 3.6-25 summarizes the permanent impacts to wetlands by classification.

Table 3.6-25
Wetland Impacts by Type at Segment 2

Wetland Classification	Total Area (Acres)	
Circular 39 Type	**Temporary ROW**	**Permanent ROW**
Type 1	0	0
Type 2	0	0
Type 3	0	0
Type 3/6/8	4.20	2.81
Type 4	0	0
Type 5	0	0
Type 6	0.17	0.04
Type 7	1.11	0.88
Type 8	0	0
Total	**5.48**	**3.73**

3.6.1.8.3 Segment 3 - Gross-Marble Pit to Canisteo Pit

Wetlands within the proposed Process Water Supply Pipeline Segment 3 corridor include eight basins that were delineated during the 2005 field surveys and four basins identified by NWI that have not been field investigated. Process Water Supply Pipeline Segment 3 will be constructed between the Gross-Marble Pit and the Canisteo Pit, as shown in Figures 1.5-1 and 1.5-7. This alignment includes a total of 6.17 acres of wetland impacts in the 150-foot wide temporary ROW. However, these impacts would be reduced to 3.79 acres for the 100-foot wide permanent ROW. These wetland impacts are included within the total wetland impacts presented in Table 3.6-26 and Table 3.6-27. Type 6 scrub-shrub wetland would sustain the greatest impacts due to this alternative. There are no water crossings associated with Process Water Supply Pipeline Segment 3. Minimization of wetland impacts during construction and operation is discussed in Section 3.6.4.8.3. Mitigation of wetland impact is discussed in Section 3.6.5.

Table 3.6-26
West Range Process Water Supply Pipeline
Segment 3 – Gross-Marble Pit to Canisteo Pit

Basin ID	Total Wetland Area (acres)	Wetland Classification		Proposed Impact Area	
		Cowardin	Circular 39	Temporary ROW	Permanent ROW
				Acres	Acres
C10	4.89	PSS1A	Type 6	1.77	0.92
C12	0.67	PSS1C	Type 6	0.17	0.12
C19	1.42	PEM2H	Type 5	0.64	0.20
C21	0.69	PSS1C	Type 6	0.23	0.16
C22	0.09	PSS1C	Type 6	0.02	0
C23	0.62	PSS1C/ PFO1C	Type 6/7	0.27	0.18
C24	0.48	PFO2B	Type 8	0.14	0.02
C28	1.77	PFO1C	Type 7	1.10	0.98
NWI Basin*	1 basin	n/a	Type 4	0.62	0.42
NWI Basin*	1 basin	n/a	Type 6	0.26	0.13
NWI Basin*	1 basin	n/a	Type 7	0.46	0.31
NWI Basin*	1 basin	n/a	Type 8	0.49	0.35
			Total	**6.17**	**3.79**

* Note: NWI basins are those areas that have not been field investigated, therefore total acreage is not available, only an estimate of impacts to the wetland area. Cowardin classifications are not provided due to variability in codes for wetlands of the same type.

Table 3.6-27 summarizes the permanent impacts to wetlands by classification.

Table 3.6-27
Wetland Impacts by Type at Segment 3

Wetland Classification	Total Area (Acres)	
Circular 39 Type	Temporary ROW	Permanent ROW
Type 1	0	0
Type 2	0	0
Type 3	0	0
Type 4	0.62	0.42
Type 5	0.64	0.20
Type 6	2.45	1.33
Type 6/7	0.27	0.18
Type 7	1.56	1.29
Type 8	0.63	0.37
Total	**6.17**	**3.79**

3.6.1.9 West Range Process Water Blowdown Pipeline 1

Wetlands within the proposed Process Water Blowdown Pipeline 1 include three basins that were delineated during the 2005 field surveys and one basin identified by NWI that has not been field investigated. Process Water Blowdown Pipeline 1 will be constructed from the facility to Holman Lake, as shown in Figures 1.5-1 and 1.5-7. This alignment includes a total of 5.86 acres of wetland impacts in the 150-foot wide temporary ROW. However, these impacts would be reduced to 4.07 acres for the 100-foot wide permanent ROW. The largest impact for Process Water Blowdown Pipeline 1 is within Wetland A1, the large wetland complex near the southern boundary of the West Range Buffer Land. A summary of wetlands and proposed impacts is provided in 3.6-28 and 3.6-29. Minimization of wetland impacts during construction and operation is discussed in Section 3.6.4.9. Mitigation of wetland impact is discussed in Section 3.6.5.

Table 3.6-28
West Range Process Water Blowdown Pipeline 1 Wetland Impacts

Basin ID	Total Wetland Area Delineated (acres)	Wetland Classification		Proposed Impact Area	
		Cowardin	Circular 39	Temporary ROW	Permanent ROW
				Acres	Acres
A1	78.26	PEMB/ PSS1B/PFO4	Type 3/6/8	4.35	2.87
C24	0.48	PFO2B	Type 8	0.02	0.001
C28	1.77	PFO1C	Type 7	1.08	0.88
NWI Basin*	1 basin	n/a	Type 6	0.41	0.32
			Total	**5.86**	**4.07**

* Note: NWI basins are those areas that have not been field investigated, therefore total acreage is not available, only an estimate of impacts to the wetland area. Cowardin classifications are not provided due to variability in codes for wetlands of the same type.

Table 3.6-29 summarizes the permanent impacts to wetlands by classification.

Table 3.6-29
Wetland Impacts by Type at West Range Process Water Blowdown Pipeline 1

Wetland Classification	Total Area (Acres)	
Circular 39 Type	**Temporary ROW**	**Permanent ROW**
Type 1	0	0
Type 2	0	0
Type 3	0	0
Type 3/6/8	4.35	2.87
Type 4	0	0
Type 5	0	0
Type 6	0.41	0.32
Type 7	1.08	0.88
Type 8	0.02	0.001
Total	**5.86**	**4.07**

Process Water Blowdown Pipeline 1 will impact wetlands and waterbodies through open-cut trenching. Section 3.3.1.1.9 describes options and requirements for installing Process Water Blowdown Pipeline 1 given the type of soils expected. Two water crossings are associated with Process Water Blowdown Pipeline 1, a perennial stream between Little Diamond Lake and the CMP at Milepost 1+3990 (ft) and a perennial stream that drains to Holman Lake at Milepost 2+2280, as shown in Figure 3.1-8.

Wetland impacts include the total length of the crossing through waterbodies and adjacent wetlands. A summary of these impacts is provided in Table 3.6-30. 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 and are included within the total wetland impacts presented in Table 3.6-28 and Table 3.6-29. Wetland habitats associated with the water crossings that will be affected include 7,500 ft^2 (0.17 acres) in the temporary ROW and 5,000 ft^2 (0.11 acres) in the permanent ROW.

The perennial stream draining from Little Diamond Lake and the perennial stream draining to Holman Lake are both protected waters as listed in the MDNR Protected Waters Inventory. A License for Utility Crossings of Public Lands and Waters granted by the MDNR Division of Lands and Minerals will be required to complete the water crossings over both of these water bodies for Process Water Blowdown Pipeline 1.

Table 3.6-30
Wetland Impacts at Stream Crossings for Process Water Blowdown Pipeline 1

Stream Crossing Location	Milepost (mile + linear ft)	MDNR PWI?	Length of Crossing (linear ft)	Wetland Impacts			
				Temporary ROW		Permanent ROW	
				Square Ft	Linear Ft	Square Ft	Linear Ft
Perennial stream from Little Diamond Lake	1+3990	Yes	3	6,000	40	4,000	40
Perennial stream, drains to Holman Lake	2+2280	Yes	3	1,500	10	1,000	10
		Total	**6 lf**	**7,500**	**50**	**5,000**	**50**
				0.17 acres		**0.11 acres**	

3.6.1.10 West Range Process Water Blowdown Pipeline 2

A summary of wetlands and proposed impacts is provided in Tables 3.6-31 and 3.6-32 Minimization of wetland impacts during construction and operation is discussed in Section 3.6.4.10. Wetlands within the proposed Process Water Blowdown Pipeline 2 include one basin that was delineated during the 2005 field surveys and two basins identified by NWI that have not been field investigated. Process Water Blowdown Pipeline 2 will be constructed from the facility to the Canisteo Pit accounting for the conditions identified in Sections 3.3.1.1.10. This alignment includes a total of 20.38 acres of wetland impacts in the 150-foot wide temporary ROW. However, these impacts would be reduced to 13.60 acres for the 100-foot wide permanent ROW. The largest impacts of Process Water Blowdown Pipeline 1 would be within Type 6 and 8 wetlands. There are no streams, rivers, or bodies of water that will be crossed for the Process Water Blowdown Pipeline 2.

Table 3.6-31
West Range Process Water Blowdown Pipeline 2
Wetland Impacts

Basin ID	Total Wetland Area Delineated (acres)	Wetland Classification		**Proposed Impact Area**	
		Cowardin	Circular 39	**Temporary ROW**	**Permanent ROW**
				Acres	**Acres**
A13	0.45	PFO1B	Type 7	0.35	0.24
NWI Basin*	2 basins	n/a	Type 6	8.46	5.71
NWI Basin*	7basins	n/a	Type 8	11.57	7.65
			Total	**20.38**	**13.60**

* Note: NWI basins are those areas that have not been field investigated, therefore total acreage is not available, only an estimate of impacts to the wetland area. Cowardin classifications are not provided due to variability in codes for wetlands of the same type.

Table 3.6-32 summarizes the permanent impacts to wetlands by classification.

Table 3.6-32
Wetland Impacts by Type at West Range
Process Water Blowdown Pipeline 2

Wetland Classification	Total Area (Acres)	
Circular 39 Type	**Temporary ROW**	**Permanent ROW**
Type 1	0	0
Type 2	0	0
Type 3	0	0
Type 4	0	0
Type 5	0	0
Type 6	8.46	5.71
Type 7	0.35	0.24
Type 8	11.57	7.65
Total	**20.38**	**13.60**

3.6.1.11 West Range Potable Water and Sewer Pipelines

Wetlands within the proposed sewer and water corridor include four basins that were delineated during the 2005 field surveys. Sewer and water alignments for the West Range IGCC Power Station are shown in Figures 1.5-1 and 1.5-7. This alignment includes a total of 4.48 acres of wetland impacts in the 100-foot temporary ROW. However, these impacts would be reduced to 1.79 acres for the 40-foot permanent ROW. The largest impact for the sewer and water are within Wetland A1, the large wetland complex near the southern boundary of the West Range Buffer Land. There are no water crossings associated with the water and sewer lines. A summary of wetlands and proposed impacts is provided in Tables 3.6-33 and 3.6-34. Minimization of wetland impacts during construction and operation is discussed in Section 3.6.4.11. Mitigation of wetland impact is discussed in Section 3.6.5.

Table 3.6-33
West Range Potable Water and Sewer Pipelines
Wetland Impacts.

Basin ID	Total Wetland Area Delineated (acres)	Wetland Classification		Proposed Impact Area	
		Cowardin	Circular 39	Temporary ROW Acres	Permanent ROW Acres
A1	78.26	PEMB/ PSS1B/PFO4	Type 3/6/8	2.84	1.14
A13	0.45	PFO1B	Type 7	0.20	0.06
C10	4.89	PSS1A	Type 6	0.46	0.13
C28	1.77	PFO1C	Type 7	0.98	0.46
			Total	**4.48**	**1.79**

Table 3.6-34 summarizes the permanent impacts to wetlands by classification.

Table 3.6-34
Wetland Impacts by Type for
West Range Potable Water and Sewer Pipelines

Wetland Classification	Total Area (Acres)	
Circular 39 Type	Temporary ROW	Permanent ROW
Type 1	0	0
Type 2	0	0
Type 3	0	0
Type 3/6/8	2.84	1.14
Type 4	0	0
Type 5	0	0
Type 6	0.46	0.13
Type 7	1.18	0.52
Type 8	0	0
Total	**4.48**	**1.79**

3.6.1.12 West Range Railroad Alternative 1A

Wetland impacts for the West Range Railroad Alternative 1A 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 80 – 450 feet for this alternative. The railroad alternatives are the only utility or transportation corridors that have construction limit widths established. Therefore these data were used to calculate wetland impacts anticipated due to construction of the railroad. In some instances, temporary impacts may be identified that are less than those impacts identified for the permanent ROW. There are no areas in the railroad

alternatives where wetland impacts will be temporary in nature because the grading in the construction limits is necessary to set grades for the railroad bed.

Wetlands affected by West Range Railroad Alternative 1A include a total of 11 wetlands that were delineated during the 2005 field surveys. For the rail line, permanent wetlands within the construction limits (temporary ROW) are estimated at 26.45 acres. This includes the permanent wetland impacts estimated within the permanent ROW at 12.23 acres. The center loop of the rail spur for Alternative 1A has an estimated 64.85 acres of permanent impacts to Type 7 wetland (Wetland A4). However, these impacts may be reduced upon completion of final design when the layout of storage areas within the center loop is determined. No water crossings associated with Railroad Alternative 1A have been identified based on NWI, USGS, and MDNR PWI mapping resources. A summary of wetlands and proposed impacts is provided in the following Tables 3.6-35 and 3.6-36. Minimization of wetland impacts during construction and operation is discussed in Section 3.6.4.12. Mitigation of wetland impact is discussed in Section 3.6.5.

Table 3.6-35
West Range Rail Line Alternative 1A Wetland Impacts.

Basin ID	Total Wetland Area Delineated (acres)	Wetland Classification		Proposed Impact Area (Acres)	
		Cowardin	Circular 39	Permanent Impacts in Construction Limits	Permanent Impacts in Permanent ROW
A1	78.26	PEMB/PSS1B/PFO4	Type 3/6/8	1.52	0.63
A3	0.10	PFO1C	Type 7	0.10	0.09
A4	96.34	PFO1C	Type 7	19.31	7.69
C12	0.67	PSS1C	Type 6	0.45	0.14
C13	0.90	PSS1C/PFO1C	Type 6/7	0.09	0
C15	1.36	PSS1C	Type 6	0.002	0
C16	6.12	PEMC	Type 6	2.53	2.49
C20	4.18	PEMC/PSS1C	Type 3/6	0.19	0.23
D8	2.61	PEMC/PFO1C/PFO4B	Type 3/7/8	0.58	0.35
D10	0.75	PEMC/PSS1C	Type 3/6	0.49	0.24
E6	0.42	PEMC	Type 3	0.14	0.11
NWI Basin*	2 basins	n/a	Type 6	1.05	0.26
			Subtotal	**26.45**	**12.23**
Center Loop					
A4	96.34	PFO1C	Type 7	n/a	64.85
			Total	**26.45**	**77.08**

* Note: NWI basins are those areas that have not been field investigated, therefore total acreage is not available, only an estimate of impacts to the wetland area. Cowardin classifications are not provided due to variability in codes for wetlands of the same type.

Table3.6-36 summarizes the permanent impacts to wetlands by classification.

Table 3.6-36
Wetland Impacts by Type for Rail Line Alternative 1A and Center Loop

Wetland Classification	Total Area (Acres)	
Circular 39 Type	**Permanent Impacts in Construction Limits**	**Permanent Impacts in Permanent ROW**
Type 1	0	0
Type 2	0	0
Type 3	0.14	0.11
Type 3/6	0.68	0.47
Type 3/7/8	0.58	0.35
Type 3/6/8	1.52	0.63
Type 4	0	0
Type 5	0	0
Type 6	4.03	2.89
Type 6/7	0.09	0
Type 7	19.41	72.63
Type 8	0	0
Total	**26.45**	**77.08**

3.6.1.13 West Range Rail Line Alternative 1B

Wetland impacts for the West Range Railroad Alternative 1B 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 60 – 760 feet for this alternative. The railroad alternatives are the only utility or transportation corridors that have construction limit widths established. Therefore these data were used to calculate wetland impacts anticipated due to construction of the railroad. In some instances, there may be temporary impacts identified that are less than those impacts identified for the permanent ROW. This occurs in areas where the construction limits (temporary ROW) are less than the permanent ROW width. Regardless of the location of the impacts, grading that occurs within the construction limits (temporary ROW) and the permanent ROW will include permanent impacts to all wetlands within these ROWs. There are no areas in the railroad alternatives where wetland impacts will be temporary in nature because the grading in the construction limits is necessary to set grades for the railroad bed.

Wetlands within the West Range Railroad Alternative 1B include a total of 18 wetlands that were delineated during the 2005 field surveys. For the rail line, permanent wetlands within the construction limits (temporary ROW) are estimated at 18.11 acres. This includes the permanent

wetland impacts estimated within the permanent ROW at 12.00 acres. The center loop of the rail spur for Alternative 1B has an estimated 52.23 acres of permanent impacts to Type 7 wetland (Wetland A4). However, these impacts may be reduced upon completion of final design when the layout of storage areas within the center loop is determined. No water crossings associated with Railroad Alternative 1B have been identified based on NWI, USGS, and MDNR PWI mapping resources. A summary of wetlands and proposed impacts is provided in Tables 3.6-37 and 3.6-38. Minimization of wetland impacts during construction and operation is discussed in Section 3.6.4.13. Mitigation of wetland impact is discussed in Section 3.6.5.

Table 3.6-37
West Range Rail Line Alternative 1B Wetland Impacts

Basin ID	Total Wetland Area Delineated (acres)	Wetland Classification		**Proposed Impact Area (Acres)**	
		Cowardin	Circular 39	**Temporary Impacts in Construction Limits**	**Permanent ROW**
A4	96.34	PFO1C	Type 7	9.79	5.84
B5	0.02	PFO1A	Type 7	0.02	0.02
B6	0.03	PFO1A	Type 7	0.03	0.03
B7	0.03	PFO1A	Type 7	0.03	0.001
B8	0.06	PFO1A	Type 7	0.06	0.003
B9	0.29	PFO1A	Type 7	0.16	0
B10	0.06	PFO1A	Type 7	0.06	0.03
C4	45.95	PEM1H/PSS1BC/ PFO1BC	Type 5/6/7	1.11	1.05
C9	6.48	PSS1B/PFO7B	Type 6/8	1.84	1.87
C11	0.88	PEM2H	Type 5	0.86	0.11
C12	0.67	PSS1C	Type 6	0.24	0.09
C13	0.90	PSS1C/PFO1C	Type 6/7	0.72	0.13
C15	1.36	PSS1C	Type 6	0.002	0
C16	6.12	PEMC	Type 6	2.53	2.49
C20	4.18	PEMC/PSS1C	Type 3/6	0.19	0.23
C26	0.12	PFO1C	Type 7	0.12	0
D3	0.01	PEMC/PFO1C	Type 3/7	0.01	0
E6	0.42	PEMC	Type 3	0.14	0.11
NWI Basin*	1 basin	n/a	Type 7	0.20	0
			Subtotal	**18.11**	**12.00**
Center Loop					
A4	96.34	PFO1C	Type 7	n/a	52.23
			Total	**18.11**	**64.23**

* Note: NWI basins are those areas that have not been field investigated, therefore total acreage is not available, only an estimate of impacts to the wetland area. Cowardin classifications are not provided due to variability in codes for wetlands of the same type.

Table 3.6-38 summarizes the permanent impacts to wetlands by classification.

Table 3.6-38
Wetland Impacts by Type for Rail Line Alternative 1B and Center Loop

Wetland Classification	Total Area (Acres)	
Circular 39 Type	**Permanent Impacts in Construction Limits**	**Permanent Impacts in Permanent ROW**
Type 1	0	0
Type 2	0	0
Type 3	0.14	0.11
Type 3/6	0.19	0.23
Type 3/7	0.01	0
Type 4	0	0
Type 5	1.97	1.16
Type 6	2.77	2.58
Type 6/7	0.72	0.13
Type 6/7/8	1.84	1.87
Type 7	10.47	58.15
Type 8	0	0
Total	**18.11**	**64.23**

3.6.1.14 West Range Roads

Wetlands within the proposed road corridors include ten basins that were delineated during the 2005 field surveys and four basins identified by NWI that have not been field investigated. Roads proposed for the West Range Phase I & II Developments are identified in Section 1.12.3.2. A total of 10 wetlands have been delineated and mapped within the road corridors during the 2005 field seasons. Four additional wetland areas within the road corridors were not delineated due access constraints. Roads that will serve the facility will impact a total of 9.72 acres of wetlands in the 200-foot temporary ROW. However, these impacts would be reduced to 5.67 acres for the 120-foot permanent ROW. The largest wetland impacts for roads are within Wetland A1, the large wetland complex near the southern boundary of the West Range Buffer Land. There are no water crossings associated with the roads. A summary of wetlands and proposed impacts is provided in Tables 3.6-39 and 3.6-40. Minimization of wetland impacts during construction and operation is discussed in Section 3.6.4.14. Mitigation of wetland impact is discussed in Section 3.6.5.

Table 3.6-39
West Range Roads Wetland Impacts

Basin ID	Total Wetland Area Delineated (acres)	Wetland Classification		**Proposed Impact Area**	
		Cowardin	Circular 39	**Temporary ROW**	**Permanent ROW**
				Acres	**Acres**
A1	78.26	PEMB/ PSS1B/PFO4	Type 3/6/8	5.84	3.44
A13	0.45	PFO1B	Type 7	0.39	0.24
A14	0.44	PFO1B	Type 7	0.26	0.14
A27	0.07	PFO1C	Type 7	0.002	0
C21	0.69	PSS1C	Type 6	0.51	0.33
C22	0.09	PSS1C	Type 6	0.09	0.09
C23	0.62	PSS1C/ PFO1C	Type 6/7	0.50	0.36
C24	0.48	PFO2B	Type 8	0.44	0.34
C26	0.12	PFO1C	Type 7	0.03	0
C27	1.28	PFO1C	Type 7	0.35	0.01
NWI Basin*	1 basin	n/a	Type 4	0.60	0.43
NWI Basin*	1 basin	n/a	Type 6	0.09	0
NWI Basin*	1 basin	n/a	Type 7	0.32	0.19
NWI Basin*	1 basin	n/a	Type 8	0.30	0.10
Total				9.72	5.67

* Note: NWI basins are those areas that have not been field investigated, therefore total acreage is not available, only an estimate of impacts to the wetland area. Cowardin classifications are not provided due to variability in codes for wetlands of the same type.

Table 3.6-40 summarizes the permanent impacts to wetlands by classification.

Table 3.6-40
Wetland Impacts by Type for Roads

Wetland Classification	**Total Area (Acres)**	
Circular 39 Type	**Temporary ROW**	**Permanent ROW**
Type 1	0	0
Type 2	0	0
Type 3	0	0
Type 3/6/8	5.84	3.44
Type 4	0.60	0.43
Type 5	0	0
Type 6	0.69	0.42
Type 6/7	0.50	0.36

Wetland Classification	Total Area (Acres)	
Type 7	1.352	0.58
Type 8	0.74	0.44
Total	**9.72**	**5.67**

3.6.2 Impacts and Consequences – Alternative Site (East Range)

The following sections describe the wetland impacts, wetland regulatory agency implications and requirements, wetland permitting processes, and wetland mitigation needs for the East Range IGCC Power Station Footprint, Buffer Land and Associated Facilities.

3.6.2.1 East Range Site IGCC Power Station Footprint

As described in Section 3.6.4 of this report, the positioning and configuration of the IGCC Power Station Footprint was planned to minimize wetland impacts, initiating the early stages of wetland impact sequencing (avoidance and minimization, followed by mitigation as necessary). Wetland impact avoidance and minimization will be refined through the final design process for this facility and other elements of the project. The early planning stages will involve general efforts to avoid and minimize wetland impacts followed by additional steps that refine and detail sequencing measures later in the planning and design of the project.

Table 3.6-41 provides a summary of impacts per wetland as identified by its unique ID assigned when delineated. Impacts by wetland classification are also summarized. Descriptions of the wetlands found within the East Range IGCC Power Station Footprint and Buffer Land are provided in Section 2.7 of this report.

Table 3.6-41
Wetland Impacts - East Range Site Facility

Basin ID	Total Area Surveyed (acres)	Wetland Classification		Proposed Impact Area (acres)		
		Cowardin	Circular 39	Phase 1	Phase 2	Total
A	0.09	PEMC	Type 2	0	0.003	0.003
B	5.53	PFOC	Type 7	5.53	0	5.53
C	321.63	PEMC/PEMA/ PFOC/PSS1B/ PFO2B/PEMF/ PEMH	Type 2/Type 3/ Type 4/ Type6/ Type 7/Type 8	6.38	3.70	10.08
D	1.60	PSS1B	Type 6	0	0	0
Total Acres	**328.84**			**11.91**	**3.70**	**15.61**

Wetland impacts for the East Range IGCC Power Station Footprint are 15.61 acres. These wetlands are primarily Type 7 forested basins. The greatest amount of impacts for the facility site would be to Wetland C, a large wetland complex comprised of many wetland types, though predominantly Type 7 wooded swamp.

As seen in Table 3.6-42, Type 7 wetlands are the most abundant wetland type present within the project limits and have the most impacts for both phases. The Phase II IGCC Power Station involves less wetland impact acreage and affects a very small portion of Type 2 wetland that is not impacted by the Phase I Development. The Phase I Development will impact the majority of wetlands affected by the Phase I & II IGCC Power Station, most of which impact affects Type 7 wetlands. Of the 328.84 acres of wetlands delineated within the IGCC Power Station Footprint and Buffer Land, the Phase I Development would impact a total of 11.91 acres of wetland and the Phase II Development would impact a total of 3.70 acres of wetland. Minimization of wetland impacts during construction and operation is discussed in Section 3.6.4.15. Mitigation of wetland impact is discussed in Section 3.6.5.

Table 3.6-42
Wetland Impacts by Type – East Range Site IGCC Power Station Footprint

Circular 39	Total Acres in IGCC Power Station Footprint and Buffer Land Surveyed	Phase 1 Impacts (Acres)	Phase II Impacts (Acres)	Total IGCC Power Station Footprint Impacts (Acres)
Type 2	0.09	0	0.003	0.003
Type 2/3/4/6/7/8	321.63	6.38	3.70	10.08
Type 6	1.6	0	0	0
Type 7	5.53	5.53	0	5.53
Total	**328.84 acres**	**11.91 acres**	**3.70 acres**	**15.61 acres**

3.6.2.2 East Range HVTL Alternative 1

Figures 1.5-2 and 1.5-10 describe the proposed alignment for HVTL Alternative 1. The proposed HVTL Alternative 1 does not impact any of the wetlands delineated during the 2004 or 2005 field seasons. The HVTL Alternative 1 alignment does, however, impact wetlands as they appear on the NWI maps in locations that were not field delineated. The alignment for the HVTL describes the permanent ROW only, as no temporary ROW has been described for the alignment. Permanent wetland impacts will be limited to those areas where overhead utility poles will be placed within wetland habitat. To the extent practicable, wetlands will be avoided for installation of the HVTL. Construction activities are planned during the winter months to further minimize direct impacts to wetlands

Both HVTL alternative routes primarily follow existing 115-kV, 100-foot HVTL ROW. Under Alternative 1, an additional 30 feet of new ROW will be acquired along the existing 37L/39L ROW. There is also one area within Alternative 1 that will require establishing a new 100-foot ROW for the HVTL. This new ROW consists of an approximately 2-mile section from the East Range IGCC Power Station to the Syl Laskin Substation (see Figure 1.5-54). This 2-mile section of new ROW is necessary for either HVTL 1 or HVTL 2, regardless of which alternative is chosen.

Typically, clearing of vegetation would be anticipated throughout the corridor, including wetland areas. However, because this corridor is already established and maintained free of trees and shrubs, vegetation clearing in wetlands would only be necessary in those areas where newly acquired ROW would be established. In the future, maintenance of the ROW would likely include clearing of trees and shrubs that re-establish in wetlands. This maintenance would be completed during the winter months to avoid direct impacts to wetlands or any nesting birds, in compliance with the federal Migratory Bird Treaty Act. Clearing of trees and shrubs in the future is not anticipated to include grubbing of stumps or roots and, therefore, soils would not be disturbed in these areas and direct wetland impacts (e.g., draining, excavating, filling) will be avoided to maintain the permanent HVTL ROW. Typically, tree and shrub clearing would be anticipated in Type 6, 7, and 8 wetlands, but wet meadow, emergent marsh, and open water wetlands (Types 1-5) would not require clearing of vegetation.

The total acres of wetlands within the permanent ROW for HVTL Alternative 1 are summarized below in Table 3.6-43. The additional acreage of wetlands within the additional 30-foot of ROW to be acquired is also provided. Wetlands within the existing 100-foot ROW are not anticipated to be cleared of trees and shrubs for HVTL Alternative 1 because the existing ROW is already maintained free of trees and shrubs. However, on the additional 30-foot of new ROW and on the 2-mile section to the Syl Laskin Substation to be acquired, these areas would require clearing of trees and shrubs in Type 6 (scrub-shrub), Type 7 (forested), and Type 8 (bogs with trees) wetlands. The wetlands identified within the proposed new ROW areas are based on NWI map resources and have not been field surveyed; therefore, some Type 8 bog areas may be treeless. However, for the purposes of this evaluation, it was assumed that all Type 8 wetlands contained trees that would require clearing.

The following table provides a summary of total wetland areas within HVTL Alternative 1 and estimated impacts of tree and shrub clearing in Types 6, 7, and 8 wetlands. Wetland areas and estimated tree and shrub clearing acreages are also described for the additional 30-foot of new ROW paralleling the existing ROW, and the 150-foot new ROW described near the Syl Laskin Substation.

The existing 100-foot ROW has an estimated 132.46 acres of wetlands. None of these areas would require tree or shrub clearing as this ROW is already maintained free of trees and shrubs for the existing power line. The proposed new 30-foot ROW that would parallel the existing 100-foot ROW has an estimated 27.06 acres of wetland, of which 26.31 acres of Types 6-8 wetlands would require tree and shrub clearing. The proposed new 100-foot ROW that would extend between the East Range IGCC Power Station and the Syl Laskin Substation has an estimated 4.80 acres of wetlands, of which 2.91 acres would require tree and shrub clearing. Wetland Types 1-5 would not require tree or shrub clearing. A total of 29.22 acres wetlands would have tree and shrub clearing impacts, as summarized in Table 3.6-43 below.

Table 3.6-43
East Range HVTL Alternative 1 Tree and Shrub Clearing in Wetlands

NWI Basins	Total Wetland Area (Acres)			Total Tree and Shrub Clearing Area (Acres) [1]		
Circular 39 [2]	Existing 100-ft ROW	30-foot New ROW	100-foot New ROW to Syl Laskin Substation	Existing 100-ft ROW[3]	30-foot New ROW	100-foot New ROW to Syl Laskin Substation
2	2.18	0.58	0.31	0	0	0
3	0	0	0	0	0	0
5	0.62	0.10	1.58	0	0	0
6	50.52	11.96	2.91	0	11.96	2.91
7	6.44	2.65	0	0	2.65	0
8	40.65	11.70	0	0	11.70	0
Riverine	0.19	0.07	0	0	0	0
Total	**100.60**	**27.06**	**4.80**	**0**	**26.31**	**2.91**
Total Wetland Area: 132.46 acres				**Total Tree and Shrub Clearing: 29.22 acres**		

[1] Tree and shrub clearing limited to Wetland Types 6, 7, and 8.
[2] NWI basins are those areas that have not been field investigated. Only Circular 39 classifications are provided due to variability in codes for Cowardin *et al.* (1979) system; future wetland permitting and mitigation measures will be based on impacts by wetland type using Circular 39 classification.
[3] Existing ROW is already cleared, therefore no additional tree clearing is anticipated for installation of HVTL Alternative 1.

Direct wetland impacts due to placement of fill material for HVTL Alternative 1 is limited to the small area needed to install each HVTL pole. Approximately 0.05 acres of wetland habitat would be impacted for HVTL Alternative 1, as described in the Tables 3.6-44 and 3.6-45 below. This is based on an alignment with power poles being placed every 650 feet for the HVTL Alternative 1 and the footprint of each power pole requiring approximately 28 ft^2 (area) of fill. A total of 73 power poles would be placed in wetland areas for this alternative. However, if during final design any of these wetland impacts can be further minimized by adjusting the pole placement, this will be considered. The maximum expanse length between poles is approximately 1,000 linear feet. Further minimization of impacts for particularly small wetlands is possible where a pole location may be adjusted by a few hundred feet or less outside of a wetland area. Minimization of wetland impacts during construction and operation is discussed in Section 3.6.4.16. Mitigation of wetland impact is discussed in Section 3.6.5.

Table 3.6-44
East Range HVTL Alternative 1 Wetland Impacts

Basin ID	Number of Wetland Basins	Wetland Classification		Proposed Impact Area	
		Cowardin	Circular 39	**# Poles**	**Acres**
NWI Basin*	3 basins	n/a	2	3	0.0019
NWI Basin*	1 basin	n/a	5	1	0.0006
NWI Basin*	19 basins	n/a	6	33	0.0211
NWI Basin*	4 basins	n/a	7	5	0.0030
NWI Basin*	14 basins	n/a	8	30	0.0189
NWI Basin*	1 basin	n/a	Riverine	1	0.0006
			Total	**73**	**0.05 acres**

* Note: NWI basins are those areas that have not been field investigated, therefore total acreage is not available, only an estimate of impacts to the wetland area. Cowardin classifications are not provided due to variability in codes for wetlands of the same type.

Table 3.6-45 summarizes the permanent impacts to wetlands by classification.

Table 3.6-45
Wetland Impacts by Type for HVTL Alternative 1

Wetland Classification	**Wetland Impacts**
Circular 39 Type	**Acres**
Type 1	0
Type 2	0.0019
Type 3	0
Type 4	0
Type 5	0.0006
Type 6	0.0211
Type 7	0.0030
Type 8	0.0189
Riverine	0.0006
Total	**0.05 acres**

There are 21 crossings of streams or water bodies associated with HVTL Alternative 1. Placement of the power poles supporting the HVTL will be designed to avoid direct impacts to streams, rivers, or other bodies of water within the project area. The average expanse between poles will be approximately 650 feet, but in sensitive or otherwise important areas that should be avoided, the expanse between power poles may be shortened or lengthened to whatever length necessary to avoid or mitigate wetland impacts. Because of this, wetland impacts within the bed of any water bodies will be avoided. The total length of water crossings for HVTL Alternative 1

is estimated at 1,194 linear feet. A summary of the length of each water body crossing for HVTL Alternative 1 is provided in the following table.

Colby Lake (249P) and an unnamed pond (430W) are lakes protected by the MDNR. There are also nine rivers and streams that are protected by the MDNR. Table 3.6-46 below describes which impacted wetlands are protected. The water crossings over Colby Lake, the unnamed pond, and the protected rivers and streams will require a License for Utility Crossings of Public Lands and Waters granted by the MDNR Division of Lands and Minerals.

Table 3.6-46
Stream Crossings for HVTL Alternative 1

Water Crossing Location	Milepost (mile + linear ft)	MDNR PWI?	Length of Crossing (linear ft)	Permanent Wetland Impact (acres)
Colby Lake	1+4670	Yes—249P	540	0
Partridge River	5+1190	Yes	110	0
Perennial Tributary to St. Louis River	6+3680	No	3	0
Perennial Tributary to St. Louis River	6+4590	Yes	3	0
Perennial Tributary to St. Louis River	8+1215	No	3	0
Perennial Tributary to St. Louis River	8+2420	No	3	0
Unnamed Pond	9+0480	Yes—430W	180	0
Perennial Stream between North and South Cedar Island Lake	11+1780	Yes	60	0
Perennial Stream South of Forge Lake	13+1850	No	95	0
Perennial Tributary to Esquagama Lake	15+0670	Yes	3	0
Perennial Ditch to Esquagama Lake	15+3590	No	3	0
Perennial Tributary to Embarrass River	16+3900	No	60	0
Intermittent Stream to Embarrass River	16+4900	No	3	0
Ely Creek	22+0090	Yes	3	0
Perennial Stream south of Half Moon Lake	23+4750	No	3	0
Intermittent Stream north of Long Lake Creek	26+4020	No	3	0
Long Lake Creek	27+0360	Yes	3	0

Perennial Stream north of St. Louis River	29+3250	Yes	3	0
Elbow Creek	30+1230	Yes	15	0
Perennial Stream north of Elbow Creek	30+4100	No	3	0
Two River (in 3 places due to meander)	31+2840	Yes	95	0
Totals			**1194**	**0**

3.6.2.3 East Range HVTL Alternative 2

Section 1.5.3.3.1 of the EIV describes the proposed alignment for HVTL Alternative 2. Under this route alternative, the additional 30 feet of ROW would be taken adjacent to the 38L corridor instead of the 37L/39L corridor. As with Alternative 1, this proposed route does not impact any of the wetlands delineated during the 2004 or 2005 field seasons. The HVTL Alternative 2 alignment does, however, impact wetlands as they appear on the NWI maps in locations that were not field delineated. The alignment for the HVTL describes the permanent ROW only, as no temporary ROW has been described for the alignment. Permanent wetland impacts will be limited to those areas where overhead utility poles will be placed within wetland habitat. To the extent practicable, wetlands will be avoided for installation of the HVTL. Construction activities are planned during the winter months to further minimize direct impacts to wetlands.

The majority of HVTL Alternative 2 is proposed within an existing 100-foot power utility ROW. An additional 30 feet of new ROW will be acquired along and will run parallel to the existing 37L/39L ROW. There are also two areas within Alternative 2 that will require establishing new ROW. Similar to HVTL Alternative 1, a new 2-mile section of 100-foot ROW from the East Range IGCC Power Station facility to the Syl Laskin Substation would be acquired (see Figure 1.5-54). This 2-mile section of new ROW would be necessary under either HVTL Alternative 1 or 2, regardless of which alternative is chosen. The other area of new ROW would be a 150-foot wide corridor extending approximately 7,500 linear feet from just west of Eveleth and southward to the Thunderbird Mine Substation.

Typically clearing of vegetation would be anticipated throughout the corridor, including wetland areas. However, because this corridor is already established and maintained free of trees and shrubs, vegetation clearing in wetlands would only be necessary in those areas where newly acquired ROW would be established. In the future, maintenance of the ROW would likely include clearing of trees and shrubs that re-establish in wetlands. This maintenance would be completed during the winter months to avoid direct impacts to wetland or any nesting birds, in compliance with the federal Migratory Bird Treaty Act. Clearing of trees and shrubs in the future is not anticipated to include grubbing of stumps or roots and, therefore, soils would not be disturbed in these areas and direct wetland impacts (e.g., draining, excavating, filling) would be avoided to maintain the permanent HVTL ROW. Typically tree and shrub clearing would be anticipated in Type 6, 7, and 8 wetlands, but wet meadow, emergent marsh, and open water wetlands (Types 1-5) would not require clearing of vegetation.

The total acres of wetlands within the permanent ROW for HVTL Alternative 2 are summarized below in Table 3.6.-47. The additional acreage of wetlands within the additional 30-foot of ROW to be acquired is also provided. Wetlands within the existing 100-foot ROW are not anticipated to be cleared of trees and shrubs for HVTL Alternative 2 because the existing ROW is already maintained free of trees and shrubs. However, the additional 30-foot new ROW to be acquired would require clearing of trees and shrubs in Type 6 (scrub-shrub), Type 7 (forested), and Type 8 (bogs with trees) wetlands. The wetland areas identified within the additional 30-foot of new ROW are based on NWI map resources and have not been field surveyed; therefore, some Type 8 bog areas may be treeless. However, for the purposes of this evaluation, it was assumed that all Type 8 contained trees that would require clearing.

The following table provides a summary of total wetland areas within HVTL Alternative 2 and estimated impacts of tree and shrub clearing in Types 6, 7, and 8 wetlands. Wetland areas and estimated tree and shrub clearing acreages are also described for the additional 30-foot of new ROW paralleling the existing ROW, and the two areas of new ROW previously described near the Syl Laskin Substation and Thunderbird Mine Substation.

The existing 100-foot ROW has an estimated 72.81 acres of wetlands. None of these areas would require tree or shrub clearing as this ROW is already maintained free of trees and shrubs for the existing power line. The proposed new 30-foot ROW that would parallel the existing 100-foot ROW has an estimated 24.72 acres of wetland, of which 23.48 acres of Types 6-8 wetlands would require tree and shrub clearing. The proposed new 100-foot ROW that would extend between the East Range IGCC Power Station and the Syl Laskin Substation has an estimated 4.80 acres of wetlands, of which 2.91 acres would require tree and shrub clearing. The proposed new 150-foot ROW that would extend to the Thunderbird Mine Substation has an estimated 0.70 acres of wetlands, of which 0.58 acres would require tree and shrub clearing. Wetland Types 1-5 would not require tree or shrub clearing. Total tree and shrub clearing in wetlands for HVTL Alternative 2 is 26.97 acres, which is summarized in Table 3.6-47 below.

Table 3.6-47
East Range HVTL Alternative 2 Tree and Shrub Clearing in Wetlands

NWI Basins	Total Wetland Area (Acres)				Total Tree and Shrub Clearing Area (Acres) [1]			
Circular 39 [2]	Existing 100-ft ROW	30-foot New ROW	100-foot New ROW to Syl Laskin Substation	150-ft New ROW to Thunder-bird Mine Substation	Existing 100-ft ROW [3]	30-foot New ROW	100-foot New ROW to Syl Laskin Substation	150-ft New ROW to Thunder-bird Mine Substation
1	0.002	0	0	0	0	0	0	0
2	1.77	0.40	0.31	0.01	0	0	0	0
3	0	0	0	0.11	0	0	0	0
5	2.59	0.84	1.58	0	0	0	0	0
6	22.02	6.90	2.91	0.58	0	6.90	2.91	0.58
7	12.69	4.49	0	0	0	4.49	0	0
8	33.70	12.09	0	0	0	12.09	0	0
Riverine	0.04	0	0	0	0	0	0	0
Total	**72.81**	**24.72**	**4.80**	**0.70**	**0**	**23.48**	**2.91**	**0.58**
Total Wetland Area: 103.03 acres					**Total Tree and Shrub Clearing: 26.97 acres**			

[1] Tree and shrub clearing limited to Wetland Types 6, 7, and 8.
[2] NWI basins are those areas that have not been field investigated. Only Circular 39 classifications are provided due to variability in codes for Cowardin *et al.* (1979) system; future wetland permitting and mitigation measures will be based on impacts by wetland type using Circular 39 classification.
[3] Existing ROW is already cleared, therefore no additional tree clearing is anticipated for installation of HVTL Alternative 2.

Direct wetland impacts due to placement of fill material for HVTL Alternative 2 is limited to the small area needed to install each HVTL pole. Approximately 0.04 acres of wetland habitat would be impacted for HVTL Alternative 2, as described in the Tables 3.6-48 and 3.6-49, below. This is based on an alignment with power poles being placed every 530 feet and the footprint of each power pole requiring approximately 28 ft^2 (area) of fill. A total of 66 power poles would be placed in wetland areas for this alternative. However, if during final design that any of these wetland impacts can be further minimized by adjusting the pole placement, this will be considered. The maximum expanse length between poles is approximately 1,000 linear feet. Further minimization of impacts for particularly small wetlands is possible where a pole location may be adjusted by a few hundred feet or less outside of a wetland area. Minimization of wetland impacts during construction and operation is discussed in Section 3.6.4.17. Mitigation of wetland impact is discussed in Section 3.6.5.

Table 3.6-48
East Range HVTL Alternative 2 Wetland Impacts

Basin ID	Number of Wetland Basins	Wetland Classification		Proposed Impact Area	
		Cowardin	Circular 39	# Poles	Acres
NWI Basin*	1 basin	n/a	2	1	0.0006
NWI Basin*	3 basins	n/a	5	3	0.0019
NWI Basin*	12 basins	n/a	6	19	0.0123
NWI Basin*	6 basins	n/a	7	13	0.0084
NWI Basin*	17 basins	n/a	8	30	0.0194
			Total	**66**	**0.04 acres**

* Note: NWI basins are those areas that have not been field investigated, therefore total acreage is not available, only an estimate of impacts to the wetland area. Cowardin classifications are not provided due to variability in codes for wetlands of the same type.

Table 3.6-49 summarizes the permanent impacts to wetlands by classification.

Table 3.6-49
Wetland Impacts by Type for HVTL Alternative 2

Wetland Classification	Wetland Impacts
Circular 39 Type	Acres
Type 1	0
Type 2	0.0006
Type 3	0
Type 4	0
Type 5	0.0019
Type 6	0.0123
Type 7	0.0084
Type 8	0.0194
Total	**0.04 acres**

There are 20 crossings of streams or water bodies associated with HVTL Alternative 2. Placement of the power poles supporting the HVTL will be designed to avoid direct impacts to streams, rivers, or other bodies of water within the project area. The average expanse between poles will be approximately 530 feet, 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. Because of this, wetland impacts within the bed of any water bodies will be avoided. The total length of water crossings for HVTL Alternative 2 is

estimated at 1760 linear feet. A summary of the length of each water body crossing for HVTL Alternative 2 is provided in the following table.

Colby Lake (249P) and Deep Lake (666P) are lakes protected by the MDNR. There are also seven rivers and streams that are protected by the MDNR. Table 3.6-50 below describes which impacted wetlands are protected. The water crossings over Colby Lake, Deep Lake, and these streams will require a License for Utility Crossings of Public Lands and Waters granted by the MDNR Division of Lands and Minerals.

Table 3.6-50
Stream Crossings for HVTL Alternative 2

Water Crossing Location	Milepost (mile + linear ft)	MDNR PWI?	Length of Crossing (linear ft)	Permanent Wetland Impacts (acres)
Colby Lake	1+4760	Yes 249 P	540	0
Partridge River	5+3020	Yes	250	0
Perennial Tributary to St. Louis River	7+1110	Yes	80	0
Perennial Tributary to St. Louis River	8+2300	Yes	3	0
Perennial Tributary to St. Louis River	8+2980	No	3	0
Perennial Drainage Ditch to wetland	12+1410	No	6	0
Embarrass River	15+1140	No	3	0
Embarrass River	15+1490	Yes	70	0
Deep Lake	19+2260	Yes 666 P	690	0
Perennial Stream west of Deep Lake (2 crossings in meander)	19+4840	No	6	0
Perennial Stream west of Deep Lake	20+1540	No	3	0
Unnamed Intermittent Stream	22+4080	Yes	3	0
Perennial Ditch to Mine Dump	25+0960	No	3	0
Perennial Stream to Mine Dump	25+1960	No	3	0
Elbow Creek	28+5130	Yes	15	0

Water Crossing Location	Milepost (mile + linear ft)	MDNR PWI?	Length of Crossing (linear ft)	Permanent Wetland Impacts (acres)
Perennial Ditch to East Two River	30+2190	No	3	0
Perennial Stream to East Two River	31+1910	No	3	0
East Two River	32+0810	Yes	70	0
Unnamed Perennial Stream	33+0340	No	3	0
Perennial Ditch to Two River	34+4960	No	3	0
		Total	**1760 linear ft**	**0 acres**

3.6.2.4 East Range Natural Gas Pipeline Alternative 1

The natural gas pipeline for the East Range Site is described in Section 1.5.3.4 The proposed East Range Natural Gas Pipeline does not impact any of the wetlands delineated during the 2004 and 2005 field surveys. The pipeline does, however, impact wetlands that appear on the NWI maps in locations that were not field delineated. Some temporary impacts are needed for construction, but will be mitigated by restoring the wetland upon completion of construction activities. The natural gas pipeline that will serve the facility will impact a total of 67.29 acres of wetlands in the temporary ROW. These impacts would be reduced to 46.81 acres for the permanent ROW. Tables 3.6-51 and 3.6-52 provide a summary of wetlands and proposed impacts due to proposed East Range Natural Gas Pipeline Alternative 1. Minimization of wetland impacts during construction and operation is discussed in Section 3.6.4.18. Mitigation of wetland impact is discussed in Section 3.6.5.

Table 3.6-51
Wetland Impacts – East Range Natural Gas Pipeline Alternative 1

Basin ID	Total Wetland Area (acres)	Wetland Classification		**Proposed Impact Area**	
		Cowardin	Circular 39	**Permanent ROW**	**Temporary ROW**
				Acres	**Acres**
NWI Basin*	3.46	n/a	2	3.46	5.10
NWI Basin*	0.68	n/a	5	0.68	0.96
NWI Basin*	17.58	n/a	6	17.58	25.05
NWI Basin*	6.37	n/a	7	6.37	9.34
NWI Basin*	18.54	n/a	8	18.54	26.59
NWI Basin*	0.18	n/a	Riverine	0.18	0.25
			Total	**46.81**	**67.29**

* Note: NWI basins are those areas that have not been field investigated, therefore total acreage is not available, only an estimate of impacts to the wetland area. Cowardin classifications are not provided due to variability in codes for wetlands of the same type.

Table 3.6-52 summarizes the permanent impacts to wetlands by classification.

Table 3.6-52
Wetland Impacts by Type – East Range Natural Gas Pipeline Alternative 1

Wetland Classification	Total Area (Acres)	
Circular 39 Type	**Permanent ROW**	**Temporary ROW**
Type 1	0	0
Type 2	3.46	5.10
Type 3	0	0
Type 4	0	0
Type 5	0.68	0.96
Type 6	17.58	25.05
Type 7	6.37	9.34
Type 8	18.54	26.59
Riverine	0.18	0.25
Total	**46.81**	**67.29**

The natural gas pipeline will be directionally drilled under streams starting at approximately 100 feet from the edge of each stream bank. This will minimize impacts to wetlands associated with stream crossings, as impacts are limited to those areas on either side of the stream where the pipeline emerges. Section 1.9.2.1.3 describes natural gas pipeline construction methods. The East Range Natural Gas Pipeline Alternative 1 will require crossing approximately 792 linear feet of streams and bodies of water, not including adjacent wetland habitat. Impacts to wetlands due to the stream crossings are based on a 100-foot temporary ROW and 70-foot permanent ROW. Wetland habitats associated with the stream crossings that will be affected where the pipeline emerges on either side of the crossing include 920,000 ft^2 (21.12 acres) in the temporary ROW. These impacts are temporary in nature and will be wetlands will be replaced upon completion of the installation. The pipeline will also impact 644,000 ft^2 (14.78 acres) in the permanent ROW.

Colby Lake (249P) and 12 streams and rivers impacted by Natural Gas Pipeline Alternative 1 are protected by the MDNR. Table 3.6-53 below describes which impacted wetlands are protected. The water crossings over Colby Lake and these streams will require a License for Utility Crossings of Public Lands and Waters granted by the MDNR Division of Lands and Minerals.

Table 3.6-53
Wetland Impacts at Water Crossings for East Range Natural Gas Pipeline Alternative 1

Water Crossing Location	Milepost (mile + linear ft)	MDNR PWI?	Length of Crossing (linear ft)	Wetland Impacts			
				Temporary ROW		Permanent ROW	
				Square Ft	Linear Ft	Square Ft	Linear Ft
Elbow Creek – West Side	1+3580	Yes	20	6,000	60	4,200	60
Elbow Creek – East Side				0	0	0	0
Unnamed Perennial Stream- West Side	4+1010	No	3	32,000	320	22,400	320
Unnamed Perennial Stream – East Side				54,000	540	37,800	540
Perennial Stream from Mud to Horseshoe Lake – West Side	5+2840	Yes	3	17,000	170	11,900	170
Perennial Stream from Mud to Horseshoe Lake – East Side				4,000	40	2,800	40
Perennial Ditch from Airport to Ely Creek – West Side	8+0550	No	3	0	0	0	0
Perennial Ditch from Airport to Ely Creek – East Side				0	0	0	0
Perennial Ditch from Airport to Ely Creek – West Side	8+1030	No	3	0	0	0	0
Perennial Ditch from Airport to Ely Creek – East Side				0	0	0	0
Ely Creek – West Side	9+3530	Yes	3	0	0	0	0
Ely Creek – East Side				106,000	1,060	74,200	1,060
Perennial Ditch from Leaf Lake – West Side	12+2370	No	3	575,000	5,750	402,500	5,750
Perennial Ditch from Leaf Lake – East side				60,000	600	42,000	600
Perennial Stream to Esquagama Lake – West Side	13+4720	Yes	15	9,000	90	6,300	90
Perennial Stream to Esquagama Lake – East Side				0	0	0	0
Perennial Stream to Esquagama Lake – West Side	14+1790	Yes	15	0	0	0	0
Perennial Stream to Esquagama Lake – East Side				0	0	0	0

Water Crossing Location	Milepost (mile + linear ft)	MDNR PWI?	Length of Crossing (linear ft)	Wetland Impacts			
				Temporary ROW		Permanent ROW	
				Square Ft	Linear Ft	Square Ft	Linear Ft
Perennial Ditch to Esquagama Lake – West Side	15+0710	No	3	22,000	220	15,400	220
Perennial Ditch to Esquagama Lake – East Side				0	0	0	0
Perennial Stream from Fourth Lake to Esquagama Lake – West Side	15+3620	Yes	90	0	0	0	0
Perennial Stream from Fourth Lake to Esquagama Lake – West Side				0	0	0	0
Perennial Stream to St. Louis River – West Side	19+3500	No	3	0	0	0	0
Perennial Stream to St. Louis River – East Side				0	0	0	0
Perennial Stream to St. Louis River – West Side	19+4350	Yes	3	0	0	0	0
Perennial Stream to St. Louis River – East Side				0	0	0	0
Perennial Stream to St. Louis River – West Side	21+1880	Yes	15	0	0	0	0
Perennial Stream to St. Louis River – East Side				0	0	0	0
Perennial Stream to St. Louis River – West Side	21+3380	No	15	0	0	0	0
Perennial Stream to St. Louis River – East Side				8,000	80	5,600	80
Partridge River – West Side	24+0960	Yes	100	4,000	40	2,800	40
Partridge River – East Side				12,000	120	8,400	120
Colby Lake – West Side	25+1490	Yes	430	0	0	0	0
Colby Lake – East Side				0	0	0	0
Partridge River – West Side	27+3230	Yes	50	11,000	110	7,700	110
Partridge River – East Side				0	0	0	0
Wyman Creek – West Side	28+0950	Yes	15	0	0	0	0
Wyman Creek – East Side				0	0	0	0
		Total	**792 lf**	**920,000 sq ft**	**9200 lf**	**644,000 sq ft**	**9200 lf**
				21.12 acres		**14.78 acres**	

3.6.2.5 East Range Process Water Supply Pipeline –

3.6.2.5.1 Area 2WX to Station Footprint

The Process Water Supply Pipeline – Area 2WX to the IGCC Power Station Footprint is shown in Figure 1.5-10. This proposed pipeline does not impact any of the wetlands delineated during the 2004 and 2005 field surveys. The pipeline does, however, impact wetlands as they appear on the NWI maps in locations that were not field delineated. This alignment includes a total of 1.45 acres of wetland impacts in the temporary ROW. However, these impacts would be reduced to 0.87 acres for the permanent ROW. There are no stream crossings associated with the Process Water Supply Pipeline – Area 2WX to Station Footprint. A summary of wetlands and proposed impacts is provided below in Tables 3.6-54 and 3.6-55. Minimization of wetland impacts during construction and operation is discussed in Section 3.6.4.19. Mitigation of wetland impact is discussed in Section 3.6.5.

Table 3.6-54
Wetland Impacts - East Range Process Water Supply Pipeline – Area 2WX to Footprint

Basin ID	Total Wetland Area (acres)	Wetland Classification		Proposed Impact Area	
		Cowardin	Circular 39	Temporary ROW	Permanent ROW
				Acres	Acres
NWI Basin*	1 basin	n/a	3	0.38	0.21
NWI Basin*	1 basin	n/a	7	0.75	0.49
NWI Basin*	1 basin	n/a	8	0.32	0.17
Total				**1.45**	**0.87**

* Note: NWI basins are those areas that have not been field investigated, therefore total acreage is not available, only an estimate of impacts to the wetland area. Cowardin classifications are not provided due to variability in codes for wetlands of the same type.

Table 3.6-55 summarizes the permanent impacts to wetlands by classification.

Table 3.6-55
Wetland Impacts by Type - East Range Process Water Supply Pipeline – Area 2WX to Footprint

Wetland Classification	Total Area (Acres)	
Circular 39 Type	**Temporary ROW**	**Permanent ROW**
Type 1	0	0
Type 2	0	0
Type 3	0.38	0.21
Type 4	0	0
Type 5	0	0
Type 6	0	0
Type 7	0.75	0.49
Type 8	0.32	0.17
Total	**1.45**	**0.87**

3.6.2.5.2 Area 2WX to Area 2W

The Process Water Supply Pipeline – Area 2WX to Area 2W is shown in Figure 1.5-10. This proposed pipeline does not impact any of the wetlands delineated during the 2004 and 2005 field surveys. No other wetland areas identified by the NWI are within the pipeline corridor, therefore wetland impacts for this alternative are not anticipated. There are no stream crossings associated with the Process Water Supply Pipeline – Area 2WX to Area 2W.

3.6.2.5.3 Area 2W to Area 2E

The Process Water Supply Pipeline – Area 2W to Area 2E is shown in Figure 1.5-10. This proposed pipeline does not impact any of the wetlands delineated during the 2004 and 2005 field surveys. No other wetland areas identified by the NWI are within the pipeline corridor; therefore wetland impacts for this alternative are not anticipated. There are no stream crossings associated with the Process Water Supply Pipeline – Area 2W to Area 2E.

3.6.2.5.4 Area 3 to Area 2E

The Process Water Supply Pipeline – Area 3 to Area 2E is shown in Figure 1.5-10. This proposed pipeline does not impact any of the wetlands delineated during the 2004 and 2005 field surveys. The pipeline does, however, impact wetlands as they appear on the NWI maps in locations that were not field delineated. This alignment includes a total of 0.41 acres of wetland impacts in the temporary ROW. However, these impacts would be reduced to 0.23 acres for the permanent ROW. There are no stream crossings associated with the Process Water Supply Pipeline – Area 3 to Area 2E. A summary of wetlands and proposed impacts is provided below

in Tables 3.6-56 and 3.6-57. Minimization of wetland impacts during construction and operation is discussed in Section 3.6.4.22. Mitigation of wetland impact is discussed in Section 3.6.5.

Table 3.6-56
Wetland Impacts - East Range Process Water Supply Pipeline – Area 3 to Area 2E

Basin ID	Total Wetland Area (acres)	Wetland Classification		**Proposed Impact Area**	
		Cowardin	Circular 39	**Temporary ROW**	**Permanent ROW**
				Acres	**Acres**
NWI Basin*	2 basins	n/a	4	0.41	0.23
			Total	**0.41**	**0.23**

* Note: NWI basins are those areas that have not been field investigated, therefore total acreage is not available, only an estimate of impacts to the wetland area. Cowardin classifications are not provided due to variability in codes for wetlands of the same type.

Table 3.6-57 summarizes the permanent impacts to wetlands by classification.

Table 3.6-57
Wetland Impacts by Type - East Range Process Water Supply Pipeline – Area 3 to Area 2E

Wetland Classification	**Total Area (Acres)**	
Circular 39 Type	**Temporary ROW**	**Permanent ROW**
Type 1	0	0
Type 2	0	0
Type 3	0	0
Type 4	0.41	0.23
Type 5	0	0
Type 6	0	0
Type 7	0	0
Type 8	0	0
Total	**0.41**	**0.23**

3.6.2.5.5 Knox Mine to Area 2WX

The Process Water Supply Pipeline – Knox Mine to Area 2WX is shown in Figure 1.5-10. This proposed pipeline does not impact any of the wetlands delineated during the 2004 and 2005 field surveys. No other wetland areas identified by the NWI are within the pipeline corridor; therefore wetland impacts for this alternative are not anticipated. There are no stream crossings associated with the Process Water Supply Pipeline – Knox Mine to Area 2WX.

3.6.2.5.6 Area 6 and Stephens Mine to Area 2WX

The Process Water Supply Pipeline –Area 6 and Stephens Mine to Area 2WX is shown in Figure 1.5-10. This proposed pipeline does not impact any of the wetlands delineated during the 2004 and 2005 field surveys. The pipeline does, however, impact wetlands as they appear on the NWI maps in locations that were not field delineated. This alignment includes a total of 0.45 acres of wetland impacts in the temporary ROW. However, these impacts would be reduced to 0.26 acres for the permanent ROW. A summary of wetlands and proposed impacts is provided below in Tables 3.6-58 and 3.6-59. Minimization of wetland impacts during construction and operation is discussed in Section 3.6.4.24. Mitigation of wetland impact is discussed in Section 3.6.5.

Table 3.6-58
Wetland Impacts - East Range Process Water Supply Pipeline – Area 6 and Stephens Mine to Area 2WX

Basin ID	Total Wetland Area (acres)	Wetland Classification		Proposed Impact Area	
		Cowardin	Circular 39	Temporary ROW	Permanent ROW
				Acres	Acres
NWI Basin*	4 basins	n/a	6	0.45	0.26
			Total	**0.45**	**0.26**

* Note: NWI basins are those areas that have not been field investigated, therefore total acreage is not available, only an estimate of impacts to the wetland area. Cowardin classifications are not provided due to variability in codes for wetlands of the same type.

Table 3.6-59 summarizes the permanent impacts to wetlands by classification.

Table 3.6-59
Wetland Impacts by Type - East Range Process Water Supply Pipeline – Area 6 and Stephens Mine to Area 2WX

Wetland Classification	Total Area (Acres)	
Circular 39 Type	Permanent ROW	Temporary ROW
Type 1	0	0
Type 2	0	0
Type 3	0	0
Type 4	0	0
Type 5	0	0
Type 6	0.26	0.45
Type 7	0	0
Type 8	0	0
Total	**0.26**	**0.45**

The East Range Process Water Supply Pipeline – Area 6 and Stephens Mine to Area 2WX corridor will be placed below streams through open-cut trenching. Section 1.9.2.1.3 and Section 3.3.1.2.7 describe methods for installation of the Process Water Supply Pipeline. There are two stream crossings associated with this alternative. Wetland impacts include the total length of the crossing through streams and adjacent wetlands. No wetlands are mapped on the NWI adjacent to the crossing at Second Creek, therefore impacts to adjacent wetlands will be avoided for this crossing. The total length of stream crossings is 33 linear feet over water, and a total of 270 linear feet in adjacent wetlands. Impacts to wetlands due to the stream crossings are based on a 150-foot temporary ROW and 100-foot permanent ROW. Wetland habitats associated with the stream crossings that will be affected include 40,500 ft^2 (0.93 acres) in the temporary ROW and 27,000 ft^2 (0.62 acres) in the permanent ROW. A summary of these impacts is provided in Table 3.6-60.

Table 3.6-60
Wetland Impacts at Stream Crossings for Process Water Supply Pipeline – Area 6 and Stephens Mine to Area 2WX

Stream Crossing Location	Milepost (mile + linear ft)	MDNR PWI?	Length of Crossing (linear ft)	Wetland Impacts			
				Temporary ROW		Permanent ROW	
				Square Ft	Linear Ft	Square Ft	Linear Ft
Stephens Creek	n/a	Yes	3	40,500	270	27,000	270
Second Creek	n/a	Yes	30	0	0	0	0
		Total	**33 lf**				
				40,500 sq ft		**27,000 sq ft**	

3.6.2.5.7 Area 9 South to Area 6

The Process Water Supply Pipeline – Area 9 South to Area 6 is shown in Figure 1.5-10. This proposed pipeline does not impact any of the wetlands delineated during the 2004 and 2005 field surveys. The pipeline does, however, impact wetlands as they appear on the NWI maps in locations that were not field delineated. This alignment includes a total of 0.54 acres of wetland impacts in the temporary ROW. However, these impacts would be reduced to 0.29 acres for the permanent ROW. A summary of wetlands and proposed impacts is provided below in Tables 3.6-61 and 3.6-62. Minimization of wetland impacts during construction and operation is discussed in Section 3.6.4.25. Mitigation of wetland impact is discussed in Section 3.6.5.

Table 3.6-61
Wetland Impacts—East Range Process Water Supply Pipeline—Area 9 South to Area 6

Basin ID	Total Wetland Area (acres)	Wetland Classification		Proposed Impact Area	
		Cowardin	Circular 39	Temporary ROW	Permanent ROW
				Acres	Acres
NWI Basin*	2 basins	n/a	5	0.54	0.29
			Total	**0.54**	**0.29**

* Note: NWI basins are those areas that have not been field investigated, therefore total acreage is not available, only an estimate of impacts to the wetland area. Cowardin classifications are not provided due to variability in codes for wetlands of the same type.

Table 3.6-62 summarizes the permanent impacts to wetlands by classification.

Table 3.6-62
Wetland Impacts by Type—East Range Process Water Supply Pipeline—Area 9 South to Area 6

Wetland Classification	Total Area (Acres)	
Circular 39 Type	Temporary ROW	Permanent ROW
Type 1	0	0
Type 2	0	0
Type 3	0	0
Type 4	0	0
Type 5	0.54	0.29
Type 6	0	0
Type 7	0	0
Type 8	0	0
Total	**0.54**	**0.29**

The East Range Process Water Supply Pipeline – Area 9 South to Area 6 will be placed in wetlands and below streams through open-cut trenching. Section 1.9.2.1.3 and Section 3.3.1.2.6 describe methods for installation of the Process Water Supply Pipeline. One stream crossing is associated with this alternative. No wetlands are mapped on the NWI adjacent to this crossing, therefore no impacts to adjacent wetlands are expected. The total length of stream crossings is 3 linear feet over water. A summary of this impact is provided in Table 3.6-63.

Table 3.6-63
Wetland Impacts at Stream Crossings for East Range Process Water Supply Pipeline—Area 9 South to Area 6

Stream Crossing Location	Milepost (mile + linear ft)	MDNR PWI?	Length of Crossing (linear ft)	Wetland Impacts			
				Temporary ROW		Permanent ROW	
				Square Ft	Linear Ft	Square Ft	Linear Ft
First Creek	n/a	Yes	3	0	0	0	0
			Total	**3 lf**			
				0 sq ft		**0 sq ft**	

3.6.2.5.8 Area 9 North (Donora Mine) to Area 6

The Process Water Supply Pipeline—Area 9 North (Donora Mine) to Area 6 is shown in Figure 1.5-10. This proposed pipeline does not impact any of the wetlands delineated during the 2004 and 2005 field surveys. The pipeline does not impact wetlands as they appear on the NWI maps in locations that were not field delineated. Wetland impacts will be avoided for this proposed pipeline.

The East Range Process Water Supply Pipeline—Area 9 North (Donora Mine) to Area 6 corridor will be placed below streams through open-cut trenching. Section 1.9.2.1.3and Section 3.3.1.2.8 describe methods for installation of the Process Water Supply Pipeline. There is no wetland mapped on the NWI adjacent to this crossing, therefore impacts to adjacent wetlands due to stream crossings will be avoided. The total length of stream crossings is 3 linear feet over water. A summary of this impact is provided in Table 3.6-64.

Table 3.6-64
Wetland Impacts at Stream Crossings for Process Water Supply Pipeline—Area 9 North (Donora Mine) to Area 6

Stream Crossing Location	Milepost (mile + linear ft)	MDNR PWI?	Length of Crossing (linear ft)	Wetland Impacts			
				Temporary ROW		Permanent ROW	
				Square Ft	Linear Ft	Square Ft	Linear Ft
First Creek	n/a	Yes	3	0	0	0	0
			Total	**3 lf**			
				0 sq ft		**0 sq ft**	

3.6.2.6 East Range Potable Water and Sewer Pipelines

The East Range Potable Water and Sewer Pipelines are shown in Figure 1.5-10. These proposed pipelines do not impact any of the wetlands delineated during the 2004 and 2005 field surveys. The pipelines do, however, show impacts to Colby Lake based on NWI mapping in areas that were not field delineated. According to the NWI, 1.45 acres of Colby Lake would be impacted in the temporary ROW. These impacts would be reduced to 0.87 acres for the permanent ROW. A summary of wetlands and proposed impacts is provided below in Tables 3.6-65 and 3.6-66.

Minimization of wetland impacts during construction and operation is discussed in Section 3.6.4.27. Mitigation of wetland impact is discussed in Section 3.6.5.

Table 3.6-65
Wetland Impacts—East Range Potable Water and Sewer Pipelines

Basin ID	Total Wetland Area (acres)	Wetland Classification		Proposed Impact Area	
		Cowardin	Circular 39	Temporary ROW	Permanent ROW
				Acres	Acres
NWI Basin*	1 basin	n/a	5	1.12	0.45
			Total	**1.12**	**0.45**

* Note: NWI basins are those areas that have not been field investigated, therefore total acreage is not available, only an estimate of impacts to the wetland area. Cowardin classifications are not provided due to variability in codes for wetlands of the same type.

Table 3.6-66 summarizes the permanent impacts to wetlands by classification.

Table 3.6-66
Wetland Impacts by Type—East Range Potable Water and Sewer Pipelines

Wetland Classification	Total Area (Acres)	
Circular 39 Type	Temporary ROW	Permanent ROW
Type 1	0	0
Type 2	0	0
Type 3	0	0
Type 4	0	0
Type 5	1.12	0.45
Type 6	0	0
Type 7	0	0
Type 8	0	0
Total	**1.12**	**0.45**

Construction of the Potable Water and Sewer Pipelines will require crossing approximately 460 linear feet of Colby Lake. The impacts due to crossing are shown in Table 3.6-67. There are no wetlands adjacent to Colby Lake at the point of crossing, therefore no wetland impacts are anticipated. Colby Lake is protected by the MDNR and will require a License for Utility Crossings of Public Lands and Waters granted by the MDNR Division of Lands and Minerals.

Table 3.6-67
Wetland Impacts at Stream Crossings for Potable Water and Sewer Pipelines

Stream Crossing Location	Milepost (mile + linear ft)	MDNR PWI?	Length of Crossing (linear ft)	Wetland Impacts			
				Temporary ROW		Permanent ROW	
				Square Ft	Linear Ft	Square Ft	Linear Ft
Colby Lake	1+3720	Yes 249 P	460	n/a	n/a	n/a	n/a
		Total	**460 lf**				
				0.00 acres		**0.00 acres**	

3.6.2.7 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 – 490 feet for this alternative. The railroad alternatives are the only utility or transportation corridors that have construction limit widths established. Therefore these data were used to calculate wetland impacts anticipated due to construction of the railroad. In some instances, there may be temporary impacts identified that are less than those impacts identified for the permanent ROW. This occurs in areas where the construction limits (temporary ROW) are less than the permanent ROW width. Regardless of the location of the impacts, grading that occurs within the construction limits (temporary ROW) and the permanent ROW will include permanent impacts to all wetlands within these ROWs. There are no areas in the railroad alternatives where wetland impacts will be temporary in nature because the grading in the construction limits is necessary to set grades for the railroad bed.

Wetlands within the East Range Railroad Alternative 1 include a total of three wetlands that were delineated during the 2004 and 2005 field surveys. For the rail line, permanent wetland impacts within the construction limits (temporary ROW) are estimated at 17.21 acres. This includes the permanent wetland impacts estimated within the permanent ROW at 10.68 acres. The center loop of the rail spur for Alternative 1 has an estimated 47.91 acres of permanent impacts. However, these impacts may be reduced upon completion of final design when the layout of storage areas within the center loop is determined. A summary of wetlands and proposed impacts is provided below in Tables 3.6-68 and 3.6-69. Minimization of wetland impacts during construction and operation is discussed in Section 3.6.4.28. Mitigation of wetland impact is discussed in Section 3.6.5.

Table 3.6-68
Wetland Impacts – East Range Railroad Alternative 1 and Center Loop

Basin ID	Total Wetland Area Delineated (acres)[1]	Wetland Classification		Proposed Impact Area (Acres)	
		Cowardin	Circular 39	Permanent Impacts in Construction Limits	Permanent ROW
C	294.28	PEMC/PEMA/ PFOC/PSS1B/ PFO2B/PEMF/ PEMH	Type 2/Type 3/ Type 4/ Type6/ Type 7/Type 8	16.40	9.77
I	4.95	PSS1B	Type 6	0.75	0.85
J	0.07	PEMC	Type 2	0.06	0.06
			Subtotal	**17.21**	**10.68**
Center Loop					
C	294.28	PEMC/PEMA/ PFOC/PSS1B/ PFO2B/PEMF/ PEMH	Type 2/Type 3/ Type 4/ Type6/ Type 7/Type 8	n/a	47.91
			Total	**17.21**	**58.59**

[1] Total wetland acreage is based on wetlands delineated inside the project limits. Actual total wetland size may be larger if the boundary extends beyond the project limits.

Table 3.6-69 summarizes the permanent impacts to wetlands by classification.

Table 3.6-69
Wetland Impacts by Type – East Range Railroad Alternative 1 and Center Loop

Wetland Classification	Total Area (Acres) Permanent Impact	
Circular 39 Type	**Permanent Impacts in Construction Limits**	**Permanent ROW**
Type 1	0	0
Type 2	0.06	0.06
Type 2/3/4/6/7/8	16.40	57.68
Type 3	0	0
Type 4	0	0
Type 5	0	0
Type 6	0.75	0.85
Type 7	0	0
Type 8	0	0
Total	**17.21**	**58.59**

The Railroad Alternative 1 corridor will require crossing approximately six linear feet of streams and bodies of water. The wetland impacts due to crossings of streams and other water bodies are shown in Table 3.6-70. Wetland impacts shown are based upon wetlands adjacent to streams

being crossed within the established construction limits. For Railroad Alternative 1, the tributary to Colby Lake that flows through Wetland C is crossed twice by the center loop. Wetland C is a large wetland complex greater than 500 acres as shown on Figures 1.5-53 and 2.7-3. The large amount of wetland impacts associated with the south crossing of the tributary to Colby Lake is due to the placement of the railroad center loop within an area of Wetland C that extends approximately 4,000 feet eastward from this stream crossing.

For Railroad Alternative 1, the permanent wetland impacts in the construction limits (temporary ROW) to wetlands adjacent to streams being crossed are 14.98 acres and 7.95 acres in the permanent ROW. Permanent impacts from construction in the streambed for the center loop will be minimized by use of culverts under the railroad bed. Maximum wetland impacts are based the entire center loop being converted to a storage area. However, upon completion of final design, the wetland impacts may be reduced if less storage area is needed. It is anticipated that direct impacts to the stream within the center loop will be avoided or minimized to the maximum extent feasible.

The tributary to Colby Lake is a protected stream regulated by the MDNR and will require a License for Utility Crossings of Public Lands and Waters granted by the MDNR Division of Lands and Minerals.

Table 3.6-70
Wetland Impacts at Stream Crossings for Railroad Alternative 1

Water Crossing Location	Milepost (mile + linear feet)	MDNR PWI?	Length of Crossing (linear feet)	Wetland Impacts[1]	
				Permanent Impacts Due to Construction	Permanent ROW (acres)
Tributary to Colby Lake (North Crossing)	n/a	Yes	3	5.00	1.79
Tributary to Colby Lake (South Crossing)	n/a	Yes	3	9.98	6.16
Total			**6**	**14.98**	**7.95**

[1] Impacts are based upon actual construction limits.

3.6.2.8 Railroad Alternative 2

Wetland impacts for the East Range Railroad Alternative 2 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 60 – 500 feet for this alternative. The railroad alternatives are the only utility or transportation corridors that have construction limit widths

established. Therefore these data were used to calculate wetland impacts anticipated due to construction of the railroad. In some instances, there may be temporary impacts identified that are less than those impacts identified for the permanent ROW. This occurs in areas where the construction limits (temporary ROW) are less than the permanent ROW width. Regardless of the location of the impacts, grading that occurs within the construction limits (temporary ROW) and the permanent ROW will include permanent impacts to all wetlands within these ROWs. There are no areas in the railroad alternatives where wetland impacts will be temporary in nature because the grading in the construction limits is necessary to set grades for the railroad bed.

Wetlands within the East Range Railroad Alternative 2 include a total of five wetlands that were delineated during the 2004 and 2005 field surveys. For the rail line, permanent wetlands within the construction limits (temporary ROW) are estimated at 18.35 acres. This includes the permanent wetland impacts estimated within the permanent ROW at 13.37 acres. There is no center loop associated with Railroad Alternative 2. A summary of wetlands and proposed impacts is provided below in Tables 3.6-71 and 3.6-72. Minimization of wetland impacts during construction and operation is discussed in Section 3.6.4.29. Mitigation of wetland impact is discussed in Section 3.6.5.

Table 3.6-71
Wetland Impacts – East Range Railroad Alternative 2

Basin ID	Total Wetland Area Delineated (acres)[2]	Wetland Classification		Proposed Impact Area (Acres)	
		Cowardin	Circular 39	Permanent Impacts in Construction Limits	Permanent ROW
C[1]	294.28	PFOC	Type 7	7.82	3.96
G	19.23	PFOC, PFO2B	Type 7, Type 8	5.26	2.83
H	18.79	PEMC, PFOC, PFO2B	Type 3, Type 7, Type 8	4.46	5.67
I	4.95	PSS1B	Type 6	0.75	0.85
J	0.07	PEMC	Type 2	0.06	0.06
			Subtotal	**18.35**	**13.37**

[1] Note: This wetland is predominantly Type 7, but it is also comprised of small portions of wetland Types 2, 3, 4, 6, and 8 as described in Section 2.7.2.
[2] Total wetland acreage is based on wetlands delineated inside the project limits. Actual total wetland size may be larger if the boundary extends beyond the project limits.

Table 3.6-72 summarizes the permanent impacts to wetlands by classification.

Table 3.6-72
Wetland Impacts by Type – East Range Railroad Alternative 2

Wetland Classification	Total Area (Acres)	
Circular 39 Type	**Permanent Impacts in Construction Limits**	**Permanent ROW**
Type 1	0	0
Type 2	0.06	0.06
Type 3	0	0
Type 3/7/8	4.46	5.67
Type 4	0	0
Type 5	0	0
Type 6	0.75	0.85
Type 7	7.82	3.96
Type 7/8	5.26	2.83
Type 8	0	0
Total	**18.35**	**13.37**

Railroad Alternative 2 will require crossing approximately 6 linear feet of streams and bodies of water. The wetland impacts due to crossings of streams and other water bodies are shown in Table 3.6-73. Wetland impacts shown are based upon wetlands adjacent to streams being crossed within the established construction limits. Approximately 6.30 acres of wetland will be impacted due to grading of the railroad bed for Railroad Alternative 2. This includes 2.59 acres that will be maintained in the corridor's permanent ROW.

The tributary to Colby Lake and Wyman Creek are protected streams regulated by the MDNR and will require a License for Utility Crossings of Public Lands and Waters granted by the MDNR Division of Lands and Minerals.

Table 3.6-73
Wetland Impacts at Stream Crossings for Railroad Alternative 2

Water Crossing Location	Milepost (mile + linear ft)	MDNR PWI?	Length of Crossing (linear ft)	Wetland Impacts[1]	
				Permanent Impacts due to Construction (acres)	**Permanent ROW (acres)**
Tributary to Colby Lake	n/a	Yes	3	5.67	1.98
Wyman Creek	n/a	Yes	3	0.63	0.61
		Total	**6 lf**		
				6.30 acres	**2.59 acres**

[1] Impacts are based upon actual construction limits

3.6.2.9 East Range Roads

Wetlands within the proposed road corridors include three basins that have been delineated during the 2004 and 2005 field surveys. Roads for the East Range Site are shown in Figure 1.12-61. Roads that will serve the facility will impact a total of 5.53 acres of wetlands in the temporary ROW. However, these impacts would be reduced to 3.23 acres for the permanent ROW. The largest wetland impacts for roads are within Wetland C, the large wetland complex that runs throughout the site. Wetland C is predominantly Type 7, but is also comprised of portions of Types 2, 3, 4, 6, and 8. There are no stream crossings associated with the roads. Tables 3.6-74 and 3.6-75 provide a summary of wetlands and proposed impacts due to proposed East Range Roads. Minimization of wetland impacts during construction and operation is discussed in Section 3.6.4.30. Mitigation of wetland impact is discussed in Section 3.6.5.

Table 3.6-74
Wetland Impacts – East Range Roads

Basin ID	Total Wetland Area Delineated (acres)[2]	Wetland Classification		Proposed Impact Area	
		Cowardin	Circular 39	Temporary ROW	Permanent ROW
				Acres	Acres
C[1]	294.28	PFOC	Type 7	4.57	2.76
D	2.03	PSS1B	Type 6	0.78	0.44
E	14.20	PSS1B	Type 6	0.18	0.03
Total				5.53	3.23

[1] Note: This wetland is predominantly Type 7, but it is also comprised of small portions of wetland Types 2, 3, 4, 6, and 8 as described in Section 2.7.2.
[2] Total wetland acreage is based on wetlands delineated inside the project limits. Actual total wetland size may be larger if the boundary extends beyond the project limits.

Table 3.6-75 summarizes the permanent impacts to wetlands by classification.

Table 3.6-75
Wetland Impacts by Type – East Range Roads

Wetland Classification	Total Area (acres)	
Circular 39 Type	Temporary ROW	Permanent ROW
Type 1	0	0
Type 2	0	0
Type 3	0	0
Type 4	0	0
Type 5	0	0
Type 6	0.96	0.47
Type 7	4.57	2.76
Type 8	0	0
Total	**5.53**	**3.23**

3.6.3 Contacts with Agencies

Wetland permitting and agency consultation will begin in earnest after the final site and associated utilities approved by MPUC. In general, wetland permitting can be initiated after 80 percent or more of the final design has been completed. A Combined Wetland Permit Application and Replacement Plan will be prepared and submitted to the following agencies:

- U.S. Army Corps of Engineers ("USACE") – Section 404 Clean Water Act wetland dredge and fill activities permit.
- Minnesota Pollution Control Agency ("MPCA") – Section 401 Clean Water Act water quality certification.
- Itasca County Soil and Water Conservation District ("SWCD") – Minnesota Wetland Conservation Act ("WCA") approval (West Range Site and Associated Corridors).
- Minnesota Board of Water and Soil Resources ("BWSR") – Replacement Plan approval under the rules of the WCA.
- MDNR – Public Waters work permit.
- 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).

3.6.4 Wetland Impacts Minimization

Section 3.6.2 above provides detailed data regarding potentially impacted wetlands due to all aspects of the project, at both potential sites. This section summarizes these potential impacts on wetlands due to construction and operation activities, emphasizing how such impacts will minimized or avoided due to construction practices, or where temporary impacts may be restored. Under Minnesota law, and through a memorandum of understanding between the BWSR and the USACE – St. Paul District, wetland impacts are generally evaluated on a per acre basis, without regard to wetland type affected when the WCA *de minimis* thresholds have been exceeded (Minn. R. 8420.0122, subp. 9). An exception to this rule is for wetlands that may have particular ecological uniqueness or protection status (e.g., calcareous fens) or are otherwise legally protected under other state and/or federal law (e.g., wetlands in state Scientific and Natural Areas, state-designated trout waters, Outstanding Resource Value Waters, etc.). Higher replacement ratios are sometimes utilized when regulatory agencies determine that impacted wetlands have a higher value relative to other wetland types (e.g., impacts to tamarack bogs may be regulated at higher level versus impacts to a disturbed, urbanized wetland).

For isolated versus non-isolated wetlands, the WCA makes no distinction in how these two types of wetlands are regulated. Therefore, isolated versus non-isolated wetlands would be mitigated at the same thresholds as defined by the WCA. The USACE regulates non-isolated wetlands, which are considered Waters of the United States; however, its jurisdiction of isolated wetlands is determined through individual project review. The USACE may claim jurisdiction of isolated basins on the project due to their adjacency to other regulated wetlands or waters (i.e., waters of the United States). It is expected that the USACE will make this determination through formal evaluation of the project during the NEPA review process.

Tables 3.6-76 and 3.6-77 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 3.6-76
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
IGCC Power Station	n/a [1]	30.95
HVTL Alternative 1	n/a [1]	0.01 [2]
HVTL Alternative 1A	n/a [1]	0.01 [2]
HVTL Phase II	n/a [1]	0.03 [2]
Gas Pipeline 1	24.69	17.47
Gas Pipeline 2	28.86	18.13
Gas Pipeline 3	12.82	9.12
Process Water Blowdown Pipeline 1 (IGCC Power Station to Holman Lake)	5.86	4.07
Process Water Blowdown Pipeline 2 (IGCC Power Station to Canisteo Pit)	20.38	13.60
Process Water Segment 1 (Lind Pit to Canisteo Pit)	0	0
Process Water Segment 2 (Canisteo Pit to West Range Site)	5.48	3.73
Process Water Segment 3 (Gross-Marble Pit to Canisteo Pit)	6.17	3.79
Railroad Alternative 1A and Center Loop	26.45 [3]	77.08
Railroad Alternative 1B and Center Loop	18.11 [3]	64.23
Potable Water and Sewer Pipelines	4.48	1.79
Roads	9.72	5.67
Subtotal[4]	**103.2**	**158.2**
Total Permanent Impacts (including railroad construction limit impacts)	**n/a**	**172.4**

[1] Temporary construction areas for the IGCC 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] Total wetland impacts assuming Proposed Natural Gas Pipeline Alternative 1 Route and Railroad Alternative 1A and Water Loop. The Applicant will strive to maintain or enhance the quality of the wetlands within the center loop, but includes it here to describe an upper limit on wetland impacts.

Table 3.6-77
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
IGCC Power Station	n/a [1]	15.61
HVTL Alternative 1	n/a [1]	0.05 [2]
HVTL Alternative 2	n/a [1]	0.04 [2]
Natural Gas Pipeline Alternative 1	67.29	46.81
Process Water Supply Pipeline (Area 2WX to Footprint)	1.45	0.87
Process Water Supply Pipeline (Area 2WX to Area 2W)	0	0
Process Water Supply Pipeline (Area 2W to Area 2E)	0	0
Process Water Supply Pipeline (Area 3 to Area 2E)	0.41	0.23
Process Water Supply Pipeline (Knox Mine to Area 2WX)	0	0
Process Water Supply Pipeline (Area 6 and Stephens Mine to Area 2WX)	0.45	0.26
Process Water Supply Pipeline (Area 9 South to Area 6)	0.54	0.29
Process Water Supply Pipeline [Area 9 North (Donora Mine) to Area 6]	0	0
Railroad Alternative 1 and Center Loop	17.21 [3]	58.59
Railroad Alternative 2 (no center loop)	18.35 [3]	13.37
Potable Water and Sewer Pipelines	1.12	0.45
Roads	5.53	3.23
Total	**94.0**	**126.43**
Total Temporary Impacts (<u>not</u> including railroad construction limit impacts)	**95.14**	**n/a**
Total Permanent Impacts (including railroad construction limit impacts)	**n/a**	**133.0**

[1] Temporary construction areas for the IGCC 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] Total wetland impacts assuming Proposed Natural Gas Pipeline Alternative 1 Route and Railroad Alternative 1A and Water Loop. The Applicant will strive to maintain or enhance the quality of the wetlands within the center loop, but includes it here to describe an upper limit on wetland impacts.

Special or protected wetlands as discussed above are not known to occur within the West Range 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. It is anticipated that no wetland type will require higher mitigation requirements over any other type (e.g., Type 7 forested wetlands will not require higher mitigation requirements than Type 6 scrub-shrub or Type 3 emergent wetlands). However, these mitigation requirements will be negotiated during the wetland permitting phase of the project.

3.6.4.1 West Range IGCC Power Station Footprint and Buffer Land

Minimization of wetland impacts has been implemented by adjusting the site layout to essentially straddle the two large wetland complexes (A1 and A4) located within the IGCC Power Station Footprint and Buffer Land. Siting the IGCC Power Station Footprint was largely driven by the location of the railroad that will ultimately serve the IGCC Power Station and property access to the site.

Permanent wetland impacts for the West Range IGCC Power Station Footprint are estimated at 30.95 acres, with Phase 1 wetland impacts estimated at 17.33 acres and Phase II wetland impacts estimated at 13.62 acres. These wetlands are primarily Type 3/7 or Type 7 basins, most of which are isolated. However, the greatest amount of impacts from the facility site would be to Wetlands A1 (Type 3/6/8) and A4 (Type 7), which are large wetland complexes that extend beyond the site boundary.

As described in Table 3.6-1, Type 7 wetlands are the most abundant wetland type present within the project limits and have the most impacts for both phases of the IGCC PowerStation. Phase I will have the majority of wetland impacts for the facility, most of which are Type 7 wetlands. The Phase II Development involves less wetland impact acreage overall, but includes impacts to Type 3 and Type 3/6/8 (bog habitat) wetlands.

3.6.4.2 West Range HVTL Alternative 1

For HVTL Alternative 1, an estimate of 0.01 acres of wetlands will be permanently impacted for placement of new utility poles. To the extent practicable, wetlands will be avoided for installation of the HVTL, and construction activities are planned during the winter months to further minimize direct impacts to wetlands. Permanent wetland impacts will be limited to those areas where overhead utility poles will be placed within wetland habitat.

Tree and shrub clearing in wetlands will be initiated along new areas of ROW to be established for HVTL Alternative 1. A total of 30.21 acres of trees and shrubs is estimated to be cleared in Types 6, 7, and 8 wetlands. No vegetation clearing is anticipated in Type 1-5 wetlands (i.e., herbaceous dominated vegetation in seasonal basins, wet meadow, shallow marsh, or open water wetlands). Direct wetland impacts to these wetlands is not anticipated as no stump grubbing, excavation, or fill is planned for the areas to be cleared of woody vegetation. Ultimately some wetland areas may be converted to different types (e.g., Type 6 scrub-shrub habitat may convert to Type 2/3 wet meadow/shallow marsh); however, direct loss of wetland is not anticipated. In addition, tree clearing activities will be completed during the winter months thereby avoiding direct impacts to the wetlands from equipment, and avoiding the bird nesting period to comply

with the federal Migratory Bird Treaty Act. In the future, maintenance of the ROW would likely include clearing of trees and shrubs that re-establish in wetlands, but this would be completed during the winter months to avoid direct impacts to wetland or nesting birds.

3.6.4.3 West Range HVTL Alternative 1A

For HVTL Alternative 1A, an estimate of 0.01 acres of wetlands will be permanently impacted for placement of new utility poles. To the extent practicable, wetlands will be avoided for installation of the HVTL, and construction activities are planned during the winter months to further minimize direct impacts to wetlands. Permanent wetland impacts will be limited to those areas where overhead utility poles will be placed within wetland habitat.

Similar to HVTL Alternative 1, tree and shrub clearing in wetlands will be initiated along new areas of ROW to be established for HVTL Alternative 1A. A total of 24.53 acres of trees and shrubs is estimated to be cleared in Types 6, 7, and 8 wetlands. No vegetation clearing is anticipated in Type 1-5 wetlands (i.e., herbaceous dominated vegetation in seasonal basins, wet meadow, shallow marsh, or open water wetlands). Direct wetland impacts to these wetlands is not anticipated as no stump grubbing, excavation, or fill is planned for the areas to be cleared of woody vegetation. Ultimately some wetland areas may be converted to different types (e.g., Type 6 scrub-shrub habitat may convert to Type 2/3 wet meadow/shallow marsh); however, direct loss of wetland is not anticipated. In addition, tree clearing activities will be completed during the winter months thereby avoiding direct impacts to the wetlands from equipment, and avoiding the bird nesting period which is in compliance with the federal Migratory Bird Treaty Act. In the future, maintenance of the ROW would likely include clearing of trees and shrubs that re-establish in wetlands, but this would be completed during the winter months to avoid direct impacts to wetland or nesting birds.

3.6.4.4 West Range Plan B Phase II Alternate Route WRB-2A

For Plan B Phase II Alternate Route WRB-2A, an estimated 0.03 acres of wetlands will be permanently impacted for placement of new utility poles. To the extent practicable, wetlands will be avoided for installation of the HVTL, and construction activities are planned during the winter months to further minimize direct impacts to wetlands. Permanent wetland impacts will be limited to those areas where overhead utility poles will be placed within wetland habitat.

No tree and shrub clearing in wetlands is anticipated for Plan B Phase II Alternate Route WRB-2A as this alternative is proposed along an existing utility corridor maintained by Minnesota Power. In the future, maintenance of the ROW would likely include clearing of trees and shrubs that re-establish in wetlands, but this would be completed during the winter months to avoid direct impacts to wetland or nesting birds.

3.6.4.5 West Range Natural Gas Pipeline Alternative 1

Wetlands within the Natural Gas Pipeline Alternative 1 corridor include a total of 24.69 acres of wetland habitat in the proposed temporary ROW. However, for the permanent ROW, these wetland impacts would be reduced to 17.47 acres. Temporary impacts are needed for construction, but would be mitigated by restoring the habitat upon completion of construction

activities. Temporary wetland impacts may include tree and shrub clearing for construction staging areas paralleling the pipeline corridor.

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

3.6.4.6 West Range Natural Gas Pipeline Alternative 2

Wetlands within the Natural Gas Pipeline Alternative 2 corridor include a total of 28.86 acres of wetland habitat in the proposed temporary ROW. However, for the permanent ROW, these wetland impacts would be reduced to 18.13 acres. Temporary impacts are needed for construction, but would be mitigated by restoring the habitat upon completion of construction activities. Temporary wetland impacts may include tree and shrub clearing for construction staging areas paralleling the pipeline corridor.

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

3.6.4.7 West Range Natural Gas Pipeline Alternative 3

Wetlands within the Natural Gas Pipeline Alternative 3 corridor include a total of 12.82 acres of wetland habitat in the proposed temporary ROW. However, for the permanent ROW, these wetland impacts would be reduced to 9.12 acres. Temporary impacts are needed for construction, but would be mitigated by restoring the habitat upon completion of construction activities. Temporary wetland impacts may include tree and shrub clearing for construction staging areas paralleling the pipeline corridor.

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

3.6.4.8 West Range Process Water Supply Pipeline

3.6.4.8.1 Segment 1 – Lind Pit to Canisteo Pit

No wetlands have been identified for Process Water Supply Pipeline Segment 1, therefore wetland impacts are not anticipated due to construction or operation activities. Field investigations will be performed prior to construction activities to confirm that impacts will not occur.

3.6.4.8.2 Segment 2 – Canisteo Pit to West Range Site

Wetland impacts were minimized to the maximum extent feasible by routing the process water lines along existing and proposed roadways, railroads, and utility rights-of-way. Wetlands impacts within the proposed process water line 2 corridor include a total of 5.48 acres in the 150-foot temporary ROW. However, these impacts would be reduced to 3.73 acres for the 100-foot permanent ROW. The largest impact for the process water line 2 is within Wetland A1, the large wetland complex near the southern boundary of the West Range Site. There are no water crossings associated with the Process Water Supply Pipeline Segment 2. Temporary wetland impacts may include tree and shrub clearing for construction staging areas paralleling the Process Water Supply Pipeline Segment 2 corridor. Where soils and vegetation may become disturbed in the construction areas, these areas will be restored by loosening the soils from compaction and reseeding with grasses and forbs native to the region.

3.6.4.8.3 Segment 3 – Gross-Marble Pit to Canisteo Pit

Wetland impacts were minimized to the maximum extent feasible by routing the process water lines along existing and proposed roadways, railroads, and utility rights-of-way. Process water line 3 will include a total of 6.17 acres of wetland impacts in the150-foot temporary ROW. However, these impacts would be reduced to 3.79 acres for the 100-foot permanent ROW. Type 6 scrub-shrub wetland would sustain the greatest impacts due to this alternative. There are no water crossings associated with the Process Water Supply Pipeline Segment 3. Temporary wetland impacts may include tree and shrub clearing for construction staging areas paralleling the Process Water Supply Pipeline Segment 3 corridor. Where soils and vegetation may become disturbed in the construction areas, these areas will be restored by loosening the soils from compaction and reseeding with grasses and forbs native to the region.

3.6.4.9 West Range Process Water Blowdown Pipeline 1 (Facility to Holman Lake)

Wetland impacts were minimized to the maximum extent feasible by routing the process water lines along existing and proposed roadways, railroads, and utility rights-of-way. The blowdown process water line includes a total of 5.86 acres of wetland impacts in the temporary ROW. However, these impacts would be reduced to 4.07 acres for the permanent ROW. The process water blowdown line will be placed in wetlands and below waterbodies through open-cut trenching. Sections 1.9.2.1.3 and 3.3.1.1.10 describe methods for installation of Process Water Blowdown Pipeline 2.

There are two water crossings associated with Process Water Blowdown Pipeline 1. Wetland impacts include the total length of the crossing through bodies of water and adjacent 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. Wetland habitats associated with the water crossings that will be affected include 7,500 ft^2 (0.17 acres) in the temporary ROW and 5,000 ft^2 (0.11 acres) in the permanent ROW.

Temporary wetland impacts may include tree and shrub clearing for construction staging areas paralleling the Process Water Supply Pipeline corridor. Where soils and vegetation may become disturbed in the construction areas, these areas will be restored by loosening the soils from compaction and reseeding with grasses and forbs native to the region.

3.6.4.10 West Range Process Water Blowdown Pipeline 2 (Facility to Canisteo Pit)

Wetland impacts were minimized to the maximum extent feasible by routing the process water lines along existing and proposed roadways, railroads, and utility rights-of-way. The blowdown process water line includes a total of 20.38 acres of wetland impacts in the temporary ROW. However, these impacts would be reduced to 13.60 acres for the permanent ROW. The process water blowdown pipeline will be placed in wetlands and below waterbodies through open-cut trenching. Section 1.9.2.1.3 describes in detail methods for installation of the water process line. There are no water crossings (i.e., streams, rivers, or lakes) associated with Alternative 2 for the process water blowdown pipeline.

Temporary wetland impacts may include tree and shrub clearing for construction staging areas paralleling the water process line corridor. Where soils and vegetation may become disturbed in the construction areas, these areas will be restored by loosening the soils from compaction and reseeding with grasses and forbs native to the region.

3.6.4.11 West Range Potable Water and Sewer Pipelines

Wetland impacts were minimized to the maximum extent feasible by routing the sewer and water lines adjacent to the process water lines, which were placed along existing and proposed roadways, railroads, and utility rights-of-way. Wetland impacts within the proposed sewer and water corridor include a total of 4.48 acres in the 100-foot temporary ROW. These impacts would be reduced to 1.79 acres for the 40-foot permanent ROW. The largest impact for the sewer and water pipelines are within Wetland A1, the large wetland complex near the southern boundary of the West Range Site. There are no water crossings associated with the water and sewer lines.

3.6.4.12 West Range Rail Line Alternative 1A

The railroad alternatives avoid both Dunning and Big Diamond Lakes. Preliminary alignments for the railroad included some design that would have required filling as much as one fourth of Big Diamond Lake; however this design was removed from further consideration based on this large type of impact. At the southeast corner of Big Diamond Lake, Alternative 1A was shifted

away from Big Diamond Lake to reduce direct impacts on the lakebed itself and any surrounding aquatic habitat.

Because the railroads are designed in the straightest possible alignment, minimizing curves where possible, there will be unavoidable wetland impacts. The railroad alternatives are the only utility or transportation corridors that have established construction limits, which may be considered as temporary ROW. For the West Range Railroad Alternative 1A, the construction limits (temporary ROW) vary in width from 80 – 450 feet. The permanent ROW for the railroad would be an established 100-foot ROW, which includes the ROW width needed for the center loop.

Permanent wetland impacts within the railroad alternatives will occur within the construction limits (temporary ROW), permanent ROW, and the center loop. There are no temporary wetland impacts anticipated for the railroad alternatives due the necessary grading required for the railroad bed. Permanent wetland impacts within the construction limits (temporary ROW) include 24.45 acres. Permanent wetland impacts within the permanent ROW (the railroad bed itself) include 12.23 acres. The center loop of the rail spur for Alternative 1A has an estimated 64.85 acres of permanent impacts. The impacts estimated for the center loop may be reduced upon completion of final design when the layout of storage areas within the center loop is determined. There are no water crossings associated with Railroad Alternative 1A.

3.6.4.13 West Range Rail Line Alternative 1B

This railroad alternative also avoids both Dunning and Big Diamond Lakes. Preliminary alignments for the railroad included some design that would have required filling as much as one fourth of Big Diamond Lake; however this design was removed from further consideration based on this large impact.

Because the railroads are designed in the straightest possible alignment, minimizing curves where possible, there will be unavoidable wetland impacts. The railroad alternatives are the only utility or transportation corridors that have established construction limits, which may be considered as temporary ROW. For the West Range Railroad Alternative 1B, the construction limits (temporary ROW) vary in width from 60 – 760 feet. The permanent ROW for the railroad would be an established 100-foot ROW, which includes the ROW width needed for the center loop.

Permanent wetland impacts within the railroad alternatives will occur within the construction limits (temporary ROW), permanent ROW, and the center loop. There are no temporary wetland impacts anticipated for the railroad alternatives due the necessary grading required for the railroad bed. Permanent wetland impacts within the construction limits (temporary ROW) include 18.11 acres. Permanent wetland impacts within the permanent ROW (the railroad bed itself) include 12.00 acres. The center loop of the rail spur for Alternative 1A would have an estimated 64.23 acres of permanent impacts. The impacts estimated for the center loop may be reduced upon completion of final design when the layout of storage areas within the center loop is determined. There are no water crossings associated with Railroad Alternative 1B.

3.6.4.14 West Range Roads

Road corridors were identified by assessing the least amount of impacts overall by considering grading requirements, existing topography, accessible properties, and presence of wetlands, but still achieving the access requirements of the West Range site. Although there will be impacts to wetlands due to the placement of the corridors, these impacts were balanced by the overall site grading requirements. In some instances it became more feasible to impact a small area of wetland rather than to attempt grading hillsides or steep slopes.

Roads that will serve the facility will impact a total of 9.72 acres of wetlands in the 200-foot temporary ROW. These impacts would be reduced to 5.67 acres for the 120-foot permanent ROW. The largest wetland impacts for roads are within Wetland A1, the large wetland complex near the southern boundary of the West Range Site. There are no water crossings associated with the roads.

3.6.4.15 East Range IGCC Power Station

The IGCC plant facility preliminary layout was planned to minimize wetland impacts, initiating the early stages of wetland impact sequencing (avoidance and minimization, followed by mitigation as necessary).

Wetland impacts for the East Range IGCC Power Station Footprint are estimated at 15.61 acres with Phase 1 wetland impacts estimated at 11.91 acres and Phase 2 wetland impacts estimated at 3.70 acres. Type 7 wetlands are the most abundant wetland type present within the project limits and have the most impacts for both phases of the IGCC Power Station. Phase 1 will have the majority of wetland impacts for the facility, most of which are Type 7 wetlands. Phase 2 involves less wetland impact acreage overall, but includes impacts to a small Type 2 wetland not impacted by Phase 1.

3.6.4.16 East Range HVTL Alternative 1

For HVTL Alternative 1, an estimated 0.05 acres of wetlands will be permanently impacted for placement of new utility poles. To the extent practicable, wetlands will be avoided for installation of the HVTL, and construction activities are planned during the winter months to further minimize direct impacts to wetlands. Permanent wetland impacts will be limited to those areas where overhead utility poles will be placed within wetland habitat.

Tree and shrub clearing in wetlands would usually be initiated along new areas of ROW. Trees and shrubs would be cleared in Types 6, 7, and 8 wetlands. No vegetation clearing would be anticipated in Type 1-5 wetlands (i.e., herbaceous dominated vegetation in seasonal basins, wet meadow, shallow marsh, or open water wetlands). However, wetlands are not anticipated to be cleared of trees in shrubs for HVTL Alternative 1 because it is located entirely within existing ROW, and this existing ROW is already maintained free of trees and shrubs. In the future, maintenance of the ROW would likely include clearing of trees and shrubs that re-establish in wetlands, but this would also be completed during the winter months avoiding direct wetland impacts or impacts to nesting birds.

There are 21 crossings of streams or water bodies associated with HVTL Alternative 1 that would require crossing of 1194 linear feet of water. Placement of the power poles supporting the HVTL will be designed to avoid direct impacts to streams, rivers, or other bodies of water within the project area. The average expanse between poles will be approximately 650 feet, 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. Because of this, wetland impacts within the bed of any water bodies will be avoided.

3.6.4.17 East Range HVTL Alternative 2

For HVTL Alternative 2, an estimate of 0.04 acres of wetlands will be permanently impacted for placement of new utility poles. To the extent practicable, wetlands will be avoided for installation of the HVTL, and construction activities are planned during the winter months to further minimize direct impacts to wetlands. Permanent wetland impacts will be limited to those areas where overhead utility poles will be placed within wetland habitat.

The majority of HVTL Alternative 2 is proposed within an existing 100-foot power utility ROW. Approximately 1.5 miles of the proposed corridor is new and would require tree and shrub clearing in wetlands. A total of 0.58 acres of trees and shrubs is estimated to be cleared in Types 6 wetlands. No vegetation clearing is anticipated in Type 1-5 wetlands (i.e., herbaceous dominated vegetation in seasonal basins, wet meadow, shallow marsh, or open water wetlands). Direct wetland impacts to these wetlands is not anticipated as no stump grubbing, excavation, or fill is planned for the areas to be cleared of woody vegetation. Ultimately some wetland areas may be converted to different types (e.g., Type 6 scrub-shrub habitat may convert to Type 2/3 wet meadow/shallow marsh); however, direct loss of wetland is not anticipated. In addition, tree clearing activities will be completed during the winter months thereby avoiding direct impacts to the wetlands from equipment, and avoiding the bird nesting period which is in compliance with the federal Migratory Bird Treaty Act. In the future, maintenance of the ROW would likely include clearing of trees and shrubs that re-establish in wetlands, but this would be completed during the winter months to avoid direct impacts to wetland or nesting birds.

There are 20 crossings of streams or water bodies associated with HVTL Alternative 2 that would require crossing of 1760 linear feet of water. Placement of the power poles supporting the HVTL will be designed to avoid direct impacts to streams, rivers, or other bodies of water within the project area. The average expanse between poles will be approximately 530 feet, 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. Because of this, wetland impacts within the bed of any water bodies will be avoided.

3.6.4.18 East Range Natural Gas Pipeline Alternative 1

Wetland impacts were minimized to the maximum extent feasible by routing the process water lines along existing and proposed roadways, railroads, and utility rights-of-way. Wetland impacts within the proposed Natural Gas Pipeline Alternative 1 corridor include a total of 67.29 acres in the 100-foot temporary ROW. However, these impacts would be reduced to 46.81 acres for the 70-foot permanent ROW. These impacts are based upon the NWI maps because the locations were not yet field delineated.

For water crossings, the natural gas pipeline will be directionally drilled under water bodies starting at approximately 100 feet from the edge of each bank. This will minimize impacts to wetlands associated with water crossings. The East Range Natural Gas Pipeline Alternative 1 will require crossing approximately 792 linear feet of streams and bodies of water, not including adjacent wetland habitat. Impacts to wetlands due to the stream crossings are based on a 100-foot temporary ROW and 70-foot permanent ROW. Wetland habitats associated with the stream crossings that will be affected where the pipeline emerges on either side of the crossing include 920,000 ft^2 (21.12 acres) in the temporary ROW. These impacts are temporary in nature and will be wetlands will be replaced upon completion of the installation. The pipeline will also impact 644,000 ft^2 (14.78 acres) in the permanent ROW. The remainder of the natural gas pipeline will include open trench installation.

3.6.4.19 East Range Process Water Supply Pipeline – Area 2WX to Footprint

Wetland impacts were minimized to the maximum extent feasible by routing the process water lines along existing and proposed roadways, railroads, and utility rights-of-way. Wetlands impacts within the proposed Process Water Supply Pipeline – Area 2WX to Footprint corridor include a total of 1.45 acres in the 150-foot temporary ROW. However, these impacts would be reduced to 0.87 acres for the 100-foot permanent ROW. These impacts are based upon the NWI maps because the locations were not yet field delineated. There are no stream crossings associated with the Process Water Supply Pipeline – Area 2WX to Footprint. Temporary wetland impacts may include tree and shrub clearing for construction staging areas paralleling the water process line corridor. Where soils and vegetation may become disturbed in the construction areas, these areas will be restored by loosening the soils from compaction and reseeding with grasses and forbs native to the region.

3.6.4.20 East Range Process Water Supply Pipeline – Area 2WX to Area 2W

No wetland impacts have been identified for Water Process Line – Area 2WX to Area 2W, therefore no affects due to construction or operation activities are anticipated for this alignment.

3.6.4.21 East Range Process Water Supply Pipeline – Area 2W to Area 2E

No wetland impacts have been identified for Water Process Line – Area 2W to Area 2E, therefore no affects due to construction or operation activities are anticipated for this alignment.

3.6.4.22 East Range Process Water Supply Pipeline – Area 3 to Area 2E

Wetland impacts were minimized to the maximum extent feasible by routing the process water lines along existing and proposed roadways, railroads, and utility rights-of-way. Wetland impacts within the proposed Process Water Supply Pipeline – Area 3 to Area 2E corridor include a total of 0.41 acres in the 150-foot temporary ROW. However, these impacts would be reduced to 0.23 acres for the 100-foot permanent ROW. These impacts are based upon the NWI maps because the locations were not yet field delineated. There are no stream crossings associated with the Process Water Supply Pipeline – Area 3 to Area 2E. Temporary wetland impacts may include tree and shrub clearing for construction staging areas paralleling the water process line

corridor. Where soils and vegetation may become disturbed in the construction areas, these areas will be restored by loosening the soils from compaction and reseeding with grasses and forbs native to the region.

3.6.4.23 East Range Process Water Supply Pipeline – Knox Mine to Area 2WX

No wetland impacts have been identified for Water Process Line – Knox Mine to Area 2WX, therefore no affects due to construction or operation activities are anticipated for this alignment.

3.6.4.24 East Range Process Water Supply Pipeline – Area 6 and Stephens Mine to Area 2WX

Wetland impacts were minimized to the maximum extent feasible by routing the process water lines along existing and proposed roadways, railroads, and utility rights-of-way. Wetland impacts within the proposed Process Water Supply Pipeline – Area 6 and Stephens Mine to Area 2WX corridor include a total of 0.45 acres in the 150-foot temporary ROW. However, these impacts would be reduced to 0.26 acres for the 100-foot permanent ROW. These impacts are based upon the NWI maps because the locations were not yet field delineated.

There are two stream crossings associated with the Process Water Supply Pipeline – Area 6 and Stephens Mine to Area 2WX corridor. Wetland impacts include the total length of the crossing through streams and adjacent wetlands. There is no wetland mapped on the NWI adjacent to the crossing at Second Creek, therefore impacts to adjacent wetlands will be avoided for this crossing. The total length of stream crossings is 33 linear feet over water, and a total of 270 linear feet in the adjacent wetlands. Impacts to wetlands due to the stream crossings are based on a 150-foot temporary ROW and 100-foot permanent ROW. Wetland habitats associated with the stream crossings that will be affected include 40,500 ft^2 (0.93 acres) in the temporary ROW and 27,000 ft^2 (0.62 acres) in the permanent ROW. Temporary wetland impacts may include tree and shrub clearing for construction staging areas paralleling the water process line corridor. Where soils and vegetation may become disturbed in the construction areas, these areas will be restored by loosening the soils from compaction and reseeding with grasses and forbs native to the region.

3.6.4.25 East Range Process Water Supply Pipeline – Area 9 South to Area 6

Wetland impacts were minimized to the maximum extent feasible by routing the process water lines along existing and proposed roadways, railroads, and utility rights-of-way. Wetland impacts within the proposed Process Water Supply Pipeline – Area 9 South to Area 6 corridor include a total of 0.54 acres in the 150-foot temporary ROW. However, these impacts would be reduced to 0.29 acres for the 100-foot permanent ROW. These impacts are based upon the NWI maps because the locations were not yet field delineated.

There is one stream crossing associated with this alternative. There is no wetland mapped on the NWI adjacent to this crossing, therefore impacts to adjacent wetlands will be avoided. The total length of stream crossings is 3 linear feet over water.

3.6.4.26 East Range Process Water Supply Pipeline – Area 9 North (Donora Mine) to Area 6

No wetland impacts have been identified for Water Process Line – Area 9 North (Donora Mine) to Area 6 corridor; however, the UGSG topographic map for the area has identified one stream that flows from Donora Mine to Partridge River. Because of the mining activity in the area, it is not clear from aerial photographs whether or not this stream currently exists or what measures have been taken to divert its path. No field investigation has been conducted in this area to date. As such, this crossing is addressed below assuming the stream exists.

There is no wetland mapped on the NWI adjacent to this crossing, therefore impacts to adjacent wetlands due to stream crossings will be avoided. The total length of stream crossings is 3 linear feet over water.

3.6.4.27 East Range Potable Water and Sewer

Wetland impacts were minimized to the maximum extent feasible by routing the sewer and water lines along existing and proposed roadways and utility rights-of-way. Wetland impacts within the proposed sewer and water corridor include a total of 1.12 acres in the 100-foot temporary ROW. These impacts would be reduced to 0.45 acres for the 40-foot permanent ROW. The only impact from the Potable Water and Sewer pipelines are from the crossing of the northern section of Colby Lake. The total length of the crossing is 460 linear feet over water. There are no wetlands mapped by the NWI adjacent to Colby Lake where the crossing occurs.

3.6.4.28 East Range Railroad Alternative 1

For the East Range Railroad Alternative 1, the construction limits (temporary ROW) vary in width from 75 – 490 feet. The permanent ROW for the railroad would be an established 100-foot ROW, which includes the ROW width needed for the center loop.

Permanent wetland impacts within the railroad alternatives will occur within the construction limits (temporary ROW), permanent ROW, and the center loop. There are no temporary wetland impacts anticipated for the railroad alternatives due the necessary grading required for the railroad bed. Permanent wetland impacts within the construction limits (temporary ROW) include 17.21 acres. Permanent wetland impacts within the permanent ROW (the railroad bed itself) include 10.68 acres. The center loop of the rail spur for Alternative 1 has an estimated 47.91 acres of permanent impacts. The impacts estimated for the center loop may be reduced upon completion of final design when the layout of storage areas within the center loop is determined.

Railroad Alternative 1 will require crossing approximately 6 linear feet of streams and bodies of water. Wetland impacts are based upon wetlands adjacent to streams being crossed within the established construction limits. Approximately 14.98 acres of wetland will be impacted due to grading of the railroad bed for Railroad Alternative 2. This includes 7.95 acres that will be maintained in the corridor's permanent ROW. Permanent impacts from construction in the streambed for the center loop will be minimized by use of culverts under the railroad bed.

3.6.4.29 East Range Railroad Alternative 2

For the East Range Railroad Alternative 2, the construction limits (temporary ROW) vary in width from 60 – 500 feet. The permanent ROW for the railroad would be an established 100-foot ROW. There is no center loop associated with East Range Railroad Alternative 2.

Permanent wetland impacts within the railroad alternatives will occur within the construction limits (temporary ROW) and the permanent ROW. There are no temporary wetland impacts anticipated for the railroad alternatives due the necessary grading required for the railroad bed. Permanent wetland impacts within the construction limits (temporary ROW) include 18.35 acres. Permanent wetland impacts within the permanent ROW (the railroad bed itself) include 13.37 acres. There is no center loop associated with Railroad Alternative 2.

Railroad Alternative 2 will require crossing approximately 6 linear feet of streams and bodies of water. Wetland impacts are based upon wetlands adjacent to streams being crossed within the established construction limits. Approximately 6.30 acres of wetland will be impacted due to grading of the railroad bed for Railroad Alternative 2. This includes 2.59 acres that will be maintained in the corridor's permanent ROW.

3.6.4.30 East Range Roads

Road corridors were identified by assessing the least amount of impacts overall by considering grading requirements, existing topography, accessible properties, and presence of wetlands, but still achieving the access needs to the East Range site. Although there will be impacts to wetlands due to the placement of the corridors, these impacts were balanced by the overall site grading requirements. In some instances it became more feasible to impact a small area of wetland than attempt grading hillsides or steep slopes.

Roads that will serve the facility will impact a total of 5.53 acres of wetlands in the 200-foot temporary ROW. These impacts would be reduced to 3.23 acres for the 120-foot permanent ROW. The largest wetland impacts for roads are within Wetland C, the large wetland complex found throughout the East Range Site. There are no crossings of water associated with the roads.

3.6.5 Mitigation Measures

Mitigation of wetland impacts will be in the form of direct replacement or through purchase of credits through an approved wetland bank. Wetland mitigation will follow USACE and BWSR requirements and guidance and include addressing the provisions of the Replacement Plan requirements set forth in the WCA. The application will be submitted with the Combined Wetland Permit Application and will include any design details on wetland replacement sites, wetland banks, and/or sources of wetland credit for the project.

Tables 3.6-76 and 3.6-77 in Section 3.6.4 describe estimated temporary and permanent wetland impacts for the West and East Range sites, respectively. For the West Range Site, an estimate of 290.19 acres of permanent wetland impacts is anticipated for construction of the IGCC Power Station and its Associated Facilities. Temporary wetland impacts estimated for the IGCC Power Station and its Associated Facilities include 118.46 acres, which would be restored upon

completion of construction activities. In comparison, the East Range Site would have an estimated 175.36 acres of permanent wetland impacts for the same construction. The temporary wetland impacts estimated for the East Range Site utility and transportation corridors include 95.14 acres, which would be restored upon completion of construction activities.

In accordance with USACE and BWSR wetland mitigation policy, wetland replacement options will be explored in the following sequence:

Step 1 Project specific wetland replacement options (on-site or adjacent to the project site) will be investigated first. If no project specific wetland replacement opportunities exist or additional mitigation credit is required, Step 2 will be followed.

Step 2 Potential wetland replacement opportunities within the sub-watershed, watershed, or county where the project is located will be investigated. If no opportunities are available or additional wetland mitigation credit is required, Step 3 will be followed.

Step 3 Potential wetland replacement opportunities within the MDNR-defined eco-region, neighboring watersheds or counties, or within a geographic area that is as close as possible to the project will be investigated.

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 LGU. Higher ratios are utilized when the agencies determine that impacted wetlands have a higher value relative to other wetland types (e.g., impacts to tamarack bogs may be regulated at higher level versus impacts to a disturbed, urbanized wetland). The USACE has recently been implementing replacement requirements of 1.5:1, although formal guidance indicating this change in replacement requirements has not been officially published. Formal guidance describing these new federal replacement ratios was anticipated to be officially published in January 2006; however, this has not occurred to date.

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 will require wetland replacement at a ratio of 1.5:1, which would exceed the WCA replacement requirements.

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 will need to be negotiated between the USACE and BWSR appropriate for mitigation for the site and its utility and transportation corridors.

No wetland replacement site specific design details have been developed to date, but are anticipated to begin after the preferred site location is determined and after the site design is initiated. Proposed wetland replacement will 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 will be followed.

Wetland agency consultation to date has been limited thus far to the MEQB 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 MDNR Division of Lands and Minerals has indicated that it may become the designated LGU administering the WCA, but that has not yet been formally determined. The wetland agency coordination process will not begin until the selection of a preferred site has occurred. These agencies are expected to provide formal comments and guidance on the environmental effects of the project.

3.7 Land use

This section provides detailed estimates of the direct land use impacts of Mesaba One and Mesaba Two for the West Range and East Range Sites. The analysis addresses the impacts of the IGCC Power Station, its Associated Facilities, the Interconnection Corridors, the Preferred and Alternate HVTL Routes, and the Proposed Natural Gas Pipeline Route.

The primary source of the data is the 1996 Land Use/Land Cover Map, which was completed by the Manitoba Remote Sensing Centre and obtained through the Minnesota Department of Natural Resources ("MDNR") Data Deli. Local comprehensive plans were also reviewed but there was not sufficient information in those plans to discuss land use in detail. The data from the 1996 Land Use/Land Cover map was verified in discussions with Itasca County officials, as well as with representatives from Iron Range Township and the City of Taconite. Aerial imagery was also reviewed to verify the accuracy of the 1996 Land Use/Land Cover. The land use data were further refined through on-site wetland delineations in parts of the two Sites, particularly in the IGCC Power Station Footprint and Buffer Land.

3.7.1 West Range

3.7.1.1 IGCC Power Station and Buffer Land

The land use/land cover on the West Range IGCC Power Station Footprint and Buffer Land is primarily coniferous forest, mixed wood forest and regeneration/young forests. There are also some areas that are wetlands. A detailed map showing existing land use/land cover for the West Range Site is provided in Section 2 (Figure 2.8-1). Table 3.7-1 below summarizes the permanent impacts on the IGCC Power Station Footprint and the temporary ROW in the Buffer Land.

Table 3.7-1
West Range IGCC Power Station Footprint Land Use Impacts
Land Use/Land Cover

	Temporary Impacts (Acres)	Permanent Impacts (Acres)
Coniferous forest	52.53	4.27
Deciduous forest	694.39	86.48
Grassland	1.57	0.00
Mixed wood forest	326.57	56.22
NWI wetlands	80.80	0.00
Open water	2.80	0.00
Other rural development	21.95	0.00
Regeneration/young forests	221.78	3.12
Surveyed wetlands	257.07	30.95
Wetlands – bogs	34.58	4.55
Wetlands – marsh and fends	14.38	0.00
Total	1708.42	185.59

Approximately 150 acres of forested land will be cleared for the IGCC Power Station Footprint.

3.7.1.2 West Range HVTL Alternative 1

The West Range HVTL Proposed Alternative will require a 150-foot permanent ROW. See Table 3.7-2 for land use permanently affected within the transmission ROW. Temporary impacts were not assessed for the HVTL corridors.

Table 3.7-2
West Range HVTL Proposed Alternative
Impacts to Land Use/Land Cover

Land Use/Land Cover	Permanent Impacts (Acres)
Coniferous forest	7.97
Deciduous forest	41.34
Grassland	2.75
Mixed wood forest	12.74
Open water	0.80
Other rural developments	8.72
Regeneration/young forests	26.37
Shrubby grassland	4.37
Wetlands – bogs	24.76
Wetlands – marsh and fens	4.30
Total	134.12

Based on the information from Table 3.7-2, approximately 88 acres or 66 percent of the HVTL Alternative 1 corridor is some type of forest land. Although grassland and wetlands can remain in the ROW, the forested areas would have to be permanently cleared. Twenty-nine acres of wetlands would be crossed on this route alternative. Wetlands comprise approximately 29 acres or approximately 22 acres of the corridor.

3.7.1.3 West Range HVTL Alternative 1A

The permanent ROW width required is 150 feet when it is shared with the gas line corridor and 100 feet when alone. Permanent impacts will result from the placement of the tower poles and portions which must remain clear of trees. *See* Table 3.7-3 below for the acreage and type of land impacted within the permanent ROW.

Table 3.7-3
West Range HVTL Alternative 1A Impacts to Land Use/Land Cover

Land Use/Land Cover	Permanent Impacts (Acres)
Coniferous forest	5.5
Deciduous forest	40.1
Grassland	12.2
Gravel pits and open mines	1.1
Mixed wood forest	9.4
Open water	2.4
Other rural developments	5.6
Regeneration/young forests	15.4
Shrubby grassland	1.8
Wetlands – bogs	19.9
Wetlands – marsh and fens	7.2
Total	120.6

Based on the information from Table 3.7-3, approximately 82 acres or 54 percent of the HVTL Alternative 1A corridor is forest land. Wetlands comprise approximately 36 acres or 24 percent of the HVTL Alternative 1A corridor. Approximately 82 acres of forest land will be cleared to build the HVTL corridor, but the rest would be allowed to re-establish after construction is complete. Thirty-six acres of wetlands will also be traversed by the HVTL line.

3.7.1.4 West Range Plan B Phase II Alternate Route WRB-2A

The Plan B Phase II Alternate Route WRB-2A would be constructed entirely within an existing HVTL corridor, so no further land use impacts would be expected if this route is selected

3.7.1.5 West Range Gas Pipeline Alternative 1

The West Range Gas Pipeline Alternative 1 will require a 100-foot ROW for construction activities and a 70-foot permanent ROW for maintenance. See Figure 2.8-2 for a detailed map showing existing land use/land cover. Table 3.7-4, below, shows the acreage and type of land impacted within the permanent ROW and temporary ROW.

Table 3.7-4
West Range Gas Pipeline Alternative 1 Impacts to Land Use/Land Cover

Land Use/Land Cover	Temporary Impact (Acres)	Permanent Impact (Acres)
Coniferous forest	11.51	8.08
Deciduous forest	31.19	21.11
Grassland	20.34	14.20
Mixed wood forest	25.84	17.81
Open water	0.59	0.39
Other rural developments	16.63	12.74
Regeneration/young forests	23.22	16.18
Shrubby grassland	10.55	7.40
Wetlands – bogs	14.64	10.21
Wetlands – marsh and fens	5.11	3.58
Total	159.62	111.70

Approximately 91 acres of forested land will be cleared to build the gas pipeline corridor, resulting in 63 acres of permanent impact. The remaining 28 acres will be allowed to revert back to its original condition.

3.7.1.6 West Range Gas Pipeline Alternative 2

The West Range Gas Pipeline Alternative 2 will require a 100-foot ROW during construction activities and a 70-foot permanent ROW to be used for maintenance of the pipeline. Table 3.7-5 summarizes the expected land use impacts of this route.

Table 3.7-5
West Range Gas Pipeline Alternative 2

Impacts to Land Use/Land Cover Land Use/Land Cover	Temporary Impact (Acres)	Permanent Impact (Acres)
Coniferous forest	7.60	5.31
Deciduous forest	17.25	11.14
Farmsteads and rural residences	0.21	0.14
Grassland	49.93	35.26
Mixed wood forest	13.70	8.82
Open water	0.69	0.49
Other rural developments	45.60	33.74
Regeneration/young forests	20.05	13.79
Shrubby grassland	5.16	3.59
Wetlands – bogs	6.75	4.65
Wetlands – marsh and fens	3.83	2.57
Total	170.77	119.50

Approximately 59 acres of forest land will be cleared. Of this, 20 acres would be allowed to revert back to its original condition. Approximately 55 acres of grasslands will be cleared to build the gas pipeline corridor resulting in about 39 acres of permanent impact. The remaining 16 acres would revert to its original condition. Finally, approximately 46 acres of other rural development will be impacted to build the gas pipeline corridor resulting in about 34 acres of permanent impact. The remaining 12 acres have the potential to revert back to their original condition.

3.7.1.7 West Range Gas Pipeline Alternative 3

The West Range gas pipeline Alternative 3 will require a 70-foot permanent ROW and a 100-foot temporary ROW. See Table 3.7-6 for the acreage and type of land impacted within the permanent ROW and temporary ROW. The temporary ROW will only be needed for the construction phase of the project.

Table 3.7-6
West Range Gas Pipeline Alternative 3
Impacts to Land Use/Land Cover

Land Use/Land Cover	Temporary Impacts (Acres)	Permanent Impact (Acres)
Coniferous forest	6.72	4.65
Deciduous forest	26.40	17.48
Farmsteads and rural residences	2.57	1.84
Grassland	25.27	17.40
Gravel pits and open mines	20.23	14.31
Mixed wood forest	12.66	8.65
Open water	0.08	0.01
Other rural developments	21.87	16.86
Regeneration/young forests	10.00	7.00
Shrubby grassland	7.12	4.87
Wetlands – bogs	1.06	0.72
Wetlands – marsh and fens	8.23	5.68
Total	142.21	99.47

Approximately 56 acres of forest land will be cleared to build the gas pipeline corridor resulting in about 38 acres of permanent impact. The remaining 18 acres will be allowed to revert back to its original condition. Approximately 32 acres of grassland will be cleared to build the corridor resulting in about 22 acres of permanent impact. The remaining 10 acres will be allowed to revert back to its original condition.

3.7.1.8 West Range Process Water Supply Pipeline

3.7.1.8.1 Segment 1 – Lind Pit to Canisteo Pit

The West Range Process Water Supply Pipeline segment 1 will require a 100-foot permanent ROW and a 150-foot temporary ROW. *See* Table 3.7-7 below for the acreage and type of land impacted within the permanent ROW and temporary ROW. The temporary ROW will only be needed for the construction phase of the project.

Table 3.7-7
West Range Proposed Process Water Line
Segment 1 – Lind Pit to Canisteo Pit Impacts to Land Use/Land Cover

Land Use/Land Cover	Temporary Impacts (Acres)	Permanent Impacts (Acres)
Deciduous forest	2.60	1.69
Gravel pits and open mines	36.62	24.45
Open water	0.74	0.42
Total	39.96	26.56

Approximately 37 acres of gravel pits and open mines will be impacted, resulting in about 24 acres of permanent impact. The remaining 13 acres will be allowed to revert back to its original condition.

3.7.1.8.2 Segment 2 – Canisteo Pit to West Range Site

The West Range Process Water Supply Pipeline segment 2 will require a 100-foot permanent ROW and a 150-foot temporary ROW. See Table 3.7-8 for the acreage and type of land impacted within the permanent ROW and temporary ROW.

Table 3.7-8
West Range Process Water Supply Pipeline
Segment 2 – Canisteo Pit to West Range Site
Impacts to Land Use/Land Cover

Land Use/Land Cover	Temporary Impacts (Acres)	Permanent Impacts (Acres)
Coniferous forest	0.13	0.06
Deciduous forest	18.51	12.43
Gravel pits and open mines	6.01	4.04
Mixed wood forest	7.52	4.86
Open water	0.03	0.0011
Regeneration/young forests	0.29	0.22

Land Use/Land Cover	Temporary Impacts (Acres)	Permanent Impacts (Acres)
Wetlands – bogs	4.23	2.89
Wetlands – marsh and fens	0.39	0.17
Total	37.11	24.67

Approximately 26 acres of forest land will need to be cleared to build the process water line segment 2 corridor resulting in about 18 acres of permanent impact. The remaining 8 acres will be allowed to revert back to its original condition.

3.7.1.8.3 Segment 3 – Gross-Marble to Canisteo Pit

The West Range Process Water Supply Pipeline segment 3 will require a 100-foot permanent ROW and a 150-foot temporary ROW. See Table 3.7-9 for the acreage and type of land impacted within the permanent ROW and temporary ROW.

Table 3.7-9
West Range Process Water Supply Pipeline
Segment 3 – Gross-Marble to Canisteo Pit
Impacts to Land Use/Land Cover

Land Use/Land Cover	Temporary Impacts (Acres)	Permanent Impacts (Acres)
Coniferous forest	2.54	1.96
Deciduous forest	37.30	25.01
Gravel pits and open mines	32.47	21.92
Mixed wood forest	9.12	5.71
Open water	1.57	0.84
Other rural developments	0.34	0.23
Regeneration/young forests	2.26	1.55
Wetlands – bogs	0.13	0.08
Wetlands – marsh and fens	2.38	1.39
Total	88.12	58.69

Approximately 51 acres of forest land will need to be cleared, resulting in about 34 acres of permanent impact. The remaining 17 acres will be allowed to revert back to its original condition. Approximately 32 acres of gravel pits and open mines will be impacted to build the process water line, resulting in about 22 acres of permanent impact. The remaining 10 acres will be allowed to revert back to its original condition or use.

3.7.1.8.4 West Range Process Water Blowdown Pipeline 1

The West Range Process Water Blowdown Pipeline 1 will require a 100-foot permanent ROW and a 150-foot temporary ROW. See Table 3.7-10 for the acreage and type of land impacted within the permanent ROW and temporary ROW.

Table 3.7-10
West Range Process Water Blowdown Pipeline 1
Impacts to Land Use/Land Cover

Land Use/Land Cover	Temporary Impacts (Acres)	Permanent Impacts (Acres)
Coniferous forest	0.38	0.22
Deciduous forest	27.04	18.09
Gravel pits and open mines	3.46	2.37
Mixed wood forest	9.63	6.20
Regeneration/young forests	0.18	0.11
Wetlands – bogs	3.80	2.61
Wetlands – marsh and fens	0.0005	
Total	44.49	29.60

Approximately 37 acres of forest land will need to be cleared, resulting in about 25 acres of permanent impact. The remaining 12 acres will be allowed to revert back to its original condition.

3.7.1.8.5 West Range Process Water Blowdown Pipeline 2

The West Range Process Water Blowdown Pipeline 2 will require a 100-foot permanent ROW and a 150-foot temporary ROW. See Table 3.7-11 for the acreage and type of land impacted within the permanent ROW and temporary ROW.

Table 3.7-11
West Range Process Water Blowdown Pipeline 2
Impacts to Land Use/Land Cover

Land Use/Land Cover	Temporary Impacts (Acres)	Permanent Impacts (Acres)
Coniferous forest	0.34	0.23
Deciduous forest	6.16	3.95
Farmsteads and rural residences	0.08	0.00
Grassland	8.80	6.09
Gravel pits and open mines	14.95	9.88
Mixed wood forest	1.15	0.79
Regeneration/young forests	8.01	5.34
Total	39.49	26.28

Approximately 16 acres of forest land will need to be cleared, resulting in about 10 acres of permanent impact. The remaining 6 acres will be allowed to revert back to its original condition.

Approximately 15 acres of gravel pits and open mines will be impacted resulting in about 9 acres of permanent impact.

3.7.1.8.6 West Range Potable Water and Sewer Pipeline

The West Range process water and sewer pipeline will require a 40 foot permanent ROW and a 100-foot temporary ROW. See Table 3.7-12 for the acreage and type of land impacted within the permanent ROW and temporary ROW.

Table 3.7-12
West Range Potable Water and Sewer Pipeline
Impacts to Land Use/Land Cover

Land Use/Land Cover	Temporary Impacts (Acres)	Permanent Impacts (Acres)
Coniferous forest	0.10	0.03
Deciduous forest	13.49	5.34
Grassland	1.77	0.64
Gravel pits and open mines	9.62	3.97
Mixed wood forest	4.76	1.80
Regeneration/young forests	0.18	0.08
Urban/industrial (cities & towns)	0.48	0.14
Wetlands – bogs	2.81	1.19
Wetlands – marsh and fens	0.43	0.12
Total	33.65	13.31

Approximately 19 acres of forest land will need to be cleared, resulting in about 7 acres of permanent impact. The remaining 12 acres will be allowed to revert back to its original condition.

3.7.1.8.7 West Range Rail Line Alternative 1 A

The West Range rail line alternative 1A will require a 100-foot permanent ROW and an 80- to 450-foot temporary ROW. See Table 3.7-13 for the acreage and type of land impacted within the permanent ROW and temporary ROW.

Table 3.7-13
West Range Rail Line Alternative 1
Impacts to Land Use/Land Cover

Land Use/Land Cover	Temporary Impacts (Acres)	Permanent Impacts (Acres)
Coniferous forest	5.10	2.06
Deciduous forest	69.12	32.79
Grassland	0.51	0.60
Gravel pits and open mines	4.12	2.38
Mixed wood forest	33.22	17.65
Open water	0.72	0.31
Other rural developments	3.61	2.04
Regeneration/young forests	0.64	0.29
Wetlands – bogs	15.77	6.20
Wetlands – marsh and fens	6.38	4.69
Total	139.19	69.02

Approximately 108 acres of forest land will need to be cleared, resulting in about 53 acres of permanent impact. The remaining 55 acres will be allowed to revert back to its original condition.

3.7.1.8.8 West Range Rail Line Alternative 1 B

The West Range rail line alternative 1B will require a 100-foot permanent ROW and a 60- to 760-foot temporary ROW. See Table 3.7-14 for the acreage and type of land impacted within the permanent ROW and temporary ROW.

Table 3.7-14
West Range Rail Line Alternative 1 B
Impacts to Land Use/Land Cover

Land Use/Land Cover	Temporary Impacts (Acres)	Permanent Impacts (Acres)
Coniferous forest	5.37	3.61
Deciduous forest	99.80	38.83
Grassland	0.00	0.08
Gravel pits and open mines	28.66	7.13
Mixed wood forest	24.67	11.85
Other rural developments	1.45	0.45
Regeneration/young forests	1.94	0.16
Wetlands – bogs	11.49	7.79
Wetlands – marsh and fens	6.28	5.22
Total	179.66	75.12

Approximately 132 acres of forest land will need to be cleared, with about 54 acres of permanent impact. The remaining 78 acres will be allowed to revert back to its original condition.

3.7.1.8.9 West Range Roads

The West Range Access Road 1 will require a 120-foot permanent ROW and a 200-foot temporary ROW. See Table 3.7-15 for the acreage and type of land impacted within the permanent ROW and temporary ROW. The temporary ROW will only be needed for the construction phase of the project.

Table 3.7-15
West Range Roads – Access Road 1
Impacts to Land Use/Land Cover

Land Use/Land Cover	Temporary Impact (Acres)	Permanent Impact (Acres)
Coniferous forest	6.25	3.59
Deciduous forest	48.50	29.65
Grassland	3.12	1.81
Gravel pits and open mines	23.26	14.37
Mixed wood forest	8.94	4.76
Open water	0.75	0.42
Other rural developments	0.46	0.28
Regeneration/young forests	4.79	2.90
Wetlands – bogs	0.06	0.00
Wetlands – marsh and fens	2.73	1.48
Total	98.86	59.26

Approximately 68 acres of forest land will need to be cleared to build the West Range Access Road 1 corridor resulting in about 41 acres of permanent impact.

Table 3.7-16 shows the impacts of land use and land cover associated with construction of Access Road 2.

Table 3.7-16
West Range Roads – Access Road 2
Impacts to Land Use/Land Cover

Land Use/Land Cover	Temporary Impact (Acres)	Permanent Impact (Acres)
Coniferous forest	0.41	0.26
Deciduous forest	11.19	6.58
Grassland	0.00	0.00
Gravel pits and open mines	0.00	0.00

Mixed wood forest	6.42	3.99
Open water	0.00	0.00
Other rural developments	0.00	0.00
Regeneration/young forests	0.25	0.14
Wetlands – bogs	4.88	2.96
Wetlands – marsh and fens	0.00	0.00
Total	23.14	13.94

Approximately 18 acres of forest land will need to be cleared, resulting in about 11 acres of permanent impact. The remaining 7 acres will be allowed to revert back to its original condition.

Table 3.7-17 shows the combined impacts of constructing Access Roads 1 and 2.

Table 3.7-17
West Range Roads – Access Roads 1 and 2 Combined
Impacts to Land Use/Land Cover

Land Use/Land Cover	Temporary Impact (Acres)	Permanent Impact (Acres)
Coniferous forest	6.65	3.85
Deciduous forest	59.70	36.24
Grassland	3.12	1.81
Gravel pits and open mines	23.26	14.37
Mixed wood forest	15.36	8.75
Open water	0.75	0.42
Other rural developments	0.46	0.28
Regeneration/young forests	5.04	3.04
Wetlands – bogs	4.94	2.96
Wetlands – marsh and fens	2.73	1.48
Total	122.01	73.20

Approximately 87 acres of forest land will need to be cleared, resulting in about 52 acres of permanent impact. The remaining 35 acres will be allowed to revert back to its original condition.

3.7.2 East Range

3.7.2.1 IGCC Power Station Footprint and Buffer Land

The land use/land cover on the East Range Site is primarily coniferous forest, mixed wood forest and regeneration/young forests. Surveyed wetlands also are present. See Figure 2.8-3, which is a detailed map showing existing land use/land cover. Land Use impacts to the preferred site are expected to be associated with clearing the site to build the plant. Table 3.7-18 below summarizes the permanent ROW land use/land cover impacted by the facility footprint and the temporary ROW which is the entire facility site.

Table 3.7-18
East Range IGCC Power Station Footprint Land Use Impacts

Land Use/Land Cover	Temporary Impacts (Acres)	Permanent Impacts (Acres)
Coniferous forest	19.49	0.00
Deciduous forest	31.97	22.35
Mixed wood forest	359.62	119.66
Open water	0.16	0.00
Other rural developments	6.09	1.24
Shrubby grassland	51.63	8.18
Regeneration/young forests	9.19	0.00
Surveyed Wetlands	328.84	15.61
Wetlands – Bogs	0.16	0.00
Total	807.15	167.04

Approximately 142 acres of forested land will be cleared to build the facility (facility footprint).

3.7.2.2 East Range HVTL Alternative 1

The land use/land cover surrounding the East Range HVTL Alternative 1 corridor is typically coniferous forest lands consisting of mixed wood forest and regeneration/young forests. Some of the areas the HVTL passes through are also shrub swamp wetlands, wooded swamps and seasonally flooded basins or flats. Gravel pits and open mines are also land uses the HVTL traverses. Figure 2.8-3 provides a detailed map showing existing land use/land cover. Land will be cleared to accommodate the HVTL resulting in changes to the existing land uses.

The permanent ROW required for the HVTL line varies depending on existing ROW. Table 3.7-19 identifies the acreage and type of land impacted by the permanent ROW for HVTL Alternative 1.

Table 3.7-19
East Range HVTL Alternative 1
Impacts to Land Use/Land Cover

Land Use/Land Cover	Permanent Impact (Acres)
Coniferous forest	4.0
Deciduous forest	0
Farmlands and rural residences	0.2
Grassland	10.4
Gravel pits and open mines	27.7
Mixed wood forest	50.3
Open water	0
Other rural developments	1.6

Regeneration/young forests	12.1
Shrubby grassland	23.0
NWI Wetlands	32.6
Roads and trails	2.7
Total	164.6

Approximately 242 acres of forest land will need to be cleared to build the HVTL corridor. This will be permanent impact, although some trees will be allowed to re-establish after the construction phase of the project. Approximately 108 acres of grassland will need to be cleared for the HVTL line but much of this will re-establish itself after the construction phase of the project.

3.7.2.3 East Range HVTL Alternative 2

The land use/land cover surrounding the East Range HVTL Alternative 2 corridor is typically coniferous forest lands consisting of mixed wood forest and regeneration/young forests. Some of the areas the HVTL passes through are also shrub swamp wetlands, wooded swamps and seasonally flooded basins or flats. Gravel pits and open mines are also land uses the HVTL traverses. Figure 2.8-4 provides a detailed map showing existing land use/land cover. Land will be cleared to accommodate the HVTL resulting in changes to the existing land uses.

The permanent ROW required for the HVTL line varies depending on existing ROW. Table 3.7-20 identifies the acreage and type of land impacted by the permanent ROW for HVTL Alternative 2.

Table 3.7-20
East Range HVTL Alternative 2
Impacts to Land Use/Land Cover

Land Use/Land Cover	Permanent Impact (Acres)
Farmland and residences	0.7
Coniferous forest	2.5
Deciduous forest	2.4
Grassland	6.9
Gravel pits and open mines	33.5
Mixed wood forest	44.5
Open water	0.1
Other rural developments	3.0
Regeneration/young forests	15.5
Shrubby grassland	20.8
NWI wetlands	30.2
Roads and trail	0
Total	165.6

Approximately 183 acres of forest land will need to be cleared to build the HVTL corridor. This will be permanent impact, although some trees will be allowed to re-establish after the

construction phase of the project. Approximately 106 acres of grassland will need to be cleared for the HVTL line but much of this will re-establish itself after the construction phase of the project.

3.7.2.4 East Range Gas Pipeline Alternative 1

The East Range Gas Pipeline Alternative 1 will require a 100-foot ROW for construction activities and a 70-foot permanent ROW for maintenance. *See* Figure 2.8-4 for a detailed map showing existing land use/land cover and Table 3.7-21 for the acreage and type of land impacted within the permanent ROW and temporary ROW.

NNG currently provides natural gas transportation to Cliffs Erie via a 10-inch diameter pipeline. The branch line taps NNG's 20-inch diameter pipeline that, in turn, taps in Carleton, Minnesota the 36-inch line owned by Great Lakes. The tap of NNG's 20-inch pipeline occurs near the junction of St. Louis County Roads 454 and 315 about one mile due west of Iron Junction, Minnesota. From that point the 10-inch diameter branch line travels about 29 miles to where it would abut the eastern boundary of the Buffer Land.

Permanent impacts have already occurred in establishing the Cliffs Erie branch line route. The current ROW that NNG maintains on this route is 70 feet. NNG would follow the pre-construction process outlined in Section 1.2.6.2.8 and the excavation, installation, and revegetation processes outlined in Section 1.9.2.1.3. As noted in Section 1.2.6.2.8, NNG would undertake this activity apart from the state process but under the rules of the FERC. For the record in this proceeding and for purposes of conservatively establishing an upper limit on the impacts that could occur along this route, permanent impacts are identified in Table 3.7-21 as if the pipeline did not exist. Table 3.7-21 provides the upper limit and marks each value under a given category with the "less than" symbol "<".

Table 3.7-21
East Range Gas Pipeline Alternative 1
Impacts to Land Use/Land Cover

Land Use/Land Cover	Temporary Impact (Acres)	Permanent Impact (Acres)
Coniferous forest	7.56	<5.63
Deciduous forest	5.00	<3.50
Farmsteads and rural residences	0.98	<0.74
Grassland	46.12	<31.97
Gravel pits and open mines	0.24	<0.24
Mixed wood forest	120.71	<84.54
Open water	1.69	<1.22
Other rural developments	4.80	<3.25
Regeneration/young forests	53.83	<38.25

Land Use/Land Cover	Temporary Impact (Acres)	Permanent Impact (Acres)
Shrubby grassland	78.89	<54.79
Urban/industrial	0.53	<0.44
Wetlands – bogs	28.16	<19.24
Wetlands – marsh and fens	1.19	<0.91
Total	349.70	<244.72

Approximately 187 acres of forested land will be cleared to build the gas pipeline corridor, resulting in 132 acres of permanent impact. The remaining 55 acres will be allowed to revert back to its original condition. Approximately 125 acres of grassland will be cleared as well, resulting in 87 acres of permanent impact. The remaining 38 acres will be allowed to revert back to its original condition.

3.7.2.5 East Range Process Water Supply Pipeline

3.7.2.5.1 Pipeline 2WX – SITE

The East Range Process Water Supply Pipeline 2WX – SITE will require a 100-foot permanent ROW and a 150-foot temporary ROW. See Table 3.7-22 for the acreage and type of land impacted within the permanent ROW and temporary ROW. The temporary ROW will only be needed for the construction phase of the project.

Table 3.7-22
East Range Proposed Process Water Line
Pipeline 2WX – SITE
Impacts to Land Use/Land Cover

Land Use/Land Cover	Temporary Impacts (Acres)	Permanent Impacts (Acres)
Deciduous forest	3.41	2.22
Gravel pits and open mines	0.72	0.48
Mixed wood forest	1.85	1.21
Other rural development	0.42	0.26
Regeneration/young forest	9.51	6.35
Total	15.91	10.52

Approximately 15 acres of forest lands will be cleared to build this process water line corridor resulting in about 10 acres of permanent impact. The remaining 5 acres will be allowed to revert back to its original condition.

3.7.2.5.2 Pipeline 2WX – 2W

The East Range Process Water Supply Pipeline 2WX – 2W will require a 100-foot permanent ROW and a 150-foot temporary ROW. See Table 3.7-23 for the acreage and type of land impacted within the permanent ROW and temporary ROW. The temporary ROW will only be needed for the construction phase of the project.

Table 3.7-23
East Range Proposed Process Water Line
Pipeline 2WX – W Impacts to Land Use/Land Cover

Land Use/Land Cover	Temporary Impacts (Acres)	Permanent Impacts (Acres)
Gravel pits and open mines	8.53	5.78
Mixed wood forest	0.10	0.02
Open water	0.31	0.16
Shrubby grassland	0.58	0.33
Wetlands – marsh and fens	0.07	0.01
Total	9.59	6.30

Approximately 9 acres of gravel pits and open mines will be impacted to build this process water line corridor resulting in about 6 acres of permanent impact. The remaining 3 acres will be allowed to revert back to its original condition or use.

3.7.2.5.3 Pipeline 2W – 2E

The East Range Process Water Supply Pipeline 2W – 2E will require a 100-foot permanent ROW and a 150-foot temporary ROW. See Table 3.7-24 for the acreage and type of land impacted within the permanent ROW and temporary ROW. The temporary ROW will only be needed for the construction phase of the project.

Table 3.7-24
East Range Proposed Process Water Line
Pipeline 2W – E Impacts to Land Use/Land Cover

Land Use/Land Cover	Temporary Impacts (Acres)	Permanent Impacts (Acres)
Gravel pits and open mines	2.90	1.85
Total	2.90	1.85

Approximately 2.90 acres of gravel pits and open mines will be impacted to build this process water line corridor resulting in about 1.85 acres of permanent impact. The remaining approximately 1 acre will be allowed to revert back to its original condition or use.

3.7.2.5.4 Pipeline 3 – 2E

The East Range Process Water Supply Pipeline 3 – 2E will require a 100-foot permanent ROW and a 150-foot temporary ROW. See Table 3.7-25 for the acreage and type of land impacted within the permanent ROW and temporary ROW. The temporary ROW will only be needed for the construction phase of the project.

Table 3.7-25
East Range Proposed Process Water Line
Pipeline 3 – 2E Impacts to Land Use/Land Cover

Land Use/Land Cover	Temporary Impacts (Acres)	Permanent Impacts (Acres)
Gravel pits and open mines	10.47	6.89
Total	10.47	6.89

Approximately 10 acres of gravel pits and open mines will be impacted to build this process water line corridor resulting in about 7 acres of permanent impact. The remaining approximately 3 acres will be allowed to revert back to its original condition or use.

3.7.2.5.5 Pipeline K – 2WX

The East Range Process Water Supply Pipeline K – 2WX will require a 100-foot permanent ROW and a 150-foot temporary ROW. See Table 3.7-26 for the acreage and type of land impacted within the permanent ROW and temporary ROW. The temporary ROW will only be needed for the construction phase of the project.

Table 3.7-26
East Range Proposed Process Water Line
Pipeline K – 2WX Impacts to Land Use/Land Cover

Land Use/Land Cover	Temporary Impacts (Acres)	Permanent Impacts (Acres)
Gravel pits and open mines	0.97	0.67
Mixed wood forest	0.13	0.03
Open water	0.92	0.61
Regeneration/young forest	1.36	0.86
Total	3.38	2.17

Approximately 1.5 acres of forest lands will be cleared to build this process water line corridor resulting in about 1 acre of permanent impact. The remaining approximately 1/2 acre will be allowed to revert back to its original condition. .

3.7.2.5.6 Pipeline 6 – S – 2WX

The East Range Process Water Supply Pipeline 6 – S – 2WX will require a 100-foot permanent ROW and a 150-foot temporary ROW. See Table 3.7-27 for the acreage and type of land impacted within the permanent ROW and temporary ROW. The temporary ROW will only be needed for the construction phase of the project.

Table 3.7-27
East Range Proposed Process Water Line
Pipeline 6 – S – 2WX Impacts to Land Use/Land Cover

Land Use/Land Cover	Temporary Impacts (Acres)	Permanent Impacts (Acres)
Deciduous forest	1.76	1.15
Grassland	0.42	0.27
Gravel pits and open mines	8.42	5.69
Mixed wood forest	10.15	6.65
Open water	2.46	1.58
Regeneration/young forest	7.19	4.84
Shrubby grassland	8.57	5.72
Wetlands – marsh and fens	0.44	0.29
Total	39.41	26.19

Approximately 19 acres of forest lands will be cleared to build this process water line corridor resulting in about 13 acres of permanent impact. The remaining 6 acres will be allowed to revert back to its original condition.

3.7.2.5.7 Pipeline 9S – 6

The East Range Process Water Supply Pipeline 9S – 6 will require a 100-foot permanent ROW and a 150-foot temporary ROW. See Table 3.7-28 for the acreage and type of land impacted within the permanent ROW and temporary ROW. The temporary ROW will only be needed for the construction phase of the project.

Table 3.7-28
East Range Proposed Process Water Line
Pipeline 9S – 6 Impacts to Land Use/Land Cover

Land Use/Land Cover	Temporary Impacts (Acres)	Permanent Impacts (Acres)
Mixed wood forest	5.45	3.61
Open water	4.12	2.68
Total	9.57	6.29

Approximately 5 acres of forest lands will be cleared to build this process water line corridor resulting in about 4 acres of permanent impact. The remaining approximately 1 acre will be allowed to revert back to its original condition. Approximately 4 acres of open water will be impacted to build this corridor resulting in about 3 acres of permanent impact.

3.7.2.5.8 Pipeline 9N – 6

The East Range Process Water Supply Pipeline 9N – 6 will require a 100-foot permanent ROW and a 150-foot temporary ROW. See Table 3.7-29 for the acreage and type of land impacted within the permanent ROW and temporary ROW. The temporary ROW will only be needed for the construction phase of the project.

Table 3.7-29
East Range Proposed Process Water Line
Pipeline 9N – 6 Impacts to Land Use/Land Cover

Land Use/Land Cover	Temporary Impacts (Acres)	Permanent Impacts (Acres)
Mixed wood forest	15.71	10.28
Open water	1.99	1.42
Total	17.7	11.7

Approximately 16 acres of forest lands will be cleared to build this process water line corridor resulting in about 10 acres of permanent impact. The remaining approximately 6 acres will be allowed to revert back to its original condition.

3.7.2.6 East Range Potable Water and Sewer Pipeline

The East Range process water and sewer pipeline will require a 40-foot permanent ROW and a 100-foot temporary ROW. See Table 3.7-30 for the acreage and type of land impacted within the permanent ROW and temporary ROW. The temporary ROW will only be needed for the construction phase of the project.

Table 3.7-30
East Range Potable Water Pipeline Impacts to Land Use/Land Cover

Land Use/Land Cover	Temporary Impact (Acres)	Permanent Impact (Acres)
Deciduous forest	0.62	0.23
Grassland	1.84	0.72
Mixed wood forest	11.17	4.37
Open water	1.76	0.78
Other rural developments	8.19	3.25
Regeneration/Young Forests	1.91	0.81
Total	25.49	10.16

Approximately 14 acres of forest land will need to be cleared to build the potable water and sewer pipeline corridor resulting in about 5 acres of permanent impact. The remaining 9 acres will be allowed to revert back to its original condition. Approximately 8 acres of other rural developments will be impacted resulting in about 3 acres of permanent impact. The remaining 5 acres will be allowed to revert back to its original condition or use.

3.7.2.7 East Range Rail Line Alternative 1

The West Range rail line alternative 1 will require a 100-foot permanent ROW and a 75- to 490-foot temporary ROW. See Table 3.7-31 for the acreage and type of land impacted within the permanent ROW and temporary ROW. The temporary ROW will only be needed for the construction phase of the project.

Table 3.7-31
East Range Rail Line Alternative 1
Impacts to Land Use/Land Cover

Land Use/Land Cover	Temporary Impact (Acres)	Permanent Impact (Acres)
Mixed wood forest	37.24	22.14
Open water	0.09	0.18
Other rural developments	0.52	0.24
Shrubby grassland	20.65	5.83
Wetlands - bogs	1.14	1.31
Surveyed Wetlands	17.21	10.67
Total	76.83	40.37

Approximately 37 acres of forest land will need to be cleared to build the rail line alternative 1 corridor resulting in about 22 acres of permanent impact. The remaining 15 acres will be allowed to revert back to its original condition.

Table 3.7-32
East Range Rail Line Alternative 1 – Center Loop
Impacts to Land Use/Land Cover

Land Use/Land Cover	Temporary Impact (Acres)	Permanent Impact (Acres)
Mixed wood forest	30.44	30.44
Open water	0.16	0.16
Shrubby grassland	25.23	25.23
Surveyed Wetlands	47.91	47.91
Total	103.73	103.73

Approximately 48 acres of wetlands will be impacted to build the rail line Center Loop. Many of the wetlands impacted may be able to be brought back to their natural condition after construction is completed, especially any wetlands contained in the center of the loop portion of the rail road tracks.

3.7.2.8 East Range Rail Line Alternative 2

The West Range rail line alternative 2 will require a 100-foot permanent ROW and a 75- to 490-foot temporary ROW. See Table 3.7-33 for the acreage and type of land impacted within the permanent ROW and temporary ROW. The temporary ROW will only be needed for the construction phase of the project.

Table 3.7-33
East Range Rail Line Alternative 2
Impacts to Land Use/Land Cover

Land Use/Land Cover	Temporary Impact (Acres)	Permanent Impact (Acres)
Mixed wood forest	35.17	21.81
Open water	0.09	0.18
Other rural developments	0.52	0.24
Regeneration/young forest	0.68	0.76
Shrubby grassland	17.84	4.83
Wetlands – bogs	1.14	1.31
Surveyed wetlands	18.35	13.37
Total	73.79	42.49

Approximately 36 acres of forest land will need to be cleared to build the rail line alternative 2 corridor resulting in about 23 acres of permanent impact. The remaining 13 acres will be allowed to revert back to its original condition.

3.7.2.9 East Range Roads

The East Range roads will require a 120-foot permanent ROW and a 200-foot temporary ROW. See Table 3.7-34 for the acreage and type of land impacted within the permanent ROW and temporary ROW. The temporary ROW will only be needed for the construction phase of the project.

Table 3.7-34
East Range Roads
Impacts to Land Use/Land Cover

Land Use/Land Cover	Temporary Impact (Acres)	Permanent Impact (Acres)
Coniferous forest	2.38	1.48
Deciduous forest	7.97	4.79
Mixed wood forest	21.76	12.82
Regeneration/young forests	6.19	3.79
Shrubby grassland	3.12	1.93
Surveyed wetlands	5.52	3.22
Total	46.95	28.02

Approximately 38 acres of forest land will need to be cleared to build the West Range road corridors resulting in about 23 acres of permanent impact. The remaining 15 acres will be allowed to revert back to its original condition.

3.7.3 Publicly Owned Lands

3.7.3.1 West Range Site and Associated Facilities

There are several parcels of publicly owned land in the project vicinity. See Figure 2.8-5, which identifies public parcel ownership. Also, refer to Table 3.7-35, which indicates the acres of publicly owned land that is traversed by corridors associated with the West Range Site. No publicly owned lands are present within the West Range IGCC Power Station Footprint and Buffer Land.

Table 3.7-35
Publicly Owned Lands Traversed – Permanent ROW Acreage

Public Entity	Permanent Impact (Acres)
City of Bovey	0.73
City of Coleraine	4.41
City of Taconite	1.80
Itasca County	101.60

Public Entity	Permanent Impact (Acres)
Itasca County Railroad Authority	0.0078
State of Minnesota	58.24
Town of Iron Range	2.28
Total	169.07

Based on information from Table 3.7-35 approximately 169 acres of publicly owned land are traversed by ROW corridors. Sixty percent of the land traversed is owned by Itasca County and approximately 34 percent is owned by the State of Minnesota.

The publicly owned land impacted will be cleared to accommodate the ROW corridors.

3.7.3.2 East Range Site and Associated Corridors

There are several publicly owned lands in the vicinity of the East Range Site and Associated Corridors. The St. Louis County Plat Book as well as the St. Louis County Land Department provided information regarding publicly owned lands. There are several types of publicly owned lands in the area and include Superior National Forest Land, Minnesota Department of Natural Resource Lands, and St. Louis County Tax Forfeit Lands.

3.7.4 Structures

3.7.4.1 West Range Site and Associated Corridors

There are no existing structures on the West Range Site; however, there are several structures adjacent to the site. The majority of these structures are either residences or accessory structures to residences such as garages and other out-buildings. There are also several structures and rural residences located within one mile of the West Range associated corridors. See Figure 2.8-1, which identifies farmstead and rural residences in relation to the IGCC Power Station Footprint and Buffer Land and Section 2.1 (Potentially Significant Receptors) for more information regarding the location of structures within the vicinity of the West Range Site.

There will be no land use impacts to structures on or adjacent to the IGCC Power Station Footprint and Buffer Land because there are no structures on this land. The zoning of the adjacent properties is not expected to change because of this project.

The rail corridor serving the IGCC Power Station comes within 400 feet of the closest residential structure. See Figure 2.1-1 to identify the location of nearby residential properties to infrastructure related to the IGCC Power Station.

There will be no land use impacts to structures along the ROW corridors. The zoning of the properties adjacent to existing corridors is not expected to change because of this project.

3.7.4.2 East Range Site and Associated Corridors

There are no existing structures on the East Range Site; however, there are several structures adjacent to the site. The majority of these structures are either residences or accessory structures to residences such as garages and other out-buildings. There are also several structures and rural residences located within one mile of the corridors associated with the East Range Site. See Figure 2.8-3, which identifies farmstead and rural residences in relation to the preferred site. See Section 2.1 (Potentially Significant Receptors) for a detailed discussion on the location of structures within the vicinity of the East Range Site.

There will be no land use impacts to structures on the preferred site because there are no structures on the preferred site.

There will be no land use impacts to structures adjacent to the preferred site. The zoning of the adjacent properties will not change, meaning the existing uses or allowable uses will not change because of the project.

3.7.5 Residential Areas

3.7.5.1 West Range Site

There are no residences located within 300 feet of the West Range Site according to the 1996 Land Use/Land Cover map. There are several residences west of the proposed site located along County Highway 7. Some of the residences are year-round residences while others are seasonal residences. There are also residential/recreational homes located on Dunning and Big Diamond Lake that are adjacent to the preferred site. Some of these properties are located one mile or less from the West Range Site. There are several home sites located along the “heavy haul” road between Big Diamond Lake and Dunning Lake. These homes are a mixture of seasonal and year-round residences.

The City of Taconite has both single-family and multi-family residential uses. The majority of these residences are year-round residences and are approximately 1.5 miles from the West Range IGCC Power Station Footprint and Buffer Land.

There will be no land use impacts to residential areas on the preferred site because there are no residential areas on the preferred site.

There will be no land use impacts to residential uses adjacent to the preferred site. The zoning of the adjacent properties will not change, meaning the existing uses or allowable uses will not change because of this project.

3.7.5.2 West Range Associated Corridors

The HVTL corridor is within one-half mile of multiple farmsteads/rural residential land uses and structures. The line also is within one-quarter mile of the City of Pengilly as the HVTL line runs adjacent to the western city limits of the City.

The gas pipeline corridor passes within one-half mile of several farmsteads/rural residences. The pipeline also is within one-half mile of the City of Taconite which has many residences and within one mile of the City of Holman.

The water and wastewater corridor is in close proximity to both rural residences and the City of Taconite. The water and wastewater pipe exits the City of Taconite on the northern limits of the city. The pipeline will be within one-fourth mile of multiple residences at this point. As the pipeline continues northerly it will be within several hundred feet of farmsteads/rural residences on County Highway 7, just northwest of the West Range Site. The corridor will also be within one-half to one mile of residences on both Dunning and Big Diamond Lake, as well as within approximately one-half mile of residences in the City of Silverwood. The City of Silverwood is located less than one mile from the water and wastewater corridor and there are several residences in Silverwood.

The rail corridor is as close as 400 feet of some rural residential structures. *See* figure 2.8-2, Corridor Existing Land/Use Land Cover which identifies farmsteads and rural residences in relation to the corridors.

There will be no land use impacts on residential areas along the ROW corridors. The zoning of the adjacent properties will not change, meaning the existing uses or allowable uses will not change because of the project.

Please also refer to sections 3.1 and 3.10 for impacts associated with aesthetics and noise, respectively.

3.7.5.3 East Range Site and Associated Corridors

There are no residences located within the East Range Site. Many residences are located within two miles of the project site in the City of Hoyt Lakes. The HVTL corridors are within one-half mile of multiple farmsteads/rural residential land uses and structures. The line also is within approximately two miles of the cities of Aurora, Gilbert, Virginia, and Eveleth. There are many residential areas in each of these cities.

The gas line is within two miles of the cities of Hoyt Lakes, Aurora, Gilbert, Eveleth, and Virginia. There are many residential areas in each of these cities.

The proposed rail lines will be within two miles of the residential areas in the City of Hoyt Lakes. *See* Section 2.1 (Potentially Significant Receptors) for a detailed discussion on the location of residences within the vicinity of the West Range Site.

See the potentially sensitive receptors section of this document for more detailed information of where residences may be located in relation to the proposed facility and associated corridors.

There will be no land use impacts to residential areas on the preferred site because there are no residential areas on the preferred site.

There will be no land use impacts to residential uses adjacent to the preferred site. The zoning of the adjacent properties will not change, meaning the existing uses or allowable uses will not change because of this project.

Please also refer to Sections 3.1 and 3.10 for impacts associated with aesthetics and noise, respectively.

3.7.6 Farmland

3.7.6.1 West Range Site and Associated Corridors

According to the 1996 Land Use/Land Cover map there is no cultivated farmland on the West Range Preferred Site. There is land considered prime farmland within the project site, but it is not actively farmed. See the prime farmland section for more detail on prime farmland.

According to the 1996 Land Cover/Land Use Map there are not any cultivated farmlands within one mile of the HVTL corridors. There are several tracts of cultivated farmland within one mile of the gas pipeline corridors as well as the water and wastewater pipeline corridor. There is not any cultivated farmland near the rail line corridors. *See* Figure 2.8-1 and 2.8-2 for exact locations of cultivated farmland.

3.7.6.1.1 Impacts

There are no anticipated land use impacts to farmland on the West Range site or associated corridors.

3.7.6.2 East Range Site and Associated Corridors

According to the 1996 Land Use/Land Cover map there is no cultivated farmland on the East Range Site. One small tract of cultivated farmland exists in the project area near Fayal Township. Figure 2.8-3 identifies the location of this cultivated land. There is land considered prime farmland in the project area but it is not actively farmed. Refer to the prime farmland section for more detail on prime farmland.

3.7.6.2.1 Impacts

There are no anticipated land use impacts to farmland.

3.7.7 Industrial Areas

3.7.7.1 West Range Site and Associated Corridors

The 1996 Land Use/Land Cover map was reviewed to determine the location of industrial areas located at the West Range Site and its associated corridors. Industrial areas are designated as *Other rural developments*, which includes commercial and industrial, cultural and recreational, and agricultural developments not associated with urban areas. Commercial/industrial developments include substations, communications facilities, power plants, private airstrips,

landfills, storage maintenance yards, businesses, factories, lumber mills, and commercial livestock/poultry/grain operations.

Impacts

There are no anticipated land use impacts to industrial areas on the West Range site or associated corridors.

3.7.8 East Range Industrial Areas

The 1996 Land Use/Land Cover map was reviewed to determine the location of industrial areas located at the East Range Site and its associated corridors. Industrial areas are designated as *Other rural developments*, which include commercial and industrial, cultural and recreational, and agricultural developments not associated with urban areas. Commercial/industrial developments include substations, communications facilities, power plants, private airstrips, landfills, storage maintenance yards, businesses, factories, lumber mills, and commercial livestock/poultry/grain operations.

Impacts

There are no anticipated land use impacts to industrial areas on the West Range or associated corridors.

3.7.9 Recreational Areas

3.7.9.1 West Range Site and Associated Corridors

According to the 1996 Land Use/Land Cover map there are no recreational areas within the West Range Site. Area lakes provide numerous recreational opportunities for residents. Activities such as swimming, boating, fishing, bird watching and other similar activities are prevalent. The forested areas in the project area also allow for recreational activities such as hiking, biking, hunting, bird-watching and other similar activities. Many of these activities take place on land that is County-owned but is not specifically referred to as a designated recreational area.

The Itasca County Comprehensive Land Use Plan was reviewed and the Plan mentions forest and recreational management zones in Itasca County. After reviewing the Plan, exact locations of the forest and recreational management zones could not be identified.

3.7.9.1.1 Impacts

There are no anticipated land use impacts to recreational areas on the West Range site or associated corridors, except that the Proponent is requesting that the boat landing on the CMP be permanently removed, and that recreational activity cease in the CMP for operational, security, and safety reasons.

3.7.10 East Range Site and Associated Corridors

According to the 1996 Land Use/Land Cover map there are no recreational areas within the East Range Site. Area lakes provide numerous recreational opportunities for residents. Activities

such as swimming, boating, fishing, bird watching and other similar activities are prevalent. The forested areas in the project area also allow for recreational activities such as hiking, biking, hunting, bird-watching and other similar activities. Many of these activities take place on land that is County-owned but is not specifically referred to as a designated recreational area.

3.7.10.1 Impacts

There are no anticipated land use impacts to recreational areas on the East Range site or associated corridors.

3.7.11 Site Restoration

All efforts will be made to restore permanently unaffected areas of the site to original conditions.

3.7.12 Mitigation Measures

Appropriate mitigation measures will be determined when a site is approved by the MPUC. Best Management Practices (BMPs) will be used to mitigate any adverse impacts.

3.8 MATERIALS AND WASTE MANAGEMENT

See Section 1.8.3 through 1.8.10 for information related to materials and waste management at the IGCC Power Station.

3.9 ECOLOGICAL RESOURCES

The following sections describe effects to flora and fauna, and in particular, state- and federally-listed threatened, endangered, or otherwise rare natural features. The federal or state natural resources agencies that manage these resources and all necessary permitting or agency coordination for the proposed project are described.

3.9.1 Federal and State Resource Management Agencies

The following state and federal agencies are anticipated to provide comments on the environmental review documents, and require permits or approvals on natural resource related subjects. Wetland agency requirements and involvement are discussed in detail in Section 3.6 of this report.

Table 3.9-1
Anticipated Involvement of Federal and State Agencies

Federal Agency	**Potential Project Roles**
U.S. Fish and Wildlife Service	Endangered Species Act, Migratory Bird Treaty Act, Fish and Wildlife Coordination Act, Environmental Document Review and Comments
U.S. Army Corps of Engineers	Section 404 Federal Wetland Permit, Federal Clean Water Act, Environmental Document Review and Comments
U.S. Environmental Protection Agency	Environmental Document Review and Comments
State Agency	**Potential Project Roles**
Minnesota Department of Natural Resources	Minnesota Endangered Species Statute, Public Waters Work Permit, License for Utility Crossings of Public Lands and Waters, Water Appropriation Permit, Environmental Document Review and Comments
Minnesota Pollution Control Agency	Section 401 Water Quality Permit, Federal Clean Water Act, Environmental Document Review and Comments
Minnesota Board of Water and Soil Resources	Minnesota Wetland Conservation Act, Environmental Document Review and Comments

3.9.2 Flora

3.9.2.1 West Range Site

Vegetative communities within the West Range Site and its associated utility and transportation corridors are described in Section 2.10.1. The vegetative communities within the West Range Site boundary were classified utilizing the *Field Guide to the Native Plant Communities of Minnesota: The Laurentian Mixed Forest Province* (MDNR 2003). Figure 2.8-1 shows the IGCC Power Station Footprint and Buffer Land and the impacted flora and fauna habitats by vegetative community. Impacts to vegetative communities are described between terrestrial and

wetland habitats. Summaries of these impacts by habitat type for the West Range Site and its associated utility and transportation corridors are provided in the following subsections that describe impacts per alternative.

3.9.2.1.1 West Range Terrestrial Communities

Impacts on terrestrial vegetation for the West Range Site and its associated utility and transportation corridors are summarized in the following sub-sections. The West Range Site boundary was the only area that was thoroughly reviewed for vegetative cover types during the 2005 field surveys due to access limitations. Where portions of the existing HVTL and road corridors were accessible, assessments of these areas were limited to wetland surveys and did not necessarily include assessments of terrestrial habitat cover types. For this reason, all impacts to terrestrial communities within the utility and transportation corridors are based on land coverages provided by the LandSat-Based Land Use-Land Cover (Raster) data provided by the Manitoba Remote Sensing Centre. If the West Range Site is chosen as the preferred project location, these corridors will likely require review of potential habitats that could support any state- or federally-protected species or their habitats.

3.9.2.1.1A West Range IGCC Power Station Footprint and Buffer Land

Northern mesic hardwood forest (MDNR Code MHn35b is the vegetative community/habitat type with the highest acreage of impact from the IGCC Power Station Footprint. A total of 126.47 acres of this habitat would be cleared, which is also the vegetative community/habitat that is most abundant on the West Range IGCC Power Station and Footprint and Buffer Land. Northern wet-mesic boreal forest (MDNR Code MHn44a) and aspen forest would require less clearing with 11.14 and 1.26 acres, respectively, impacted due to the West Range IGCC Power Station Footprint.

Table 3.9-2
Summary of Terrestrial Communities and Proposed Impacts within West Range IGCC Power Station Footprint and Buffer Land

Terrestrial Community [1]	Acres within West Range IGCC Power Station Footprint and Buffer Land	Acres Impacted by IGCC Power Station Footprint		
		Phase 1	Phase 2	Total Impacts
Northern mesic hardwood forest [Red oak-sugar maple-basswood-(bluebead lily) forest – MDNR Code MHn35b]	518.89	72.47	64.42	136.89
Northern wet-mesic boreal hardwood-conifer forest (Aspen-birch-red maple forest – MDNR Code MHn44a)	335.18	0	16.11	16.11
Aspen forest	137.30	1.64	0	1.64
Old field	24.64	0	0	0
Total	**1,016.01 acres**	**74.11 acres**	**80.53 acres**	**154.64 acres**

[1] Plant Community description based on the *Field Guide to the Native Plant Communities of Minnesota: The Laurentian Mixed Forest Province* (MDNR 2003).

3.9.2.1.1B West Range HVTL Alternative 1

For the area of existing HVTL alignment that extends from the West Range Site boundary southward to Trunk Highway (TH) 169, this area is classified by the LandSat-Based Land Use-Land Cover (Raster) data as "other rural developments," meaning this existing ROW has already been identified as some other land use besides a terrestrial vegetative community. In this area, no additional land clearing (beyond what is already cleared for the existing ROW) is anticipated for installation of HVTL Alternative 1.

For the remaining area of proposed as the West Range HVTL Alternative 1, a total of 95.54 acres of terrestrial habitats are within the proposed alignment. Of these areas, a total of 92.79 acres are anticipated to be cleared of trees and shrubs. Deciduous and regeneration/young forest are the most common vegetative community/habitat within the corridor proposed for HVTL Alternative 1. An estimate of 41.34 acres of deciduous forest and 26.37 acres of regeneration/young forest would be cleared to establish ROW for the HVTL. In the future, the ROW will be mowed/brushed as needed to manage re-emerging trees and shrubs.

Table 3.9-3
Summary of Terrestrial Communities and Proposed Impacts within West Range HVTL Alternative 1

Terrestrial Community [1]	Acres Impacted by HVTL Alternative 1	Proposed Tree/Shrub Clearing Impacts
Coniferous Forest	7.97	7.97
Deciduous Forest	41.34	41.34
Grassland	2.75	0
Mixed Wood Forest	12.74	12.74
Regeneration/Young Forest	26.37	26.37
Shrubby Grassland	4.37	4.37
Total	**95.54 acres**	**92.79 acres**

[1] Plant Community description based on the LandSat-Based Land Use-Land Cover (Raster) data (Manitoba Remote Sensing Centre).

3.9.2.1.1C West Range HVTL Alternative 1A

For the area of existing HVTL alignment that extends from the West Range Site boundary southward to Trunk Highway (TH) 169, this area is classified by the LandSat-Based Land Use-Land Cover (Raster) data as "other rural developments," again meaning that this existing ROW has already been identified as some other land use besides a terrestrial vegetative community. In this area, no additional land clearing (beyond what is already cleared for the existing ROW) is anticipated for installation of HVTL Alternative 1A.

For the remaining area of proposed as the West Range HVTL Alternative 1A, a total of 82.93 acres of terrestrial habitats are within the proposed alignment. Of these areas, a total of 71.37 acres are anticipated to be cleared of trees and shrubs. Deciduous and regeneration/young forest

are the most common vegetative community/habitat within the corridor proposed for HVTL Alternative 1. An estimate of 40.67 acres of deciduous forest and 14.63 acres of regeneration/young forest would be cleared to establish ROW for the HVTL. In the future, the ROW will be mowed/brushed as needed to manage re-emerging trees and shrubs.

Table 3.9-4
Summaries of Terrestrial Communities and Proposed Impacts within West Range HVTL Alternative 1A

Terrestrial Community [1]	Acres within HVTL Alternative 1	Proposed Tree/Shrub Clearing Impacts
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	1.82	1.8
Total	**84.42 acres**	**72.2 acres**

[1] Plant Community description based on the LandSat-Based Land Use-Land Cover (Raster) data (Manitoba Remote Sensing Centre).

3.9.2.1.1D West Range Plan B Phase II Alternate Route WRB-2A

For the area of existing HVTL alignment that extends eastward from the West Range Site and then southward near TH 169, this area has been already cleared of tree and shrub vegetation for establishment and maintenance of the existing ROW. Although the LandSat-Based Land Use-Land Cover (Raster) data classify the areas within the Phase 2 ROW as a mix of terrestrial and wetland habitats, and other developed uses, 2003 Farm Service Agency aerial photographs of the ROW itself show that it is clear of trees and shrubs. Based on these findings, no additional land clearing (beyond what is already cleared for the existing ROW) is anticipated for installation of Plan B Phase II Alternate Route WRB-2A. The following table describes the terrestrial plant communities identified by the LandSat imagery; however, because these areas are already clear of trees or shrubs, no additional clearing within these habitats is anticipated. In the future, the ROW will be mowed/brushed as needed to manage re-emerging trees and shrubs.

Table 3.9-5
Summary of Terrestrial Communities and Proposed Impacts within West Range Plan B Phase II Alternate Route WRB-2A

Terrestrial Community [1]	Acres within Plan B Phase II Alternate Route WRB-2A	Proposed Tree/Shrub Clearing Impacts
Coniferous Forest	9.38	0
Deciduous Forest	68.03	0
Grassland	67.13	0
Mixed Wood Forest	27.95	0
Regeneration/Young Forest	22.71	0
Shrubby Grassland	0.63	0
Total	**195.83 acres**	**0 acres**

[1] Plant Community description based on the LandSat-Based Land Use-Land Cover (Raster) data (Manitoba Remote Sensing Centre).

3.9.2.1.1E West Range Natural Gas Pipeline 1

The proposed alignment for Gas Pipeline 1 includes a total of 122.64 acres of terrestrial habitats in the temporary ROW and 84.79 acres of terrestrial habitats in the permanent ROW. Of these areas, a total 102.30 acres in the temporary ROW and 70.59 acres in the permanent ROW are anticipated to be cleared of trees and shrubs for installation of the natural gas pipeline. Deciduous, mixed wood, and regeneration/young forests are the most common vegetative habitats that will 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) are not anticipated to be cleared of trees and shrubs, although these habitats will be used for access and staging of construction equipment as the pipeline is installed. In the future, the ROW will be mowed/brushed as needed to manage re-emerging trees and shrubs.

Table 3.9-6
Summary of Terrestrial Communities and Proposed Impacts within West Range Natural Gas Pipeline 1

Terrestrial Community [1]	Acres within Gas Pipeline 1		Proposed Tree/Shrub Clearing Impacts (Acres)	
	Temporary ROW	Permanent ROW	Temporary ROW	Temporary ROW
Coniferous Forest	11.51	8.08	11.51	8.08
Deciduous Forest	31.19	21.12	31.19	21.12
Grassland	20.34	14.20	0	0
Mixed Wood Forest	25.84	17.81	25.84	17.81
Regeneration/Young Forest	23.22	16.18	23.22	16.18
Shrubby Grassland	10.54	7.40	10.54	7.40
Total Acres	**122.64**	**84.79**	**102.30**	**70.59**

[1] Plant Community description based on the LandSat-Based Land Use-Land Cover (Raster) data (Manitoba Remote Sensing Centre).

3.9.2.1.1F West Range Natural Gas Pipeline 2

The proposed alignment for Gas Pipeline 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 63.76 acres in the temporary ROW and 42.65 acres in the permanent ROW are anticipated to be cleared of trees and shrubs for installation of the natural gas pipeline. Deciduous, mixed wood, and regeneration/young forests are the most common vegetative habitats that will be 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) are not anticipated to be cleared of trees and shrubs, although these habitats will be used for access and staging of construction equipment as the pipeline is installed. In the future, the ROW will be mowed/brushed as needed to manage re-emerging trees and shrubs.

Table 3.9-7
Summary of Terrestrial Communities and Proposed Impacts within West Range Natural Gas Pipeline 2

Terrestrial Community [1]	Acres within Gas Pipeline 2		Proposed Tree/Shrub Clearing Impacts (Acres)	
	Temporary ROW	Permanent ROW	Temporary ROW	Temporary ROW
Coniferous Forest	7.60	5.31	7.60	5.31
Deciduous Forest	17.25	11.14	17.25	11.14
Grassland	49.93	35.26	0	0
Mixed Wood Forest	13.70	8.82	13.70	8.82
Regeneration/Young Forest	20.05	13.79	20.05	13.79
Shrubby Grassland	5.16	3.59	5.16	3.59
Total Acres	**113.69**	**77.91**	**63.76**	**42.65**

[1] Plant Community description based on the LandSat-Based Land Use-Land Cover (Raster) data (Manitoba Remote Sensing Centre).

3.9.2.1.1G West Range Natural Gas Pipeline 3

The proposed alignment for Gas Pipeline 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. Deciduous forest is the most common vegetative habitat that will 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) are not anticipated to be cleared of trees and shrubs, although these habitats will be used for access and staging of construction equipment as the pipeline is installed. In the future, the ROW will be mowed/brushed as needed to manage re-emerging trees and shrubs.

Table 3.9-8
Summary of Terrestrial Communities and Proposed Impacts within West Range Natural Gas Pipeline 3

Terrestrial Community [1]	Acres within Gas Pipeline 3		Proposed Tree/Shrub Clearing Impacts (Acres)	
	Temporary ROW	Permanent ROW	Temporar y ROW	Temporar y ROW
Coniferous Forest	6.72	4.65	6.72	4.65
Deciduous Forest	26.40	17.48	26.40	17.48
Grassland	25.27	17.40	0	0
Mixed Wood Forest	12.66	8.65	12.66	8.65
Regeneration/Young Forest	10.00	7.01	10.00	7.01
Shrubby Grassland	7.12	4.87	7.12	4.87
Total Acres	**88.17**	**60.06**	**62.90**	**42.66**

[1] Plant Community description based on the LandSat-Based Land Use-Land Cover (Raster) data (Manitoba Remote Sensing Centre).

3.9.2.1.1H West Range Process Water Supply Pipeline

3.9.2.1.1H(1) Segment 1 (Lind Pit to Canisteo Pit)

The proposed alignment for Process Water Supply Pipeline Segment 1 includes a total of 2.60 acres of terrestrial habitats in the temporary ROW and 1.69 acres of terrestrial habitats in the permanent ROW. These habitats are all classified by the LandSat-Based Land Use-Land Cover (Raster) data as deciduous forest, all of which are anticipated to be cleared of trees and shrubs for construction of the Process Water Supply Pipeline. In the future, the ROW will be mowed/brushed as needed to manage re-emerging trees and shrubs.

Table 3.9-9
Summary of Terrestrial Communities and Proposed Impacts within West Range Process Water Supply Pipeline Segment 1

Terrestrial Community [1]	Acres within Process Water Supply Pipeline Segment 1		Proposed Tree/Shrub Clearing Impacts (Acres)	
	Temporary ROW	Permanent ROW	Temporar y ROW	Temporar y ROW
Coniferous Forest	0	0	0	0
Deciduous Forest	2.60	1.69	2.60	1.69
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 Acres	**2.60**	**1.69**	**2.60**	**1.69**

[1] Plant Community description based on the LandSat-Based Land Use-Land Cover (Raster) data (Manitoba Remote Sensing Centre).

3.9.2.1.1H(2) Segment 2 (Canisteo Pit to West Range Site)

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. All of these areas will be cleared of trees and shrubs in both the temporary and permanent ROW for installation of the Process Water Supply Pipeline. Deciduous forest is the most common vegetative habitat that will 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 will be mowed/brushed as needed to manage re-emerging trees and shrubs.

Table 3.9-10
Summary of Terrestrial Communities and Proposed Impacts within West Range Process Water Supply Pipeline Segment 2

Terrestrial Community [1]	Acres within Process Water Supply Pipeline Segment 2		Proposed Tree/Shrub Clearing Impacts (Acres)	
	Temporary ROW	Permanent ROW	Temporar y ROW	Temporar y ROW
Coniferous Forest	0.13	0.06	0.13	0.06
Deciduous Forest	18.52	12.43	18.52	12.43
Grassland	0	0	0	0
Mixed Wood Forest	7.52	4.86	7.52	4.86
Regeneration/Young Forest	0.29	0.22	0.29	0.22
Shrubby Grassland	0	0	0	0
Total Acres	**26.46**	**17.57**	**26.46**	**17.57**

[1] Plant Community description based on the LandSat-Based Land Use-Land Cover (Raster) data (Manitoba Remote Sensing Centre).

3.9.2.1.1H(3) Segment 3 (Gross-Marble Pit to Canisteo Pit)

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. All of these areas will be cleared of trees and shrubs in both the temporary and permanent ROW for installation of the Process Water Supply Pipeline. Deciduous forest is the most common vegetative habitat that will 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 will be mowed/brushed as needed to manage re-emerging trees and shrubs.

Table 3.9-11
Summary of Terrestrial Communities and Proposed Impacts within West Range Process Water Supply Pipeline Segment 3

Terrestrial Community [1]	Acres within Process Water Supply Pipeline Segment 3		Proposed Tree/Shrub Clearing Impacts (Acres)	
	Temporary ROW	Permanent ROW	Temporar y ROW	Temporar y ROW
Coniferous Forest	2.54	1.96	2.54	1.96
Deciduous Forest	37.30	25.01	37.30	25.01
Grassland	0	0	0	0
Mixed Wood Forest	9.12	5.71	9.12	5.71
Regeneration/Young Forest	2.26	1.55	2.26	1.55
Shrubby Grassland	0	0	0	0
Total Acres	**51.22**	**34.23**	**51.22**	**34.23**

[1] Plant Community description based on the LandSat-Based Land Use-Land Cover (Raster) data (Manitoba Remote Sensing Centre).

3.9.2.1.1I West Range Process Water Blowdown Pipeline 1 (IGCC Power Station Footprint to Holman Lake)

The proposed alignment for Process Water Blowdown Pipeline 1 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. All of these areas will be cleared of trees and shrubs in both the temporary and permanent ROW for installation of the process water blowdown pipeline. Deciduous forest is the most common vegetative habitat that will be cleared for the process water blowdown pipeline alignment. There are no grassland or shrubby grassland habitats identified within the temporary or permanent ROW. In the future, the ROW will be mowed/brushed as needed to manage re-emerging trees and shrubs.

Table 3.9-12
Summary of Terrestrial Communities and Proposed Impacts within West Range Process Water Supply Pipeline Segment 3

Terrestrial Community [1]	Acres within Process Water Blowdown Pipeline 1		Proposed Tree/Shrub Clearing Impacts (Acres)	
	Temporary ROW	Permanent ROW	Temporar y ROW	Temporary ROW
Coniferous Forest	0.38	0.22	0.38	0.22
Deciduous Forest	27.04	18.09	27.04	18.09
Grassland	0	0	0	0
Mixed Wood Forest	9.63	6.20	9.63	6.20
Regeneration/Young Forest	0.18	0.11	0.18	0.11
Shrubby Grassland	0	0	0	0
Total Acres	**37.23**	**24.62**	**37.23**	**24.62**

[1] Plant Community description based on the LandSat-Based Land Use-Land Cover (Raster) data (Manitoba Remote Sensing Centre).

3.9.2.1.1J West Range Process Water Blowdown Pipeline 2 (IGCC Power Station Footprint to Canisteo Pit)

The proposed alignment for Process Water Blowdown Pipeline 2 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 15.66 acres in the temporary ROW and 10.31 acres in the permanent ROW are anticipated to be cleared of trees and shrubs for installation of the natural gas pipeline. Deciduous and regeneration/young forests are the most common vegetative habitats that will be cleared for the process water blowdown pipeline alignment. There are no shrubby grassland habitats identified within the temporary or permanent ROW. The grassland habitats (8.80 acres in the temporary ROW and 6.09 acres in the permanent ROW) are not anticipated to be cleared of trees and shrubs, although these habitats will be used for access and staging of construction equipment as the pipeline is installed. In the future, the ROW will be mowed/brushed as needed to manage re-emerging trees and shrubs.

Table 3.9-13
Summary of Terrestrial Communities and Proposed Impacts within West Range Process Water Blowdown Pipeline 2

Terrestrial Community [1]	Acres within Water Process Blowdown Alternative 2		Proposed Tree/Shrub Clearing Impacts (Acres)	
	Temporary ROW	Permanent ROW	Temporar y ROW	Temporary ROW
Coniferous Forest	0.34	0.23	0.34	0.23
Deciduous Forest	6.16	3.95	6.16	3.95
Grassland	8.80	6.09	0	0
Mixed Wood Forest	1.15	0.79	1.15	0.79
Regeneration/Young Forest	8.01	5.34	8.01	5.34
Shrubby Grassland	0	0	0	0
Total Acres	**24.46**	**16.40**	**15.66**	**10.31**

[1] Plant Community description based on the LandSat-Based Land Use-Land Cover (Raster) data (Manitoba Remote Sensing Centre).

3.9.2.1.1K West Range Potable Water and Sewer Pipelines

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. Of these areas, a total of 18.53 acres in the temporary ROW and 7.25 acres in the permanent ROW are anticipated to be cleared of trees and shrubs for installation of the potable water and sewer pipelines. Deciduous forest is the most common vegetative habitat that will be cleared for the potable water and sewer pipelines alignment. There are no shrubby grassland habitats identified within the temporary or permanent ROW. The grassland habitats (1.77 acres in the temporary ROW and 0.64 acres in the permanent ROW) are not anticipated to be cleared of trees and shrubs, although these habitats will be used for access and staging of construction equipment as the pipelines are installed. In the future, the ROW will be mowed/brushed as needed to manage re-emerging trees and shrubs.

Table 3.9-14
Summary of Terrestrial Communities and Proposed Impacts within West Range Potable Water and Sewer Pipelines

Terrestrial Community [1]	Acres within Potable Water and Sewer Pipelines		Proposed Tree/Shrub Clearing Impacts (Acres)	
	Temporary ROW	Permanent ROW	Temporar y ROW	Temporary ROW
Coniferous Forest	0.10	0.03	0.10	0.03
Deciduous Forest	13.49	5.34	13.49	5.34
Grassland	1.77	0.64	0	0
Mixed Wood Forest	4.76	1.80	4.76	1.80
Regeneration/Young Forest	0.18	0.08	0.18	0.08
Shrubby Grassland	0	0	0	0
Total Acres	**20.30**	**7.89**	**18.53**	**7.25**

[1] Plant Community description based on the LandSat-Based Land Use-Land Cover (Raster) data (Manitoba Remote Sensing Centre).

3.9.2.1.1L West Range Rail Line Alternative 1A and Center Loop

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. All of these areas for the rail line and center loop are anticipated to be cleared for construction of the rail line. Upon final design of the center loop, some areas of habitat clearing may be avoided depending on the need for storage areas.

Table 3.9-15
Summary of Terrestrial Communities and Proposed Impacts within West Range Rail Line Alternative 1A

Terrestrial Community [1]	Acres within Rail Line Alternative 1A		Proposed Clearing Impacts (Acres)	
	Construction Limits [2]	Permanent ROW	Construction Limits [2]	Permanent ROW
Rail Line				
Coniferous Forest	5.10	2.06	5.10	2.06
Deciduous Forest	69.12	32.79	69.12	32.79
Grassland	0.51	0.60	0.51	0.60
Mixed Wood Forest	33.22	17.65	33.22	17.65
Regeneration/Young Forest	0.64	0.29	0.64	0.29
Shrubby Grassland	0	0	0	0
Rail Line Total Acres	**108.59**	**53.39**	**108.59**	**53.39**
Center Loop				
Coniferous Forest	14.73		14.73	
Deciduous Forest	9.58		9.58	

Grassland	0	0
Mixed Wood Forest	25.88	25.88
Regeneration/Young Forest	0	0
Shrubby Grassland	0	0
Center Loop Total Acres	**50.19**	**50.19**

[1] Plant Community description based on the LandSat-Based Land Use-Land Cover (Raster) data (Manitoba Remote Sensing Centre).
[2] All habitats within construction limits will be impacted due to necessary grading for construction of rail bed.

3.9.2.1.1M West Range Rail Line Alternative 1B and Center Loop

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. All of these areas for the rail line and center loop are anticipated to be cleared for construction of the rail line. Upon final design of the center loop, some areas of habitat clearing may be avoided depending on the need for storage areas.

Table 3.9-16
Summary of Terrestrial Communities and Proposed Impacts within West Range Rail Line Alternative 1B

Terrestrial Community [1]	**Acres within Rail Line Alternative 1A**		**Proposed Clearing Impacts (Acres)**	
	Construction Limits [2]	**Permanent ROW**	**Construction Limits [2]**	**Permanent ROW**
Rail Line				
Coniferous Forest	5.37	3.61	5.37	3.61
Deciduous Forest	99.80	38.83	99.80	38.83
Grassland	0	0.08	0	0.08
Mixed Wood Forest	24.67	11.85	24.67	11.85
Regeneration/Young Forest	1.94	0.16	1.94	0.16
Shrubby Grassland	0	0	0	0
Rail Line Total Acres	**131.78**	**54.53**	**131.78**	**54.53**
Center Loop				
Coniferous Forest	10.78		10.78	
Deciduous Forest	32.30		32.30	
Grassland	0		0	
Mixed Wood Forest	18.96		18.96	
Regeneration/Young Forest	0		0	
Shrubby Grassland	0		0	
Center Loop Total Acres	**62.04**		**62.04**	

[1] Plant Community description based on the LandSat-Based Land Use-Land Cover (Raster) data (Manitoba Remote Sensing Centre).
[2] All habitats within construction limits will be impacted due to necessary grading for construction of rail bed.

3.9.2.1.1N West Range Roads

The proposed alignment for the roads includes a total of 89.88 acres of terrestrial habitats in the temporary ROW and 53.68 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. Deciduous forest is the most common vegetative habitat that will be cleared 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 will be used for access and staging of construction equipment, and areas in the permanent ROW will be converted to road bed.

Table 3.9-17
Summary of Terrestrial Communities and Proposed Impacts within West Range Roads

Terrestrial Community [1]	Acres within Road Alignments		Proposed Clearing Impacts (Acres)	
	Temporary ROW	Permanent ROW	Temporary ROW	Temporary ROW
Coniferous Forest	6.66	3.85	6.66	3.85
Deciduous Forest	59.70	36.23	59.70	36.23
Grassland	3.12	1.81	3.12	1.81
Mixed Wood Forest	15.36	8.75	15.36	8.75
Regeneration/Young Forest	5.04	3.04	5.04	3.04
Shrubby Grassland	0	0	0	0
Total Acres	**89.88**	**53.68**	**89.88**	**53.68**

[1] Plant Community description based on the LandSat-Based Land Use-Land Cover (Raster) data (Manitoba Remote Sensing Centre).

3.9.2.1.2 Wetland and Aquatic Communities

Wetland and aquatic communities are discussed in detail in Section 2.7. Impacts and mitigation measures for the West Range Site and its associated utility and transportation corridors are discussed in detail in Section 3.6. The reader should refer to these two sections of the document for analysis of affected environment and environmental consequences to ecological resources in wetland and aquatic communities for the West and East Range Sites.

3.9.2.2 East Range Site

Vegetative communities within the East Range Site and its associated utility and transportation corridors are described in Section 2.10.1. The vegetative communities within the East Range Site boundary were classified utilizing the *Field Guide to the Native Plant Communities of Minnesota: The Laurentian Mixed Forest Province* (MDNR 2003). Impacts to vegetative communities are divided between terrestrial and wetland habitats. Summaries of these impacts by habitat type for the East Range Site and its associated utility and transportation corridors are provided in the following subsections that describe impacts per alternative.

3.9.2.2.1 East Range Terrestrial Communities

Impacts on terrestrial vegetation for the East Range Site and its associated utility and transportation corridors are summarized in the following sub-sections. The East Range Site boundary was the only area that was thoroughly reviewed for vegetative cover types during the 2004 and 2005 field surveys due to access limitations. Where portions of the existing HVTL and road corridors were accessible, assessments to these areas were limited to wetland surveys and did not necessarily include assessments of terrestrial habitat cover types. For this reason, all impacts to terrestrial communities within the utility and transportation corridors are based on land coverages provided by the LandSat-Based Land Use-Land Cover (Raster) data provided by the Manitoba Remote Sensing Centre. Impacts to terrestrial communities within the HVTL corridors are based upon the LandSat-Based Land Use Land Cover (Raster) data coupled with a review and interpretation of 2003 Farm Service Agency ("FSA") aerial photographs. If the East Range Site is chosen as the preferred project location, all of the corridors will likely require review of potential habitats that could support any state- or federally-protected species or their habitats.

3.9.2.2.1A East Range IGCC Power Station Footprint and Buffer Land

As discussed in Section 2.10.1, the terrestrial habitat within the East Range Site boundary can be classified as northern mesic mixed forest (aspen-birch forest, balsam fir subtype—MDNR Code FDn43b1). It is estimated that 10–15 percent of the East Range Site along the west and southwest boundary was clear cut as recent as spring of 2004. The most recent aerial photograph of the site is the Farm Service Agency's aerial photographs from 2003, so no quantification of this timber harvesting is possible at this time. For the placement of the IGCC Power Station Footprint, a maximum of 167.04 acres of northern mesic mixed forest (aspen-birch forest, balsam fir subtype) habitat would be cleared. This includes 82.44 acres during Phase 1 of construction and 84.60 acres during Phase 2. Clear cutting had occurred in the vicinity of the proposed IGCC Power Station Footprint, so tree clearing impacts for the construction of the building pad may be reduced. However, grading of cleared forest habitat will occur during construction, thus permanently altering land use for the entire 167.04-acre building pad area. The table below shows impacts on the terrestrial community for each phase on construction.

Table 3.9-18
Summary of Terrestrial Communities and Proposed Impacts within East Range IGCC Power Station Footprint and Buffer Land

Terrestrial Community [1]	Acres within East Range IGCC Power Station Footprint and Buffer Land	Acres Impacted by IGCC Power Station Footprint		
		Phase 1	Phase 2	Total Impacts
Northern mesic mixed forest (aspen-birch forest, balsam fir subtype) – (MDNR Code FDn43b1)	478.31	82.44	84.60	167.04
Total	**478.31**	**82.44**	**84.60**	**167.04**

[1] Plant Community description based on the *Field Guide to the Native Plant Communities of Minnesota: The Laurentian Mixed Forest Province* (MDNR 2003).

3.9.2.2.1B East Range HVTL Alternative 1

HVTL Alternative 1 will 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 will 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 87.48 acres of terrestrial habitats. Of these areas, a total of 75.03 acres are anticipated to be cleared of trees and shrubs. Mixed wood forest and shrubby grassland are the most common vegetative habitats that will be cleared for the HVTL Alternative 1 alignment. The 12.45 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. 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 will be mowed/brushed as needed to manage re-emerging trees and shrubs.

Table 3.9-19
Summary of Terrestrial Communities and Proposed Impacts within East Range HVTL Alternative 1

Terrestrial Community [1]	Acres within Plan B Phase II Alternate Route WRB-2A	Proposed Tree/Shrub Clearing Impacts
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 acres**	**89.4 acres**

[1] Plant Community description based on the LandSat-Based Land Use-Land Cover (Raster) data (Manitoba Remote Sensing Centre).

3.9.2.2.1C East Range HVTL Alternative 2

HVTL Alternative 2 will be constructed almost entirely alongside an existing utility ROW that has already been cleared of tree and shrub vegetation for maintenance of the ROW. The new construction will require clearing of an additional 30 feet on one side of the existing ROW. There is a 1.5-mile section of this alternative that will be established as new HVTL corridor. Impacts to terrestrial communities within the HVTL Alternative 2 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 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 104.28 acres of terrestrial habitats. Of these areas, a total of 85.94 acres are anticipated to be cleared of trees and shrubs. Mixed wood forest, shrubby grassland, and regeneration/young forests are the most common vegetative habitats that will be cleared for the HVTL Alternative 2 alignment. The 18.34 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. 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 will be mowed/brushed as needed to manage re-emerging trees and shrubs.

Table 3.9-20
Summary of Terrestrial Communities and Proposed Impacts within East Range HVTL Alternative 2

Terrestrial Community [1]	Acres within Plan B Phase II Alternate Route WRB-2A	Proposed Tree/Shrub Clearing Impacts
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 acres**	**85.7 acres**

[1] Plant Community description based on the LandSat-Based Land Use-Land Cover (Raster) data (Manitoba Remote Sensing Centre).

3.9.2.2.1D East Range Natural Gas Pipeline Alternative 1

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. Mixed wood forest, regeneration/young forest, and shrubby grassland are the most common vegetative habitats that will be cleared for the natural gas pipeline alignment. The grassland habitats (46.12 acres in the temporary ROW and 31.97 acres in the permanent ROW) are not anticipated to be cleared of trees and shrubs, although these habitats will be used for access and staging of construction equipment as the pipeline is

installed. In the future, the ROW will be mowed/brushed as needed to manage re-emerging trees and shrubs.

Table 3.9-21
Summary of Terrestrial Communities and Proposed Impacts within East Range Natural Gas Pipeline Alternative 1

Terrestrial Community [1]	Acres within Gas Pipeline 1		Proposed Tree/Shrub Clearing Impacts (Acres)	
	Temporary ROW	Permanent ROW	Temporary ROW	Temporary ROW
Coniferous Forest	7.56	5.63	7.56	5.63
Deciduous Forest	5.00	3.50	5.00	3.50
Grassland	46.12	31.97	0	0
Mixed Wood Forest	120.71	84.54	120.71	84.54
Regeneration/Young Forest	53.83	38.25	53.83	38.25
Shrubby Grassland	78.89	54.79	78.89	54.79
Total Acres	**312.11**	**218.68**	**265.99**	**186.71**

[1] Plant Community description based on the LandSat-Based Land Use-Land Cover (Raster) data (Manitoba Remote Sensing Centre).

3.9.2.2.1E East Range Process Water Supply Pipeline

3.9.2.2.1E(1) Area 2WX to Footprint

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. Regeneration/young forest, deciduous forest, and mixed wood forest are the only community types in this corridor identified by the LandSat imagery. All of these areas are anticipated to be cleared of trees and shrubs for installation of this pipeline. In the future, the ROW will be mowed/brushed as needed to manage re-emerging trees and shrubs.

Table 3.9-22
Summary of Terrestrial Communities and Proposed Impacts within East Range Process Water Supply Pipeline – Area 2WX to Footprint

Terrestrial Community [1]	Acres within Water Pipeline		Proposed Tree/Shrub Clearing Impacts (Acres)	
	Temporary ROW	Permanent ROW	Temporary ROW	Temporary ROW
Coniferous Forest	0	0	0	0
Deciduous Forest	3.41	2.22	3.41	2.22
Grassland	0	0	0	0
Mixed Wood Forest	1.85	1.21	1.85	1.21
Regeneration/Young Forest	9.51	6.35	9.51	6.35
Shrubby Grassland	0	0	0	0
Total Acres	**14.77**	**9.78**	**14.77**	**9.78**

[1] Plant Community description based on the LandSat-Based Land Use-Land Cover (Raster) data (Manitoba Remote Sensing Centre).

3.9.2.2.1E(2) Area 2WX to Area 2W

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. All of these areas are anticipated to be cleared of trees and shrubs for installation of this pipeline. In the future, the ROW will be mowed/brushed as needed to manage re-emerging trees and shrubs.

Table 3.9-23
Summary of Terrestrial Communities and Proposed Impacts within East Range Process Water Supply Pipeline – Area 2WX to Area 2W

Terrestrial Community [1]	Acres within Water Pipeline		Proposed Tree/Shrub Clearing Impacts (Acres)	
	Temporary ROW	Permanent ROW	Temporary ROW	Temporary ROW
Coniferous Forest	0	0	0	0
Deciduous Forest	0	0	0	0
Grassland	0	0	0	0
Mixed Wood Forest	0.10	0.02	0.10	0.02
Regeneration/Young Forest	0	0	0	0
Shrubby Grassland	0.58	0.33	0.58	0.33
Total Acres	**0.68**	**0.35**	**0.68**	**0.35**

[1] Plant Community description based on the LandSat-Based Land Use-Land Cover (Raster) data (Manitoba Remote Sensing Centre).

3.9.2.2.1E(3) Area 2W to Area 2E

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 flora habitats.

3.9.2.2.1E(4) Area 3 to Area 2E

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 flora habitats.

3.9.2.2.1E(5) Knox Mine to Area 2WX

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. Regeneration/young forest and mixed wood forest are the only two terrestrial habitats identified by the LandSat imagery. All of these areas are anticipated to be cleared of trees and shrubs for installation of this pipeline. In the future, the ROW will be mowed/brushed as needed to manage re-emerging trees and shrubs.

Table 3.9-24
Summary of Terrestrial Communities and Proposed Impacts within East Range Process Water Supply Pipeline – Knox Mine to Area 2WX

Terrestrial Community [1]	Acres within Water Pipeline		Proposed Tree/Shrub Clearing Impacts (Acres)	
	Temporary ROW	Permanent ROW	Temporary ROW	Temporary ROW
Coniferous Forest	0	0	0	0
Deciduous Forest	0	0	0	0
Grassland	0	0	0	0
Mixed Wood Forest	0.13	0.03	0.13	0.03
Regeneration/Young Forest	1.36	0.86	1.36	0.86
Shrubby Grassland	0	0	0	0
Total Acres	**1.49**	**0.89**	**1.49**	**0.89**

[1] Plant Community description based on the LandSat-Based Land Use-Land Cover (Raster) data (Manitoba Remote Sensing Centre).

3.9.2.2.1E(6) Area 6 and Stephens Mine to Area 2WX

The proposed alignment for East Range 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 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. Mixed wood forest, shrubby grassland, and regeneration/young forest are the most common vegetative habitats that will be cleared for this alignment. The grassland habitats (0.42 acres in the temporary ROW and 0.27 acres in the permanent ROW) are not anticipated to be cleared of trees and shrubs, although these habitats will be used for access and staging of construction equipment as the pipeline is installed. In the future, the ROW will be mowed/brushed as needed to manage re-emerging trees and shrubs.

Table 3.9-25
Summary of Terrestrial Communities and Proposed Impacts within East Range Process Water Supply Pipeline – Area 6 and Stephens Mine to Area 2WX

Terrestrial Community [1]	Acres within Water Pipeline		Proposed Tree/Shrub Clearing Impacts (Acres)	
	Temporary ROW	Permanent ROW	Temporary ROW	Temporary ROW
Coniferous Forest	0	0	0	0
Deciduous Forest	1.76	1.15	1.76	1.15
Grassland	0.42	0.27	0	0
Mixed Wood Forest	10.15	6.65	10.15	6.65
Regeneration/Young Forest	7.19	4.84	7.19	4.84
Shrubby Grassland	8.57	5.72	8.57	5.72
Total Acres	**28.09**	**18.63**	**27.67**	**18.36**

[1] Plant Community description based on the LandSat-Based Land Use-Land Cover (Raster) data (Manitoba Remote Sensing Centre).

3.9.2.2.1E(7) Area 9 South to Area 6

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. In the future, the ROW will be mowed/brushed as needed to manage re-emerging trees and shrubs.

Table 3.9-26
Summary of Terrestrial Communities and Proposed Impacts within East Range Process Water Supply Pipeline – Area 9 South to Area 6

Terrestrial Community [1]	Acres within Water Pipeline		Proposed Tree/Shrub Clearing Impacts (Acres)	
	Temporary ROW	Permanent ROW	Temporary ROW	Temporary ROW
Coniferous Forest	0	0	0	0
Deciduous Forest	0	0	0	0
Grassland	0	0	0	0
Mixed Wood Forest	5.45	3.61	5.45	3.61
Regeneration/Young Forest	0	0	0	0
Shrubby Grassland	0	0	0	0
Total Acres	**5.45**	**3.61**	**5.45**	**3.61**

[1] Plant Community description based on the LandSat-Based Land Use-Land Cover (Raster) data (Manitoba Remote Sensing Centre).

3.9.2.2.1E(8) Area 9 North (Donora Mine) to Area 6

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. In the future, the ROW will be mowed/brushed as needed to manage re-emerging trees and shrubs.

Table 3.9-27
Summary of Terrestrial Communities and Proposed Impacts within
East Range Process Water Supply Pipeline – Area 9 North (Donora Mine) to Area 6

Terrestrial Community [1]	Acres within Water Pipeline		Proposed Tree/Shrub Clearing Impacts (Acres)	
	Temporary ROW	Permanent ROW	Temporary ROW	Temporary ROW
Coniferous Forest	0	0	0	0
Deciduous Forest	0	0	0	0
Grassland	0	0	0	0
Mixed Wood Forest	1.99	1.42	1.99	1.42
Regeneration/Young Forest	0	0	0	0
Shrubby Grassland	0	0	0	0
Total Acres	**1.99**	**1.42**	**1.99**	**1.42**

[1] Plant Community description based on the LandSat-Based Land Use-Land Cover (Raster) data (Manitoba Remote Sensing Centre).

3.9.2.2.1F East Range Railroad Alternative 1

The proposed alignment for Railroad 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 cleared of trees and shrubs for installation of the railroad bed. Mixed wood forest and shrubby grassland are the most common vegetative habitats that will be cleared for this railroad alignment. In the future, the ROW will be mowed/brushed as needed to manage re-emerging trees and shrubs.

The center loop for Railroad Alternative 1 includes a total of 103.58 acres of terrestrial habitats. Mixed wood forest and shrubby grassland are the most common vegetative habitats that will be cleared for the center loop. The center loop will be used as a staging area during construction and will be used for storage during operation of the IGCC Power Station. Impacts to terrestrial habitats will be reduced upon completion of final design in which layouts of storage facilities will be determined.

Table 3.9-28
Summary of Terrestrial Communities and Proposed Impacts within
East Range Railroad Alternative 1

Terrestrial Community [1]	Acres within Rail Line Alternative 1		Proposed 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	37.24	22.14	37.24	22.14
Regeneration/Young Forest	0	0	0	0
Shrubby Grassland	20.65	5.83	20.65	5.83

Terrestrial Community [1]	Acres within Rail Line Alternative 1		Proposed Clearing Impacts (Acres)	
	Construction Limits [2]	Permanent ROW	Construction Limits [2]	Permanent ROW
Surveyed Wetlands	17.21	10.67	17.21	10.67
Rail Line Total Acres	**75.10**	**38.64**	**75.10**	**38.64**
Center Loop				
Coniferous Forest	0		0	
Deciduous Forest	0		0	
Grassland	0		0	
Mixed Wood Forest	30.44		30.44	
Regeneration/Young Forest	0		0	
Shrubby Grassland	25.23		25.23	
Surveyed Wetlands	47.91		47.91	
Center Loop Total Acres	**103.58**		**103.58**	

[1] Plant Community description based on the LandSat-Based Land Use-Land Cover (Raster) data (Manitoba Remote Sensing Centre).
[2] All habitats within construction limits will be impacted due to necessary grading for construction of rail bed.

3.9.2.2.1G East Range Railroad Alternative 2

The proposed alignment for Railroad 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 cleared of trees and shrubs for installation of the railroad bed. Mixed wood forest and shrubby grassland are the most common vegetative habitats that will be cleared for this railroad alignment. In the future, the ROW will be mowed/brushed as needed to manage re-emerging trees and shrubs. There is no center loop associated with East Range Railroad Alternative 2.

Table 3.9-29
Summary of Terrestrial Communities and Proposed Impacts within East Range Railroad Alternative 2

Terrestrial Community [1]	Acres within Rail Line Alternative 2		Proposed 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	35.18	21.81	35.18	21.81
Regeneration/Young Forest	0.68	0.75	0.68	0.75
Shrubby Grassland	17.84	4.83	17.84	4.83
Surveyed Wetlands	18.35	13.37	18.35	13.37
Rail Line Total Acres	**72.05**	**40.76**	**72.05**	**40.76**

[1] Plant Community description based on the LandSat-Based Land Use-Land Cover (Raster) data (Manitoba Remote Sensing Centre).
[2] All habitats within construction limits will be impacted due to necessary grading for construction of rail bed.

3.9.2.2.1H East Range Potable Water and Sewer

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. Mixed wood forest is the most common vegetative habitat that will 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) are not anticipated to be cleared of trees and shrubs, although these habitats will be used for access and staging of construction equipment as the pipelines are installed. In the future, the ROW will be mowed/brushed as needed to manage re-emerging trees and shrubs.

Table 3.9-30
Summary of Terrestrial Communities and Proposed Impacts within East Range Potable Water and Sewer Pipelines

Terrestrial Community [1]	Acres within Pipeline ROW		Proposed Tree/Shrub Clearing Impacts (Acres)	
	Temporary ROW	Permanent ROW	Temporary ROW	Temporary ROW
Coniferous Forest	0	0	0	0
Deciduous Forest	0.62	0.23	0.62	0.23
Grassland	1.84	0.72	0	0
Mixed Wood Forest	11.17	4.37	11.17	4.37
Regeneration/Young Forest	1.91	0.81	1.91	0.81
Shrubby Grassland	0	0	0	0
Total Acres	**15.54**	**6.13**	**13.70**	**5.41**

[1] Plant Community description based on the LandSat-Based Land Use-Land Cover (Raster) data (Manitoba Remote Sensing Centre).

3.9.2.2.1I East Range Roads

The proposed alignment for 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 roads. Mixed wood forest, deciduous forest, and regeneration/young forest are the most common vegetative habitats that will be cleared for road ROW.

Table 3.9-31
Summary of Terrestrial Communities and Proposed Impacts within East Range Roads

Terrestrial Community [1]	Acres within Road ROW		Proposed Tree/Shrub Clearing Impacts (Acres)	
	Temporary ROW	Permanent ROW	Temporary ROW	Permanent ROW
Coniferous Forest	2.38	1.48	2.38	1.48
Deciduous Forest	7.97	4.79	7.97	4.79
Grassland	0	0	0	0
Mixed Wood Forest	21.76	12.82	21.76	12.82
Regeneration/Young Forest	6.19	3.79	6.19	3.79
Shrubby Grassland	3.12	1.93	3.12	1.93
Surveyed Wetlands	5.52	3.22	5.52	3.22
Total Acres	**46.94**	**28.03**	**46.95**	**28.03**

[1] Plant Community description based on the LandSat-Based Land Use-Land Cover (Raster) data (Manitoba Remote Sensing Centre).

3.9.2.2.2 East Range Wetland and Aquatic Communities

Wetland and aquatic communities are discussed in detail in Section 2.7. Impacts and mitigation measures wetland and aquatic communities within the East Range Site and its associated utility and transportation corridors are discussed in detail in Section 3.6. The reader should refer to these two sections of the document for analysis of affected environment and environmental consequences to ecological resources in wetland and aquatic communities for the East Range Site.

3.9.3 Fauna

The fauna habitats are described in Section 2.10.1. For consistency, wildlife habitats are described in accordance with the vegetative communities that were classified utilizing *Field Guide to the Native Plant Communities of Minnesota: The Laurentian Mixed Forest Province* (MDNR 2003).

3.9.3.1 West Range Site

3.9.3.1.1 IGCC Power Station and Corridors

In general, construction and operation of the IGCC Power Station, its Associated Facilities, HVTL, and gas pipeline at both sites will cause mortality and disrupt movement and migration in the area. Indirectly, the proposed project will impact local fauna mostly through fragmentation and conversion of the existing habitat, the extent of which is described in Section 2.10.1. This impact on terrestrial and wetland habitats, shown in Tables 3.9-2 through 3.9-31, does not differ significantly between the East Range or West Range sites.

3.9.3.1.2 Crossings of Rivers, Streams, & Bodies of Water

On the West Range Site, only the Process Water Blowdown Pipeline will impact fisheries or other aquatic fauna where open cutting construction is proposed. The cross sections and contours of the waters will be restored after construction to ensure continued water flow, habitat re-establishment, and fish and other fauna movement as required to restore existing habitat.

3.9.3.2 East Range Site

3.9.3.2.1 IGCC Power Station and Corridors

In general, construction and operation of the IGCC Power Station, its Associated Facilities, HVTL, and gas pipeline at both sites will cause mortality and disrupt movement and migration in the area. Indirectly, the proposed project will impact local fauna mostly through fragmentation and conversion of the existing habitat, the extent of which is described in Section 2.10.1. This impact on terrestrial and wetland habitats, shown in Tables 3.9-2 through 3.9-31, does not differ significantly between the East Range or West Range sites.

3.9.3.2.2 Crossings of Rivers, Streams, and Bodies of Water

On the East Range Site, rivers, streams, and other water bodies will be affected by the IGCC Power Station and Associated Facilities. Although there are no direct water crossings or impacts due to the East Range IGCC Power Station, the facility will permanently impact a stream course within an adjacent large wetland complex. This impact to the wetland complex is assessed in Section 3.7, above. Along the Process Water Supply Pipeline, where cutting is proposed (from Area 6 to Area 2WX, from Area 9 South to Area 6, and from Area 9 North to Area 6) construction will temporarily impact fisheries and other aquatic fauna. When construction is completed, the restoration of cross sections and bottom contours will allow continuous water flow, habitat re-establishment, and fauna movement, as required by applicable regulations and standards. Railroad Alternatives 1 and 2, Potable Water and Sewer Pipelines, and new Access Roads will 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. Continued fish passage will be assured through the installation of culverts and the bridging of water courses. The restoration of fish passage will adhere to the grades, habitat restoration, and other specifications established by the FERC, U.S. DOT, and FHWA regulations.

3.9.4 Threatened, Endangered, and Otherwise Rare Species

Potential impacts to state- or federally-listed threatened, endangered, or otherwise rare species and their habitats are described in the following subsections for both the West and East Range site locations. The proposed utility and transportation corridors associated with both the West and East Range site are also assessed for impacts to these sensitive natural resources.

3.9.4.1 West Range Site

The following discussions regarding effects on threatened, endangered, and other rare species are separated based on federal and state protection, and subsequently, regulatory authority.

3.9.4.1.1 Federal and State Laws

3.9.4.1.1A Federal Endangered Species Act

The entire West Range Site and associated utility and transportation corridors has potential habitat for and is within the distributional range of three federally-listed species, the bald eagle (*Haliaeetus leucocephalus* – recently delisted), Canada Lynx (*Lynx canadensis*) and grey wolf (*Canis lupus*). As described in Section 2.10.2.1, a wolf was observed within the West Range Site boundary during the 2005 field reconnaissance and wolf habitat and prey items are widely dispersed throughout and surrounding the site boundary. Verified and unverified sightings (MDNR Online Data, 2005) of Canada lynx are found within Itasca County and potential habitats for this predator exist within and adjacent to the site boundary.

There are no federally protected plant species identified by the USFWS within the West Range Site or any of the proposed utility or transportation corridors, therefore no adverse effects are anticipated on any federally protected plant species for the West Range Site or its associated utility and transportation corridors.

As described in Section 2.10.2.1, Section 7 Formal Consultation will need to occur for the Canada lynx and grey wolf. Currently, population studies are being conducted on these species in conjunction with the Formal Consultation that has been initiated by the other projects in close proximity to the West Range Site and are under current consultation. Based on this Formal Consultation, the determination of the significance of effects on the Canada lynx and grey wolf will be made by the USFWS.

According to the MDNR data (MDNR Online Data, 2005), there have been both “verified without evidence of breeding” and “unverified” sightings of Canada lynx within Itasca County through 2005. Potential Canada lynx habitat and prey items were observed on and around the West Range Site during the 2005 habitat assessments and field reconnaissance for wetlands. The request for Formal Consultation under Section 7 of the Endangered Species Act will determine the need for additional studies and coordination for this species. The MDNR Natural Heritage and Information System (NHIS) database shows no bald eagle nesting areas within the West Range Site, nor within a two-mile radius of the project boundary.

Additional field survey during winter 2005–2006 by U.S. Fish & Wildlife Service is anticipated to determine the potential effects on habitat for the Canada lynx and grey wolf. The significance of effects to these species will be determined through the Section 7 consultation process. Similarly, effects on bald eagle should also be determined by the U.S. Fish & Wildlife Service through the Section 7 consultation process.

3.9.4.1.1B Minnesota Endangered Species Act

As described in Section 2.10.2.1 the MDNR Natural Heritage Information System (NHIS) database contains documented occurrences of non-status (tracked), special concern, threatened, and endangered species; sensitive ecological and natural resources; and, results of the Minnesota County Biological Survey (MCBS). State-listed threatened or endangered species are protected under the Minnesota Endangered Species Statute (Minnesota Statutes, Section 84.0895). The MDNR was contacted to request a review of the NHIS for occurrences within the West Range Site boundary and its associated utility and transportation corridors, which includes the Nashwauk, Taconite, and Bovey areas nearby the site. At the request of the MDNR, the specific locations of these occurrences are not provided in this report to protect the integrity of these rare or protected species. A summary of the known species occurrences relative to the West Range Site project alternatives are provided in the following paragraphs.

3.9.4.1.2 IGCC Power Station and Corridors

3.9.4.1.2A West Range IGCC Power Station Footprint and Buffer Land

As discussed in Section 2.10.2.1 of this report, no MDNR NHIS occurrences are within the West Range IGCC Power Station Footprint and Buffer Land. There are 17 occurrences of state-listed rare or protected species identified by the MDNR NHIS within the Nashwauk, Taconite, and Bovey areas near the site. Of these occurrences, only three species are within a one-mile radius of the West Range Site Boundary. These three species are located southeast of the project and are comprised of *Botrychium spp.* observed in mine spoil and tailings areas, as summarized in Table 3.9-18, below.

Most of the 17 NHIS occurrences near the West Range Site are associated with mine spoil, tailings ponds, or otherwise disturbed soils near mine sites. None of these mine areas or associated disturbed lands are within the West Range Site. Potential habitats for species identified in the NHIS database search were investigated during the 2005 habitat assessments and field reconnaissance for wetlands.

Of greatest concern are those records for the state-listed endangered orchid species, *Platanthera flava var. herbiola* (tubercled-rein orchid), that have colonized in disturbed in mine spoil areas. Typical habitat for this species is within fringe wetland habitats such as wet meadow habitats dominated by native graminoids and sedges, which is present within the West Range Site boundary. Because of the rarity of *Platanthera flava var. herbiola* in the state, the probability is low for encountering this species in wet meadow habitat within the footprint of the IGCC Power Station; however, it is not completely without possibility.

Two plant species records from the NHIS database that are found in areas other than disturbed mine areas are *Myriophyllum tenellum* (leafless water milfoil – non-status) and *Torreyochloa pallida* (Torrey's manna grass – special concern). *Myriophyllum tenellum*, a non-status species, is associated with aquatic environments along shorelines. Dunning Lake 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 will be avoided for construction of the West Range Site facility and associated utility and transportation corridors.

Torreyochloa pallida, a species of special concern, is associated with shallow marsh habitats in mixed hardwood forests. This type of habitat is abundant throughout the West Range Site, although this species was not observed during the field reconnaissance for habitat or during the wetland surveys. Shallow marsh habitat that could contain *Torreyochloa pallida* will be impacted for the West Range Site facility, and associated transportation and utility corridors. If the West Range Site is chosen as the preferred location, survey for this species may be requested by the MDNR. However, species of special concern are not legally protected by the Minnesota Endangered Species Statute (Minn. Stat. § 84.0895) and, therefore, impacts to these species may not require state permitting. Regardless, coordination with the MDNR will be underataken to determine the significance of effects on this species.

As described in Section 2.10.2.1, during the field reconnaissance in June 2005, a plant species that closely resembled *Botrychium 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* to determine if these resources could be affected. If the West Range Site is chosen as the preferred location, survey for this species may be requested by the MDNR. However, species of special concern are not legally protected by the Minnesota Endangered Species Statute (Minn. Stat. § 84.0895), therefore impacts to these species may not require state permitting.

For the records of state-listed species within the vicinity of the West Range Site Boundary that are listed as species of special concern or non-status, impacts to these species or their habitats are not regulated by state law. However, this does not preclude coordination with the MDNR to determine significance of potential impacts. For these reasons, coordination with MDNR will be completed as soon as possible to determine the potential effects on all state-listed species or their habitats within the vicinity of the West Range Site, particularly for state-listed endangered *Platanthera flava var. herbiola.*

Table 3.9-32
MDNR NHIS Plant Species Occurrences in Vicinity of West Range Site Boundary

NHIS Occurrence Number	Scientific Name	Common Name	Protection Status	Associated Habitat Near Project Area
#28507, #28508	*Botrychium campestre*	Prairie moonwort	SPC	High iron content and gravel soils
#24083, #24098, #24107, #28518, #28536, #28639	*Botrychium simplex*	Least moonwort	SPC	Mine tailings basin, disturbed utility ROW
#28509, #30927	*Botrychium matricariifolium*	Matricary grapefern	No status	Grassy opening, near mine area
#24653, #28537	*Liparis lilifolia*	Lilia-leaved twayblade	No status	Tailings basin
#27799	*Myriophyllum tenellum*	Leafless water milfoil	No status	Lake shoreline
#24655, #28510	*Platanthera flava var. herbiola*	Tubercled rein-orchid	END	Tailings basin

NHIS Occurrence Number	Scientific Name	Common Name	Protection Status	Associated Habitat Near Project Area
#30846	*Spiranthes casei*	Case's ladies'-tresses	No status	Tailings basin
#28514	*Torreyochloa pallida*	Torrey's manna grass	SPC	Shallow marsh in mixed hardwood forest

[1] END – Endangered
SPC – Species of Special Concern
No status – No state protection status, but species may be monitored due to other concerns

3.9.4.1.2B West Range HVTL Alternative 1

As described in Section 2.10.2.1, there are seven known occurrences of state-listed species within one mile of HVTL Alternative 1, which are detailed in the following table. Of greatest concern are those records for the state-listed endangered orchid species, *Platanthera flava var. herbiola* (tubercled-rein orchid), which is known to occur in fringe wetland habitats such as wet meadow habitats dominated by native graminoids and sedges. The known records for this species near HVTL Alternative 1 are within mine spoil areas, and it is not fully understood how this species has recruited into these highly disturbed areas. There are no mine spoil areas that are within the alignment for HVTL Alternative 1.

Because of the rarity of *Platanthera flava var. herbiola* in the state, the probability is low for encountering this species in wet meadow habitat within the HVTL Alternative 1, but it is not completely without possibility.

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. These species were all observed within mine spoil areas, which are not found within any area of HVTL Alternative 1.

Table 3.9-33
MDNR NHIS Occurrences within One Mile of HVTL Alternative 1

NHIS Occurrence Number	Common Name	Scientific name	State Protection Status[1]	Potential Habitats
#30922	Matricary grapefern	*Botrychium matricariifolium*	No status	Site records also within mine spoil areas.
#28637	Species of moonwort	*Botrychium michiganense*	No status	Site records also within mine spoil areas.
#28638	Least moonwort	*Botrychium simplex*	SPC	Site records also within mine spoil areas.
#28172, #29121, #24088	Tubercled-rein orchid	*Platanthera flava var. herbiola*	END	Occurs in fringe wetland habitats. Site records also within mine spoil areas.
#29124	Case's ladies'-tresses	*Spiranthes casei*	No Status	Occurs in fringe wetland habitats. Site records also within mine spoil areas.

[1] END – Endangered
SPC – Species of Special Concern
No status – No state protection status, but species may be monitored due to other concerns

3.9.4.1.2C West Range HVTL Alternative 1A

As described in Section 2.10.2.1, there are seven known occurrences of state-listed species within one mile of HVTL Alternative 1A, which are detailed in the following table. Of greatest concern are those records for the state-listed endangered orchid species, *Platanthera flava var. herbiola* (tubercled-rein orchid), which is known to occur in fringe wetland habitats such as wet meadow habitats dominated by native graminoids and sedges. The known records for this species near HVTL Alternative 1A is within mine spoil areas, and it is not fully understood how this species has 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 *Platanthera flava var. herbiola* in the state, the probability is low for encountering this species in wet meadow habitat within the HVTL Alternative 1 but, again, it is not completely without possibility.

The remaining records of state-listed species within one mile of HVTL Alternative 1A are listed as species of special concern or non-status species. These species were all observed within mine spoil areas, which are not found within any area of HVTL Alternative 1A. Although impacts to these species or their habitats are not regulated by state law, consultation with the MDNR will help determine the significance of potential impacts.

Table 3.9-34
MDNR NHIS Occurrences within One Mile of HVTL Alternative 1A

NHIS Occurrence Number	Common Name	Scientific name	State Protection Status[1]	Potential Habitats
#30922	Matricary grapefern	*Botrychium matricariifolium*	No status	Site records also within mine spoil areas.
#28637	Species of moonwort	*Botrychium michiganense*	No status	Site records also within mine spoil areas.
#28638	Least moonwort	*Botrychium simplex*	SPC	Site records also within mine spoil areas.
#28172, #29121, #24088	Tubercled-rein orchid	*Platanthera flava var. herbiola*	END	Occurs in fringe wetland habitats. Site records also within mine spoil areas.
#29124	Case's ladies'-tresses	*Spiranthes casei*	No Status	Occurs in fringe wetland habitats. Site records also within mine spoil areas.

[1] END – Endangered
SPC – Species of Special Concern
No status – No state protection status, but species may be monitored due to other concerns

3.9.4.1.2D West Range Plan B Phase II Alternate Route WRB-2A

As described in Section 2.10.2.1, there are 12 known occurrences of state-listed species within one mile of Plan B Phase II Alternate Route WRB-2A, which are detailed in the following table. Of greatest concern are those records for the state-listed endangered orchid species, *Platanthera flava var. herbiola* (tubercled-rein orchid), that have colonized in disturbed in mine spoil areas.

Typical habitat for this species is within in fringe wetland habitats such as wet meadow habitats dominated by native graminoids and sedges. However, the known record for this species near Plan B Phase II Alternate Route WRB-2A is within a mine spoil area, and it is not fully understood how these species have recruited into these highly disturbed areas. There are no mine spoil areas within the alignment for Plan B Phase II Alternate Route WRB-2A.

The remaining records of state-listed species within one mile of Plan B Phase II Alternate Route WRB-2A are listed as species of special concern or non-status.

Table 3.9-35
MDNR NHIS Occurrences within One Mile of Plan B Phase II Alternate Route WRB-2A

NHIS Occurrence Number	Common Name	Scientific name	State Protection Status[1]	Potential Habitats
#26408	Northern goshawk	*Accipiter gentiles*	No Status	Mature conifer forest.
#28507	Prairie moonwort	*Botrychium campestre*	SPC	Site record is within mine spoil area.
#28509	Matricary grapefern	*Botrychium matricariifolium*	SPC	Site record is within mine spoil area.
#27896	Species of moonwort	*Botrychium michiganense*	No Status	Site record is within mine spoil area.
#28534, #23754, #27894	Pale moonwort	*Botrychium pallidum*	SPC	Site records are within mine spoil areas.
#28533, #27895	Least moonwort	*Botrychium simplex*	SPC	Site records are within mine spoil areas.
#28537	Lilia-leaved twayblade	*Liparis lilifolia*	SPC	Occurs in fringe wetland habitats. Site record is within mine spoil area.
#24655	Tubercled-rein orchid	*Platanthera flava var. herbiola*	END	Occurs in fringe wetland habitats. Site record is within mine spoil area.
#19111	Lapland buttercup	*Ranunculus laponnicus*	SPC	Species is found in wetland habitats.

[1] END – Endangered
SPC – Species of Special Concern
No status – No state protection status, but species may be monitored due to other concerns

3.9.4.1.2E West Range Natural Gas Pipeline Alternative 1

As described in Section 2.10.2.1, there are nine known occurrences of state-listed species within one mile of Natural Gas Pipeline Alternative 1, which are detailed in the following table. Of greatest concern are those records for the state-listed endangered orchid species, *Platanthera flava var. herbiola* (tubercled-rein orchid), that have colonized in disturbed in mine spoil areas. Typical habitat for this species is within in 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 1 are within mine spoil areas, and it is not fully understood how this species has recruited into these highly disturbed areas. There are no mine spoil areas within the alignment for Natural Gas Pipeline Alternative 1.

Because of the rarity of *Platanthera flava var. herbiola* in the state, the probability is low for encountering this species in wet meadow habitat within Natural Gas Pipeline Alternative 1.

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.

Table 3.9-36
MDNR NHIS Occurrences within One Mile of Natural Gas Pipeline Alternative 1

NHIS Occurrence Number	Common Name	Scientific name	State Protection Status[1]	Potential Habitats
#12178	American bittern	*Botaurus lentiginosus*	No status	Wet meadow, shallow and deep marsh, and fringe lakeshore dominated by herbaceous vegetation.
#30922	Matricary grapefern	*Botrychium matricariifolium*	No status	Site record is within mine spoil area.
#28637	Species of moonwort	*Botrychium michiganense*	No status	Site record is within mine spoil area.
#28638	Least moonwort	*Botrychium simplex*	SPC	Site record is within mine spoil area.
#27799	Leafless water milfoil	*Myriophyllum tenellum*	No Status	Lake shoreline.
#28172, #29121, #24088	Tubercled-rein orchid	*Platanthera flava var. herbiola*	END	Occurs in fringe wetland habitats. Site records are within mine spoil areas.
#29124	Case's spiranthes	*Spiranthes casei*	No Status	Occurs in fringe wetland habitats. Site record is within mine spoil area.

[1] END – Endangered
SPC – Species of Special Concern
No status – No state protection status, but species may be monitored due to other concerns

3.9.4.1.2F West Range Natural Gas Pipeline Alternative 2

As described in Section 2.10.2.1, there are three known occurrences of state-listed species within one mile of Natural Gas Pipeline Alternative 2, which are detailed in the following table. These three records are for the state-listed endangered orchid species, *Platanthera flava var. herbiola* (tubercled-rein orchid), that have colonized in disturbed in mine spoil areas. Typical habitat for this species is within in 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, and it is not fully understood how this species has recruited into these highly disturbed areas. There are no mine spoil areas within the alignment for Natural Gas Pipeline Alternative 2.

Because of the rarity of *Platanthera flava var. herbiola* in the state, the probability is low for encountering this species in wet meadow habitat within Natural Gas Pipeline Alternative 2.

Table 3.9-37
MDNR NHIS Occurrences within One Mile of
Natural Gas Pipeline Alternative 2

NHIS Occurrence Number	Common Name	Scientific name	State Protection Status[1]	Potential Habitats
#28172, #29121, #24088	Tubercled-rein orchid	*Platanthera flava var. herbiola*	END	Occurs in fringe wetland habitats. Site records also within mine spoil areas.

[1] END – Endangered

3.9.4.1.2G West Range Natural Gas Pipeline Alternative 3

There are no known occurrences of state-listed protected or otherwise rare species within one mile of Natural Gas Pipeline Alternative 3 and, therefore, impacts to these resources or their habitats are not anticipated for this alternative.

3.9.4.1.2H West Range Process Water Supply Pipeline Segment 1 (Lind Pit to Canisteo Pit)

As described in Section 2.10.2.1, there are four known occurrences of state-listed species within one mile of Process Water Supply Pipeline Segment 1 (Lind Pit to Canisteo Pit), which are detailed in the following table. These four records are for the state-listed *Botrychium spp.*, which were documented through field survey completed by Critical Connections Ecological Services, Inc. in 2005. It is assumed these records have been reported to the MDNR and are now part of the NHIS database.

All four *Botrychium spp.* were observed in mine spoil areas, although it is not fully understood how these species have recruited into these highly disturbed areas. One species, *Botrychium pallidum* (pale moonwort) is listed endangered in the state. The remaining *Botrychium spp* are listed as species of special concern or non-status species. All four of these 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.

State-listed endangered or threatened species that will be impacted by the project will require securing a “takings permit” from the MDNR. This would involve at a minimum detailed descriptions of the type of habitat and number of species/populations affected, minimization and avoidance measures, and compensatory mitigation for the takings. Compensatory mitigation would be negotiated with the MDNR if *Botrychium pallidum* is directly or indirectly affected by the project.

Table 3.9-38
MDNR NHIS Occurrences within One Mile of
West Range Process Water Supply Pipeline Segment 1

NHIS Occurrence Number	Common Name	Scientific name	State Protection Status[1]	Potential Habitats
n/a [2]	Prairie moonwort	*Botrychium campestre*	SPC	Observed in mine tailings near Lind Pit and West Hill Pit.
n/a [2]	Matricary grapefern	*Botrychium matricariifolium*	No status	Observed in mine tailings near Lind Pit and West Hill Pit.
n/a [2]	Pale moonwort	*Botrychium pallidum*	END	Observed in mine tailings near Lind Pit and West Hill Pit.
n/a [2]	Least moonwort	*Botrychium simplex*	SPC	Observed in mine tailings near Lind Pit and West Hill Pit.

[1] END – Endangered
SPC – Species of Special Concern
No status – No state protection status, but species may be monitored due to other concerns

3.9.4.1.2I West Range Process Water Supply Pipeline Segment 2 (Canisteo Pit to West Range Site)

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) and, therefore, impacts to these resources or their habitats are not anticipated for this alternative.

3.9.4.1.2J West Range Process Water Supply Pipeline Segment 3 (Gross-Marble Pit to Canisteo Pit)

As described in Section 2.10.2.1, 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 the following table. This record is for the state-listed threatened *Botrychium rugulosum* (St. Lawrence grapefern), which was observed within a mine tailings basin among aspen. Although this record is not directly 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.

State-listed endangered or threatened species that will be impacted by the project will require securing a “takings permit” from the MDNR. This would involve at a minimum detailed descriptions of the type of habitat and number of species/populations affected, minimization and avoidance measures, and compensatory mitigation for the takings. Compensatory mitigation would be negotiated with the MDNR if state-listed threatened *Botrychium rugulosum* is directly or indirectly affected by the project.

Table 3.9-39
MDNR NHIS Occurrences within One Mile of
West Range Process Water Supply Pipeline Segment 3

West Range Process Water Supply Pipeline – Segment 3 (Gross-Marble Pit to Canisteo Pit)				
#30926	St. Lawrence grapefern	*Botrychium rugulosum*	THR	Site record within mine tailings basin among aspen.

[1] THR – Threatened

3.9.4.1.2K West Range Process Water Blowdown Pipeline 1 (IGCC Power Station Footprint to Holman Lake)

There are no known occurrences of state-listed protected or otherwise rare species within one mile of Process Water Blowdown Pipeline 1 (IGCC Power Station Footprint to Holman Lake) and, therefore, impacts to these resources or their habitats are not anticipated for this alternative.

3.9.4.1.2L West Range Process Water Blowdown Pipeline 2 (IGCC Power Station Footprint to Canisteo Pit)

There are no known occurrences of state-listed protected or otherwise rare species within one mile of Process Water Blowdown Pipeline 2 (IGCC Power Station Footprint to Canisteo Pit and, therefore, impacts to these resources or their habitats are not anticipated for this alternative.

3.9.4.1.2M West Range Potable Water and Sewer Pipelines

There are no known occurrences of state-listed protected or otherwise rare species within one mile of the alignment for the Potable Water Sewer Pipelines Alternative 1 and, therefore, impacts to these resources or their habitats are not anticipated for this alternative.

3.9.4.1.2N West Range Rail Line Alternative 1A and Center Loop

There are no known occurrences of state-listed protected or otherwise rare species within one mile of Rail Line Alternative 1A and Center Loop and, therefore, impacts to these resources or their habitats are not anticipated for this alternative.

3.9.4.1.2O West Range Rail Line Alternative 1B and Center Loop

There are no known occurrences of state-listed protected or otherwise rare species within one mile of Rail Line Alternative 1B and Center Loop and, therefore, impacts to these resources or their habitats are not anticipated for this alternative.

3.9.4.1.2P West Range Roads

There are no known occurrences of state-listed protected or otherwise rare species within one mile of the road alignments and, therefore, impacts to these resources or their habitats are not anticipated for this alternative.

3.9.4.2 East Range Site

3.9.4.2.1 Federal & State Laws

3.9.4.2.1A Federal Endangered Species Act

As discussed in Section 2.10.2.2 of this report, the project is within the ranges of three federally threatened species, the bald eagle (*Haliaeetus leucocephalus* – federal status, de-listed threatened), Canada lynx (*Lynx canadensis* – federal status, endangered) and grey wolf (*Canis lupus* – federal status, threatened). Verified and unverified sightings (MDNR Online Data, 2005) of Canada lynx are found within St. Louis County and potential habitats for this predator exist within and adjacent to the East Range Site boundary.

There are no federally protected plant species identified by the USFWS within the East Range Site or any of the proposed utility or transportation corridors and, therefore, no adverse effects are anticipated on any federally protected plant species for the East Range Site or its associated utility and transportation corridors.

As described in Section 2.10.2.2, Section 7 Formal Consultation will need to occur for the Canada lynx and grey wolf. Currently, population studies are being conducted on these species in conjunction with the Formal Consultation that has been initiated by other projects in close proximity to the East Range Site. The request for Formal Consultation under Section 7 of the Endangered Species Act will determine the need for additional studies and coordination for these species. Similarly, effects on bald eagle should also be determined by the USFWS through the Section 7 consultation process. Based on Section 7 Formal Consultation, the determination of the significance of effects on the Canada lynx and grey wolf will be made by the USFWS for the East Range Site.

According to the MDNR data (MDNR Online Data, 2005), there have been both “verified without evidence of breeding” and “unverified” sightings of Canada lynx within St. Louis County through 2005.

The MDNR Natural Heritage and Information System (NHIS) database shows no bald eagle nesting areas within the East Range Site, nor within a two-mile radius of the site boundary, but it does show five bald eagle nesting areas within a one-mile radius of the various transportation and utility corridors. Although the bald eagle has been delisted under the federal Endangered Species Act, they are still regulated by the USFWS and still listed as special concern by the MDNR. The USFWS and MDNR 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 tree 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 MDNR. Therefore, in addition to complying with the protection measures, the project will also coordinate with these agencies to receive updated information on new bald eagle nesting area locations prior to construction. It is anticipated that the USFWS will provide updated information and comments on bald eagles through the Section 7 Formal Consultation process as well.

3.9.4.2.1B Minnesota Endangered Species Act

As described in Section 2.10.2.2 of this report, there are no NHIS occurrences within the East Range Site boundary. There are 27 NHIS occurrences of nine different species present within one mile of the East Range Site utility and transportation corridors. The following sections describe potential impacts to state-listed species. Since access to these corridors was not available during the 2004 and 2005 field surveys for wetlands, this summary at a minimum suggests that these areas should be investigated for potential habitats for these species when access is available, if the East Range Site is chosen as the preferred location. At the request of the MDNR, the locations of these known records of state-listed or otherwise rare natural features are not provided graphically to protect the integrity of the species, populations, or respective habitat.

3.9.4.2.1C East Range IGCC Power Station Footprint and Buffer Land

As discussed in Section 2.10.2.2 of this report, no MDNR NHIS occurrences are within the East Range IGCC Power Station Footprint and Buffer Land. According to the MDNR NHIS, the closest occurrence is a wood turtle (*Clemmys insculpta*), which exists on the Partridge River more than two miles from the East Range Site boundary.

3.9.4.2.1D East Range HVTL Alternative 1

As described in Section 2.10.2.2, there are 18 known occurrences of state-listed species within one mile of HVTL Alternative 1, which are detailed in the following table. Of greatest concern are those records for the state-listed threatened wood turtle (*Clemmys insculpta*), found in habitats proximate to the St. Louis and Partridge Rivers. Wood turtles prefer wetland habitats and water bodies. The HVTL will be suspended and placement of poles can occur between 800-1,000 feet, thereby avoiding particularly sensitive habitats that may contain state-listed species. If this alternative is chosen as the preferred alternative, a survey for this species may be requested by the MDNR. Coordination with the MDNR will be completed to determine the 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, this does not preclude coordination with the MDNR to determine significance of potential impacts. For these reasons coordination with MDNR should be completed as soon as possible to determine the potential effects on these species or their habitats within or near HVTL Alternative 1.

Table 3.9-40
MDNR NHIS Plant Species within One Mile of East Range HVTL Alternative 1

NHIS Occurrence Number	Scientific Name	Common Name	Protection Status[1]	Associated Habitat Near Project Area
Flora				
3449	*Arethusa bulbosa*	Dragon's Mouth	Non-status	Creek shoreline
5319	*Poa sylvenstris*	Woodland Bluegrass	Non-status	Mixed hardwood forest
Fauna				
1491, 1523, 12192, 12480, 12996, 13864, 13865, 13871, 13872, 13873, 18515, 18516, 18518	*Clemmys insculpta*	Wood Turtle	THR	Partridge and St. Louis Rivers
12128, 27124	*Haliaeetus leucocephalus*	Bald Eagle	SPC	Various nesting areas, some in management areas
27068	*Ligumia recta*	Black Sandshell Mussel	SPC	Lake shoreline

[1] Non-status – No state protection status, but species may be monitored due to other concerns
THR – Threatened
SPC – Species of Special Concern

3.9.4.2.1E East Range HVTL Alternative 2

As described in Section 2.10.2.2 there are 16 known occurrences of state-listed species within one mile of HVTL Alternative 2, which are detailed in the following table. Of greatest concern are those records for the state-listed endangered floating marsh-marigold (*Caltha natans*) that inhabits a pond outlet and state-listed threatened wood turtle (*Clemmys insculpta*) exists in habitats proximal to the St. Louis and Partridge Rivers. Wood turtles prefer wetland habitats and water bodies. The HVTL will be suspended and placement of poles can occur between 800-1,000 feet, thereby avoiding 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 MDNR. Coordination with the MDNR should be completed to determine the significance of effect on this 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. Although impacts to these species or their habitats are not regulated by state law, this does not preclude coordination with the MDNR to determine the significance of potential impacts. For these reasons coordination with MDNR should be completed as soon as possible to determine the potential effects on these species or their habitats within or near HVTL Alternative 2.

Table 3.9-41
MDNR NHIS Plant Species Within One Mile of East Range HVTL Alternative 2

NHIS Occurrence Number	Scientific Name	Common Name	Protection Status[1]	Associated Habitat Near Project Area
Flora				
3449	*Arethusa bulbosa*	Dragon's mouth	Non-status	Creek shoreline
3905	*Caltha natans*	Floating marsh-marigold	END	Pond outlet
5932, 5933, 5934	*Waldsteinia fragarioides*	Barren strawberry	SPC	Jack pine forest
23743	*Botrychium matricarifolium*	Matricary grapefern	Non-status	Mine tailings
23745, 23746	*Botrychium simplex*	Least moonwort	SPC	Mine tailings
Fauna				
1491, 1523, 12191, 12996, 13872, 13873, 18518	*Clemmys insculpta*	Wood Turtle	Threatened	Partridge and St. Louis Rivers
19964	*Haliaeetus leucocephalus*	Bald Eagle	SPC	Various nesting areas, some in management areas

[1] Non-status – No state protection status, but species may be monitored due to other concerns
THR – Threatened
SPC – Species of Special Concern

3.9.4.2.1F East Range Natural Gas Pipeline Alternative 1

As described in Section 2.10.2.2, there are 12 known occurrences of state-listed species within one mile of Natural Gas Pipeline Alternative 1, which are detailed in the following table. Of greatest concern are those records for the state-listed threatened wood turtle (*Clemmys insculpta*) which exists in habitats proximate to the St. Louis and Partridge Rivers. The natural gas pipeline will be directionally drilled under of rivers, streams, and other bodies of water. This activity could have temporary impacts for the wood turtle and its habitat, in particular in the area where the drilling will occur. Impacted habitat will 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 MDNR. Coordination with the MDNR should be completed to determine the significance of effect on 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.

Table 3.9-42
MDNR NHIS Plant Species Within One Mile of East Range Natural Gas Pipeline Alternative 1

NHIS Occurrence Number	Scientific Name	Common Name	Protection Status[1]	Associated Habitat Near Project Area
Flora				
5932, 5933	*Waldsteinia fragarioides*	Barren Strawberry	SPC	Jack pine forest
23743	*Botrychium matricarifolium*	Matricary Grapefern	Non-status	Mine tailings
23745, 23746	*Botrychium simplex*	Least Moonwort	SPC	Mine tailings
Fauna				
1491, 12996, 13872, 13873, 18518	*Clemmys insculpta*	Wood Turtle	THR	Partridge and St. Louis Rivers
19959, 19964	*Haliaeetus leucocephalus*	Bald Eagle	SPC	Various nesting areas, some in management areas

[1] Non-status – No state protection status, but species may be monitored due to other concerns
THR – Threatened
SPC – Species of Special Concern

3.9.4.2.1G East Range Process Water Supply Pipeline – Area 2WX to Footprint

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 and, therefore, impacts to these resources or their habitats are not anticipated for this alternative.

3.9.4.2.1H East Range Process Water Supply Pipeline – Area 2WX to Area 2W

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 and, therefore, impacts to these resources or their habitats are not anticipated for this alternative.

3.9.4.2.1I East Range Process Water Supply Pipeline – Area 2W to Area 2E

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 and, therefore, impacts to these resources or their habitats are not anticipated for this alternative.

3.9.4.2.1J East Range Process Water Supply Pipeline - Area 3 to Area 2E

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 and, therefore, impacts to these resources or their habitats are not anticipated for this alternative.

3.9.4.2.1K East Range Process Water Supply Pipeline - Knox Mine to Area 2WX

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 and, therefore, impacts to these resources or their habitats are not anticipated for this alternative.

3.9.4.2.1L East Range Process Water Supply Pipeline - Area 6 and Stephens Mine to Area 2WX

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 and, therefore, impacts to these resources or their habitats are not anticipated for this alternative.

3.9.4.2.1M East Range Process Water Supply Pipeline - Area 9 South to Area 6

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 and, therefore, impacts to these resources or their habitats are not anticipated for this alternative.

3.9.4.2.1N East Range Process Water Supply Pipeline - Area 9 North (Donora Mine) to Area 6

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 and, therefore, impacts to these resources or their habitats are not anticipated for this alternative.

3.9.4.2.1O East Range Railroad Alternative 1

There are no known occurrences of state-listed protected or otherwise rare species within one mile of Railroad Alternative 1 or the center loop and, therefore, impacts to these resources or their habitats are not anticipated for this alternative.

3.9.4.2.1P East Range Railroad Alternative 2

There are no known occurrences of state-listed protected or otherwise rare species within one mile of Railroad Alternative 2 and, therefore, impacts to these resources or their habitats are not anticipated for this alternative.

3.9.4.2.1Q East Range Potable Water and Sewer Pipelines

There are no known occurrences of state-listed protected or otherwise rare species within one mile of the Potable Water and Sewer Pipelines and, therefore, impacts to these resources or their habitats are not anticipated for this alternative.

3.9.4.2.1R East Range Roads

There are no known occurrences of state-listed protected or otherwise rare species within one mile of proposed roads and, therefore, impacts to these resources or their habitats are not anticipated for this alternative.

3.9.5 Regulatory Implications and/or Mitigation

3.9.5.1 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 MDNR Wildlife Management Areas (WMAs), State Natural Areas (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 Plan B Phase II Alternate Route WRB-2A 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 are 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 includes limiting timber and land clearing activities, in particular within woodland and forest habitats, to periods outside of the songbird nesting season (approximately August 15 through April 15). This minimizes incidental taking of potential songbird nests, which would violate the provisions of the Act. Limiting land clearing and/or timber removal to the winter months is the most effective means to comply with this provision.

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 will occur nor will any mitigation for impacts to terrestrial vegetative communities, all of which 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 Migratory Bird Treaty Act to minimize impacts to nesting songbirds. Other mitigation for impacts to fauna will occur through the impact minimization and replacement standards set forth in the various federal, state, and local permits that will be required when relevant requirements on fauna apply.

Impacts to fauna at the rivers, stream, and water body crossings will 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 replacement of wetland habitats 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 will be defined through the various permits required for the project.

Impacts to wetland communities will be mitigated following the rules of the Minnesota Wetland Conservation Act ("WCA") and Section 404 of the federal Clean Water Act. Section 3.6.5 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. 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 LGU. Higher ratios are utilized when the agencies determine that impacted wetlands have a higher value relative to other wetland types (e.g., impacts to tamarack bogs may be regulated at higher level versus impacts to a disturbed, urbanized wetland). The USACE has recently been implementing replacement requirements of 1.5:1, although formal guidance indicating this change in replacement requirements has not been officially published. Formal guidance describing these new federal replacement ratios was anticipated to be officially published in January 2006; however, this has not occurred to date.

3.9.5.1.1 Ecologically Sensitive Habitats

No ecologically sensitive habitats were identified by the MDNR Natural Heritage Information System (NHIS) database within or immediately adjacent to the West or East Range Site boundaries. The Type 8 spruce, tamarack, and other bog habitats comprise the most sensitive habitats identified during the site field reconnaissance and investigations. Type 8 bogs contain the highest endemism compared to other wetland types at either the West or East Range Sites. Compared to other eco-regions of Minnesota, however, Type 8 bogs are relatively common in this area of Minnesota. These wetlands may not be listed by the MDNR NHIS as the County Biological Surveys for Itasca and St. Louis Counties have not yet been completed. A review of the NHIS database and County Biological Survey maps reveal that Type 8 bogs are often listed as sensitive habitats when they occur further south in central and southern Minnesota. No other ecologically sensitive habitats or features were observed within the terrestrial or wetland communities.

3.9.5.2 Threatened, Endangered, or Otherwise Rare Species

Potential or known impacts to threatened, endangered, and otherwise rare species will require coordination with the federal and state agencies that regulate these resources. For federally protected species, formal consultation with the USFWS will identify additional coordination needs for Canada lynx and grey wolf. Mitigation for federal endangered species, if necessary, will be defined through and during any consultation that occurs. Mitigation can develop into 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 USFWS is the only agency that can make the final determination of significance of effects on the 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 significance of effects. The results of the USFWS's determination will then be considered by the lead federal and state agencies, the DOE and the DOC, which are publishing the federal and state environmental documents for Proponent's project.

For state-listed species protected by the Minnesota Endangered Species Statute, species or sensitive habitats listed in the MDNR Natural Heritage Information System (NHIS) database that may be potentially affected will require coordination with the MDNR Division of Ecological Services Mitigation for any NHIS listed elements, if necessary, and will be addressed through this process. Minnesota Statutes provide legal protection for species listed as either "threatened" or "endangered" under the Minnesota Endangered Species Statute (Minn. Stat. § 84.0895). "Species of special concern" and "non-status" (tracked) species are not legally protected under Minn. Stat. § 84.0895 and, therefore, no avoidance, protection, or mitigation measures for taking of species designated by the MDNR as special concern or non-status (tracked) species is required. However, the determination of significance of effects on species due to the project parameters, regardless of protection status, must be determined by the MDNR.

Mitigation of impacts to state-listed species can develop into a wide variety of options ranging from passive measures such 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 the impact. It should be noted that these are not the only mitigation measures that could be undertaken for the project. Each project that affects or potentially affects state-listed protected species is evaluated individually by the MDNR to determine the appropriate mitigation measures that will be required, which are largely based on the significance of the impact.

The MDNR NHIS will 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 mobile and/or have good dispersal ability.

The MDNR is the only agency that can make the final determination of significance of effects on the resources it protects and determine the required avoidance, minimization, or mitigation measures needed. The MDNR may consider public and other agency comments when making its determination of significance of effects. The results of the MDNR's determination will then be considered by the lead federal and state agencies, the DOE and the DOC, which are publishing the federal and state environmental documents for Proponent's project.

3.10 NOISE

Construction and future operation at the West Range or East Range Site offers the potential to increase noise in and around the surrounding area from a number of different sources. These include construction noise, traffic noise from new roadways, ingress/egress to and from the facility site, and operational noise emanating from the facility during its operation.

Each of these potential noise sources will be examined in order to determine any potential impacts at residential units and other potential sensitive receptors such as hospitals, schools, and churches.

3.10.1 Construction Noise Levels

The construction process for the proposed IGCC Power Station and associated utilities would be expected to generate noise during the following phases:

- Site Preparation
- Excavation
- Foundation Placement
- Plant and Building Construction
- Exterior Finish and Cleanup

Equipment utilized during the construction process would differ from phase to phase. In general, heavy equipment (bulldozers, dump trucks, and concrete mixers) will be used during excavation and concrete pouring activities. Most other phases involve the delivery and erection of the building components. It is assumed that there will be no driven piles during the construction process, although such requirements will not be fully determined until detailed engineering and design is completed.

Noise levels of construction equipment typically utilized for this type of project are presented in Table 3.10-1. It is important to note that the equipment presented herein is not used in every phase of construction. Further, equipment used is not generally operated continuously, nor is the equipment necessarily operated simultaneously. Site average sound levels for each phase of construction (Bolt, Beranek and Newman, 1971) are presented in Table 3.10-2. The highest site average sound levels (89 dBA) are associated with excavation and finish phases of the construction operation.

Noise associated with the construction of the Project will be attenuated by a variety of mechanisms. The most significant of these is the diversion 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 associated with site clearing will be attenuated to 78 dBA at 100 feet, 72 dBA at 200 feet, and to 66 dBA at 400 feet. Attenuation for ground effects were not included in the construction noise analysis to allow for a conservative worst-case analysis.

3.10.1.1 West Range Site

The noise levels presented in Tables 3.10-1 and 3.10-2 are for a distance of 50 feet, as well as at the nearest noise sensitive receptor locations that surround the project site.

The noise sensitive areas that surround the West Range site are located at various setback distances from the Project's boundaries; the nearest noise sensitive locations are all within 1,700 to 11,330 feet from the nearest areas of future construction activity.

Table 3.10-1 details noise levels emanating from individual construction devices at the receptors specified in Section 2.11. Figure 3.10-2 details noise from amalgamated sources to these same receptors.

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Table 3.10-1 Individual Noise Levels Generated by Construction Operation Equipment

Equipment Type	Equipment Noise Level at 50 ft, dBA	Estimated Equipment Noise Level at Each Receptor Location, dBA							
		Receptor 1 (1,700' SW of Plant)	Receptor 2 (3,660' SE of Plant)	Receptor 3 (3,010' W of Plant)	Receptor 4 (4,110' W of Plant)	Receptor 5 (4,110' E of Plant)	Receptor AAC 6* (8,830' S of Plant)	Receptor AAC 7* (14,850' SE of Plant)	Receptor AAC 8 (11,330' NW of Plant)
Trucks	91	60	54	55	53	53	46	42	44
Crane	83	52	46	47	45	45	38	34	36
Roller	89	58	52	53	51	51	44	40	42
Bulldozers	80	49	43	44	42	42	35	31	33
Pickup Trucks	60	29	23	24	22	22	15	11	13
Backhoes	85	54	48	49	47	47	40	36	38
Jack Hammers	88	57	51	52	50	50	43	39	41
Rock Drills	98	67	61	62	60	60	53	49	51
Pneumatic Tools	86	55	49	50	48	48	41	37	39
Air Compressor	81	50	44	45	43	43	36	32	34
Compactor	82	51	45	46	44	44	37	33	35
Grader	85	54	48	49	47	47	40	36	38
Loader	85	54	48	49	47	47	40	36	38

Source: Bolt, Beranek, and Newman, 1971
FTA, 1995.

**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.*

Table 3.10-2 Aggregate Estimated Noise Levels Generated by Mesaba Power Plant Construction Operations

Construction Operation	Aggregate Equipment Noise Level at 50 ft, dBA	Estimated Construction Operation Noise Level at Each Receptor Location, dBA							
		Receptor 1 (1,700' SW of Plant)	Receptor 2 (3,660' SE of Plant)	Receptor 3 (3,010' W of Plant)	Receptor 4 (4,110' W of Plant)	Receptor 5 (4,110' E of Plant)	Receptor AAC 6* (8,830' S of Plant)	Receptor AAC 7* (14,850' SE of Plant)	Receptor AAC 8 (11,330' NW of Plant)
Site Clearing	84	51	45	46	44	44	38	34	36
Excavation	89	56	50	51	49	49	43	39	41
Foundation	77	44	38	39	37	37	31	27	29
Building Construction	84	51	45	46	44	44	38	34	36
Finishing	89	56	50	51	49	49	43	39	41

Source: *Bolt, Beranek, and Newman, 1971*
Alliance Acoustical Consultants, Inc, 2005

**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.*

During final construction, a method used to clean piping and testing called "steam blows" creates substantial noise. A steam blow results when high-pressure steam is allowed to escape into the atmosphere through the steam piping to clean the 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. 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. The resultant sound level at the nearby receptors would range from 86 to 103 dBA. Table 3 summarizes the noise levels at each receptor location. To minimize these short-term, temporary noise impacts, the piping would be equipped with silencers that would reduce noise levels by 20 dBA to 30 dBA at each receptor location. Table 3.10-3 details levels at select receptors.

Table 3.10-3
Estimated Steam Blow Noise Levels

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.*

3.10.1.2 East Range Site

The noise levels presented in Tables 3.10-4 and 3.10-5 are for a distance of 50 feet as well as at the nearest noise sensitive receptor locations that surround the East Range project site. Noise associated with the construction of the Project will be attenuated by a variety of mechanisms, as noted above.

The noise sensitive areas that surround the project site are located at various setback distances from the Project's boundaries; the nearest noise sensitive locations are all within 1,700 to 11,330 feet from the nearest areas of future construction activity.

Table 3.10-4 details noise levels emanating from individual construction devices at the receptors specified in Section 2.11. Figure 3.10-5 details noise from amalgamated sources to these same receptors.

Table 3.10-4 Individual Noise Levels Generated by Construction Operation Equipment

Equipment Type	Equipment Noise Level at 50 ft, dBA	Estimated Equipment Noise Level at Each Receptor Location, dBA						
		Receptor 1* (800 feet South of Plant)	Receptor 2 (7,800 feet South of Plant)	Receptor 3 (6,900 feet South of Plant)	Receptor 4 (10,500 South of Plant)	Receptor 5[1] (8,400 feet of Plant)	Receptor 6[1] (8,800 feet South of Plant)	Receptor 7[1] (8,800 feet South of Plant)
Trucks	91	67	48	49	45	47	47	47
Crane	83	59	40	41	37	39	39	39
Roller	89	65	46	47	43	45	45	45
Bulldozers	80	56	37	38	34	36	36	36
Pickup Trucks	60	36	17	18	14	16	16	16
Backhoes	85	61	42	43	39	41	41	41
Jack Hammers	88	64	45	46	42	44	44	44
Rock Drills	98	74	55	56	52	54	54	54
Pneumatic Tools	86	62	43	44	40	42	42	42
Air Compressor	81	57	38	39	35	37	37	37
Compactor	82	58	39	40	36	38	38	38
Grader	85	61	42	43	39	41	41	41
Loader	85	61	42	43	39	41	41	41

Source: *Bolt, Beranek, and Newman, 1971*
FTA, 1995.
** 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

Table 3.10-5 Aggregate Estimated Noise Levels Generated by Mesaba Power Plant Construction Operations

Construction Operation	Aggregate Equipment Noise Level at 50 ft, dBA	Estimated Construction Operation Noise Level at Each Receptor Location, dBA						
		Receptor 1 (800 feet South of Plant)	Receptor 2 (7,800 feet South of Plant)	Receptor 3 (6,900 feet South of Plant)	Receptor 4 (10,500 feet South of Plant)	Receptor 5[1] (8,400 feet South of Plant)	Receptor 6[1] 8,800 feet South of Plant)	Receptor 7[1] (8,800 feet South of Plant)
Site Clearing	84	60	41	42	38	40	40	40
Excavation	89	**65**	46	47	43	45	45	45
Foundation	77	53	34	35	31	33	33	33
Building Construction	84	60	41	42	38	40	40	40
Finishing	89	**65**	46	47	43	45	45	45

Source: *Bolt, Beranek, and Newman, 1971*
Alliance Acoustical Consultants, Inc, 2005
***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

As noted, steam blows can produce noise as loud as 130 dBA at a distance of 100 feet. The resultant sound level at the nearby receptors would range from 86 to 103 dBA. Table 3.10-6 summarizes the noise levels at each receptor location. To minimize these short-term, temporary noise impacts, the piping would be equipped with silencers that would reduce noise levels by 20 dBA to 30 dBA at each receptor location.

Table 3.10-6
Estimated Steam Blow Noise Levels

Receptor	Estimated Distance to Future Plant Steam Blow	Steam Blow Noise Level, dBA
R1*	1,900	105
R2	10,000	91
R3	9,200	91
R4	12,800	88
R5	10,700	90
R6	11,000	90
R7	11,000	90

** Receptor 1 is located at the boundary of the Buffer Land and is isolated from residential receptors.*

3.10.2 Operational Noise Levels

To evaluate the additional sound sources from the proposed IGCC Power Station equipment, a proprietary computerized noise prediction program was used to simulate and model the future equipment noise emissions throughout the area. The modeling program uses industry-accepted propagation algorithms based on ANSI and ISO standards. The calculations account for classical sound wave divergence (spherical spreading loss with adjustments for source directivity from point sources) plus attenuation factors due to air absorption, minimal ground effects, and barrier/shielding.

Calculations were performed using octave band sound power levels (abbreviated PWL or L_w) as inputs from each noise source. The computer outputs are in terms of octave band and overall A-weighted noise levels (sound pressure levels, abbreviated SPL or L_p) at discrete receptor positions or at grid map nodes (in preparation for computing a contour map). The output listing is ranked by relative noise contribution from each noise source. This model has been validated over the years via noise measurements at several operating plants that had been previously modeled during the engineering design phases. The comparison of modeled predictions versus actual measurements has consistently shown close agreement; typically in the range of 1 to 3 dB.

The project site plan and process area drawings were used to establish the position of the noise sources and other relevant physical characteristics of the facility. Receptor locations were found using project environmental documentation provided by SEH. With this information, the source

locations and receptor locations were translated into input x, y, z coordinates for the noise modeling program.

The IGCC Power Station was assumed to operate 24 hours per day at its design capacity, which means its noise output would be constant, regardless of time-of-day (and, thus, the statistical sound levels would all be the same – that is, $L_{100}=L_{90}=L_{50}=L_{10}=L_0$). Given the early stages of the project, only limited vendor data are available for use as noise model inputs. Therefore, every effort was made to use noise emission values that were obtained from equipment vendors on previous design efforts for similar-sized plant configurations. As a secondary information source, model inputs derived from generic industry reference information were used.

No special noise control options were initially assumed. These standard-design levels from the significant noise sources were converted into sound power levels (in decibels re 1 pico Watt) to serve as the initial inputs for the noise modeling program. Major buildings, as well as the 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 conservatism, low-lying buildings (such as power distribution centers and water treatment buildings) and coal piles were not included in shielding benefits.

3.10.2.1 West Range Site

These initially-assumed (nominal) sound emissions values were modeled to calculate the expected noise levels at the established receptor locations. A total of 11 receptor locations—four along the facility site boundary and seven at nearby, off-site locations—were used for the predictive analyses to assess the future noise conditions due to the proposed equipment. The modeled off-site receptor locations were the same as the ambient measurement locations used by SEH and reported in this ES (*see* Appendix 5). It should be noted that locations 6, 7, and 8 as used in the AAC construction and rail impact analyses in Sections 4 and 5 above, were not used for the predictive noise modeling. Rather, SEH locations 6 and 7, the Lutheran Church and the Catholic Church, respectively, were used for analyzing future project operations noise into the surround community. Locations 1 through 5 are common throughout all analyses. The full set of analysis receptors are summarized in the table below.

Table 3.10-7
Analysis Receptor Locations

Location	Approximate Distance from the nearest edge of West Range Site	Used for Analyses Type(s)
1. County Landfill, south of proposed Plant	1,625' to the south	Ambient Monitoring; Plant Operations Modeling; Construction Impacts; Rail Operations Impacts
2. Residence, North Big Diamond Lake	3,850' to the southeast	Ambient Monitoring; Plant Operations Modeling; Construction Impacts; Rail Operations Impacts

Location	Approximate Distance from the nearest edge of West Range Site	Used for Analyses Type(s)
3. Residence, along Scenic Hwy 7	3,800' to the west	Ambient Monitoring; Plant Operations Modeling; Construction Impacts; Rail Operations Impacts
4. 32423 Scenic Hwy 7	4,400' to the west	Ambient Monitoring; Plant Operations Modeling; Construction Impacts; Rail Operations Impacts
5. Dunning Lake Site	4,175' to the east	Ambient Monitoring; Plant Operations Modeling; Construction Impacts; Rail Operations Impacts
6. Lutheran Church	18,000' to the southeast	Plant Operations Modeling
7. Catholic Church	10,700' to the NNW	Plant Operations Modeling
AAC-6. Near Beasley Ave., City of Taconite	8,800' to the SSW	Construction Impacts; Rail Operations Impacts
AAC-7. North side of Twin Lakes; near City of Marble	14,800' to the southeast	Construction Impacts; Rail Operations Impacts
AAC-8. Between O'Reilly Lake & Island Lake (off Reilly Beach Rd.)	11,260' to the northwest	Construction Impacts; Rail Operations Impacts

The noise model was run for the base case plant configuration, both for Phase I only and for the combined Phase I and Phase II scenarios. The dominant noise sources for the base case configuration included HRSG and ASU stack exits, large buildings with major process equipment inside (including the GTG and STG buildings, the ASU buildings, Rod Mill buildings, and Slurry Feed buildings) Acid and Tail Gas burners, the Power Block and ASU cooling towers, and several large water-handling pumps.

The noise evaluation study details operational noise levels at each receptor (see Appendix 5).

3.10.2.2 East Range Site

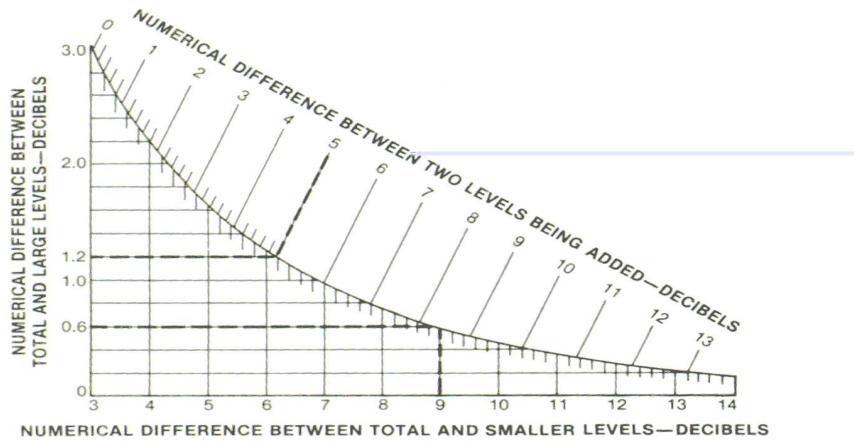
In conjunction with Alliance Acoustical Consultants, a plant noise contour map was developed and incorporated into the over-all ambient noise levels attained on site. Standard decibel addition techniques will be used to determine any potential impacts throughout the surrounding area.

When combining two like noise sources, the resultant level is not the sum of the two noise sources. Rather two like noise sources will result in a 3dB addition to the over-all level. If a noise level of 50 decibels is introduced into a similar noise environment of 50 decibels, the resultant level would be measured as 53dB. This is due to the logarithmic nature of the decibel.

Additionally, if a lower level, say 47 decibels, is introduced into a 50-decibel environment, the resultant level would be measured at approximately 52 decibels. For ease of computation, a decibel addition graph is provided in Figure 3.10-8.

Figure 3.10-8

Decibel Addition Graph



To use this chart, take the difference between two sources and follow the top of the chart. If the difference between two sources is 5dB, follow the intersection of the curved line to the left- thus adding 1.2dB.

Ambient noise measured at each receptor site can then be added, using this graph, to the calculated noise emanating from the plant during the design year (2028).

The resultant levels at selected receptor sites are detailed here in Table 3.10-9.

Table 3.10-9

Estimated Operational Noise Levels at Receptors

Receptor	Existing L_{10} /L_{50} Day (dBA)	Existing L_{10} /L_{50} Night (dBA)	Projected Plant Noise L_{10} /L_{50} (dBA)[2]	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, TH6401	50/50	49/49	55/55	1.2/1.2	1/1	51.2/51.2	50/50
R2, Boat Landing	52/52	50/49	40/40	.2/.2	.4/.5	52.2/52.2	50.4/49.5
R3, Colby Ridge	53/53	50/49	40/40	.2/.2	.4/.5	53.2/53.2	50.4/49.5
R4, 321 Kent St.	52/50	49/48	35/35	0/0	0/.2	52/50	49/48.2
R5, Faith Lutheran[1]	53/50	50/49	38/38	0/.2	.2/.3	53/50.2	50.2/49.3
R6, Queen of Peace[1]	53/50	50/49	38/38	0/.2	.2/.3	53/50.2	50.2/49.3
R7, Trinity Methodist[1]	53/50	50/49	38/38	0/.2	.2/.3	53/50.2	50.2/49.3

The resulting levels do not violate MPCA noise standards per 7030.0050 Noise Area Classification ("NAC")1 at any of the receptors.

3.10.3 Traffic Associated Noise Levels

3.10.3.1 West Range Site

Traffic noise analysis was performed according to the Federal Highway Administration (FHWA), Mn/DOT, and MPCA guidelines with regards to noise in and around proposed neighborhoods affected by the proposed road improvements. The methods used are in accordance with State and Federal mandated noise simulation methods and on-site measurement. Specifically, the MINNOISE model was used as a basis for identifying potential noise impacts along the corridor, in conjunction with on-site measurement of traffic noise during peak hours.

On site ambient measurement at the four receptors used within the last section 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. For reference, FHWA Noise Abatement Criteria is listed in Table 3.10-10.

Table 3.10-10
FHWA Noise Abatement Criteria

Table 5: Noise Abatement Criteria (NAC)
Hourly A-Weighted Sound Level in Decibels (dBA)*

Activity Category	$L_{eq}(h)$	$L_{10}(h)$	Description of Activity Category
A	57 (Exterior)	60 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (Exterior)	70 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (Exterior)	75 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	--	--	Undeveloped lands.
E	52 (Interior)	55 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

* Either $L_{eq}(h)$ or $L_{10}(h)$ (but not both) may be used on a project.

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.

The augmented FHWA noise prediction software MINNOISE was used to predict noise levels at 20 virtual receptor sites along the study corridor. Ten of the receptors were placed in and around Big Diamond and Dunning Lakes to represent residences in close proximity to the proposed roadway. All receivers were entered into the MINNOISE model using Alpha factors equaling 5.0. Alpha factors within MINNOISE models are factors that control the rate at which noise is propagated, or at what rate over distance, the noise is diminished. An Alpha factor of .5 within the MINNOISE model actually has a noise rate of decay of 4.5dB per doubling of distance.

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. Traffic volumes were taken from the traffic analysis completed. The information is summarized below within Table 3.10-11.

Table 3.10-11
Construction and Operational Traffic Volumes

Roadway Segment/Speed	Construction AM Peak			Construction PM Peak			2028 Plant Service AM			2028 Plant Service PM		
	Cars	Trucks	Hvy Truck	Cars	Trucks	Hvy Truck	Cars	Trucks	Hvy Truck	Cars	Trucks	Hvy Truck
Proceeding north from Hwy 169/55mph	679	294	10	34	15	1	100	46	7	43	20	3
Proceeding northwest towards plant/55mph	679	294	10	34	15	1	100	46	7	43	20	3
Plant entrance/35mph	828	360	12	3	2	1	99	46	7	4	2	0
Plant exit/35mph	3	2	0	828	360	12	4	2	0	99	46	7
Proceeding west to connection at Hwy 7/55mph	16	6	1	197	85	12	21	9	1	32	15	2
Proceeding east from connection at Hwy 7/55mph	185	80	3	26	10	1	44	20	3	111	51	9
Proceeding southeast away from plant/55mph	22	10	1	688	299	10	28	13	2	111	51	9
Proceeding south to connection at Hwy 169/55mph	22	10	1	688	299	10	28	13	2	111	51	9

All modeled results were judged using the L_{10} metric as both federal and state guidelines specify only one metric used when determining impacts, and L_{10} is common among both federal and state guidelines. Detailed below are projected noise levels at all receptors sites during "Nighttime" and "Daytime" hours, and during the construction year and the build year (2028) (for detailed MINNOISE raw data, see Appendix 5).

Table 3.10-12
Modeled Traffic Noise at MINNOISE Receptors

Receptors/Distance to Roadway	"Nighttime"[1] Construction L_{10}	"Daytime"[1] Construction L_{10}	"Nighttime" 2028 Plant Service L_{10}	"Daytime" 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'*	57dBA	56dBA	52dBA	50dBA
MR14/850'*	59dBA	58dBA	53dBA	51dBA
MR15/550'*	62dBA	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

Shaded values represent L_{10} values above state standards
* Represents residences at Big Diamond Lake
** Represents residences at Dunning Lake
[1] Daytime is defined by MPCA as between 7AM and 10PM; nighttime is defined by MPCA as between 10PM and 7AM.

3.10.3.2 East Range Site

There will be no substantial realignment of traffic corridors going to, or proceeding from, the proposed plant site. Currently, it as anticipated that Kensington Drive (Co. Hwy 110) will be graded, resurfaced, and not realigned.

Kensington Drive will primarily service the new plant site and, other than supply trucking and employee passage, traffic levels are not expected to increase radically. Additionally, since Kensington Drive is a county-owned highway without full control of access, it is exempt from Minnesota Noise Standards, per Minn. Stat. § 116.07, subd. 2a. Therefore, potential traffic noise impacts of this project were evaluated using federal noise criteria.

To qualify for FHWA noise analysis however, the proposed roadway must include substantial realignment and additional lanes.

The proposed highway project is not on a new location, is not a significant change in horizontal or vertical alignment, and will not increase the number of through lanes, therefore the requirements of 23 C.F.R. 772, federal procedures for abatement of highway traffic noise and construction noise, also do not apply.

3.10.4 Rail Noise and Vibration

The Project will transport coal and related materials to and from the site by way of a new rail line. Noise and vibration generated by the rail operations have the potential to impact nearby sensitive receptors. This section discusses the noise and vibration levels associated with project rail operations.

3.10.4.1 Federal Rail Impact Criteria for Noise and Vibration

Federal and local governments have established noise guidelines and regulations for the purpose of protecting citizens from potential hearing damage and from various other adverse physiological, psychological and social effects associated with noise.

The FRA provides noise impact criteria for railroad projects. The criteria apply to all rail projects (freight, rail rapid transit, light rail transit, and commuter rail) as well as fixed facilities such as storage and maintenance yards, passenger stations and terminals, parking facilities, and substations. The noise criteria are dependent upon land use, as defined in Table 3.10-13. The noise impact criteria shown in Figure 3.10-14 are based on comparison of the existing outdoor noise levels and the future outdoor noise levels from the proposed project.

All residential sensitive receptors within the project boundary fall under Land Use category 2 of Table 3.10-13. The noise impact criteria is typically based on the range of existing ambient noise levels in terms of L_{dn}.

Table 3.10-13
Land Use Categories and Metrics for Rail Noise Impact Criteria

Land Use Category and Description		Noise Metric (dBA)
1	Tracts of land where quiet is an essential element in their intended purpose. This category includes lands set aside for serenity and quiet, and such land uses as outdoor amphitheaters and concert pavilions, as well as National Historic Landmarks with significant outdoor use.	Outdoor, L_{eq}(hr)
2	Residences and buildings where people normally sleep. This category includes homes, hospitals and hotels where a nighttime sensitivity to noise is assumed to be of utmost importance. Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, and churches where it is important to avoid interference with such activities as speech, meditation and concentration on reading material.	Outdoor, L_{dn}
3	Buildings with interior spaces where quiet is important, such as medical offices, conference rooms, recording studios and concert halls fall into this category. Places for meditation or study associated with cemeteries, monuments, museums. Certain historical sites, parks and recreational facilities are also included.	Outdoor, L_{eq}(hr)

Source ; USDOT, 1995
Note: * L_{eq} for the noisiest hour of transit related activity during hours of noise sensitivity

In addition to the FTA's noise impact criteria, the American Public Transit Association (ATPA) provides guidelines that are based on maximum train pass-by noise (L_{max}). Table 3.10-15 presents the ATPA guidelines maximum airborne noise from transit train operations. Although the project's freight train operations do not fall under these passenger guidelines, a maximum noise level guideline will be used to evaluate the noise from freight train operations given the limited amount of daily rail operations. The project area falls under the Community Area Category III. An L_{max} of 75 for single family residences were used as the maximum allowable single event noise level for the proposed project.

Figure 3.10-14
Noise Impact Criteria for Railroad Projects

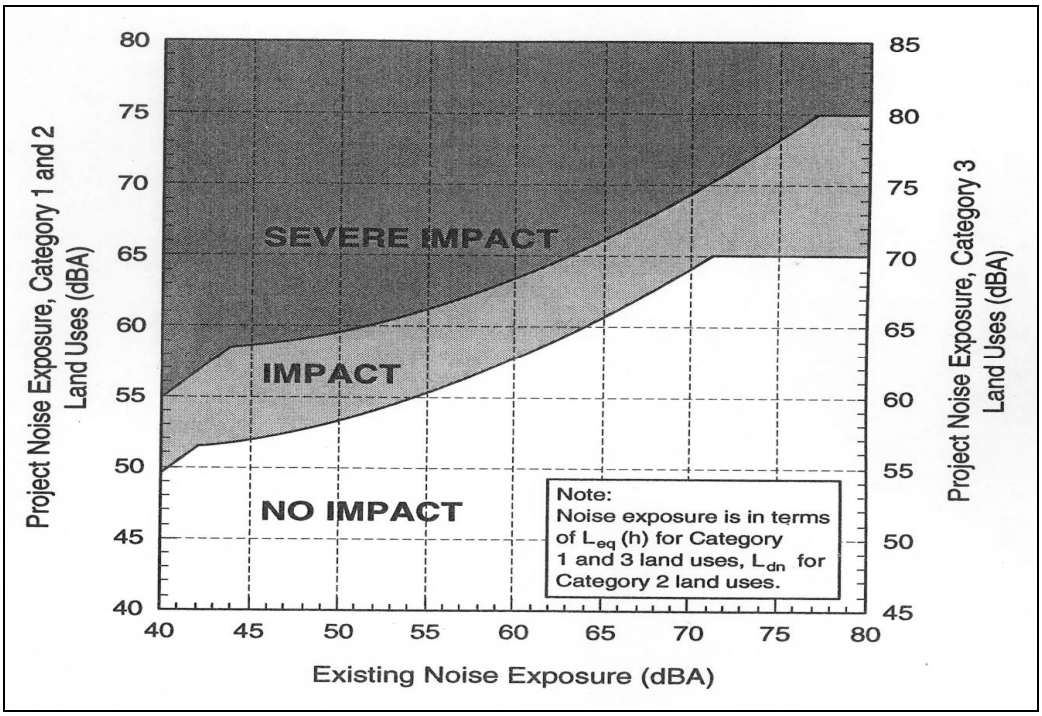


Table 3.10-15
ATPA Guidelines for Maximum Air-Borne Noise from Transit Train Operations

Community Area Category		Maximum Single-Event Noise Level, L_{max}		
		Single-Family Dwellings	Multi-family Dwellings	Commercial Buildings
I	Low density residential, open space park, suburban residential or quiet recreational area. No nearby highway or boulevards	70	75	80
II	Average residential quiet apartments and hotels, open space	75	75	80
III	High Density residential, average semi-residential/commercial areas, parks, museums, and non-commercial public building areas.	75	80	85

Community Area Category		Maximum Single-Event Noise Level, L_{max}		
		Single-Family Dwellings	Multi-family Dwellings	Commercial Buildings
IV	Commercial area, office buildings, retail stores, etc. primarily daytime occupancy.	80	80	85
V	Industrial/Highway	80	85	85

Source: ATPA

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 (USDOT, 1998 & 1995). The residential category of vibration criteria can be applied for assessing ground-borne vibration from rail operations.

Table 3.10-16 lists the FRA criteria for residential land uses for both frequent and infrequent vibration events. The residences in proximity to the Project Site fall under this residential land use classification. The maximum vibration of 80 VdB was used as vibration assessment criteria for this project.

Table 3.10-16
Ground-Borne Vibration Guideline for Residential Land use

Land use Category	Equivalent Ground-Borne Vibration Impact Velocity, inch/sec
Residences and buildings where people normally sleep	80 VdB (Infrequent Events[1]) 72 VdB (Frequent Events[2])

Source: USDOT, 1998
Note: [1] Less than 70 vibration events per day
[2] Greater than 70 vibration events per day

3.10.4.2 Project Rail Noise and Vibration Levels

3.10.4.2.1 West Range Site

Table 3.10-17 lists the estimated future noise levels generated by train operations associated with the project.

Table 3.10-17
Estimated Freight Train and Yard Activity Noise Levels

Receptor	Estimated Distance to Nearest Track Segment	Estimated Train Noise, dBA	Estimated Distance to Rail Yard (Loading & Unloading)	Estimated Yard Noise, dBA
R1	4,110	44	6,020	21
R2	500	58	7,825	18
R3	3,510	45	4,815	23
R4	5,265	43	6,520	20
R5	500	58	8,025	18

Receptor	Estimated Distance to Nearest Track Segment	Estimated Train Noise, dBA	Estimated Distance to Rail Yard (Loading & Unloading)	Estimated Yard Noise, dBA
AAC-R6*	2,000	49	13,040	13
AAC-R7*	500	58	19,050	8
R8	10,780	38	12,035	13

*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).

Rail operations associated with the project have the potential to generate vibration impacts at nearby residential receptors. The extent of the vibration would depend on the location of the receptors from the track and the vehicle speed, weight, track type, and design. An evaluation of train generated vibration was determined to be necessary to evaluate the extent of vibration impacts from the project.

Vibration generated by the Project's future rail operations have been estimated for the surrounding sensitive receptors using FRA and FTA methodologies. Adjustments were also made to the vibration calculations to conservatively account for stiff rail car suspension systems, welded rail, train speed, and efficient soil propagation conditions.

Table 3.10-18

Estimated Freight Train Vibration Levels

Receptor	Estimated Distance to Nearest Track Segment	Estimated RMS Vibration Velocity, dBV
R1	4,110	56
R2	500	74
R3	3,510	57
R4	5,265	54
R5	500	74
AAC-R6 *	2,000	62
AAC-R7 *	500	74
R8	10,780	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).

3.10.4.2.2 East Range Site

Table 3.10-19 lists the estimated future noise levels generated by train operations associated with the project.

Table 3.10-19
Estimated Freight Train and Yard Activity Noise Levels

Receptor	Estimated Distance to Nearest Track Segment	Estimated Train Noise, dBA	Estimated Distance to Rail Yard (Loading & Unloading)	Estimated Yard Noise, dBA
R1	1,700	52	1,700	30
R2	5,800	45	9,500	16
R3	5,200	46	8,700	17
R4	9,300	42	12,000	15
R5	7,300	44	10,000	15
R6	8,000	43	10,200	15
R7	8,100	43	10,200	15

* Receptor 1 is located at the boundary of the Buffer Land and is isolated from residential receptors.

Rail operations associated with the project have the potential to generate vibration impacts at nearby residential receptors. The extent of the vibration would depend on the location of the receptors from the track and the vehicle speed, weight, track type, and design. An evaluation of train generated vibration was determined to be necessary to evaluate the extent of vibration impacts from the project.

Vibration generated by the Project's future rail operations have been estimated for the surrounding sensitive receptors using FRA and FTA methodologies. Adjustments were also made to the vibration calculations to conservatively account for stiff rail car suspension systems, welded rail, train speed, and efficient soil propagation conditions.

Table 3.10-20
Estimated Freight Train Vibration Levels

Receptor	Estimated Distance to Nearest Track Segment	Estimated RMS Vibration Velocity, dBV
R1	1,700	68
R2	5,800	58
R3	5,200	57
R4	9,300	54
R5	7,300	48
R6	8,000	47
R7	8,100	47

* Receptor 1 is located at the boundary of the Buffer Land and is isolated from residential receptors.

3.10.5 Impact of Construction Noise on Receptors

In this section, impacts at receptors are discussed according to the order results were projected, along with analysis as to whether impacts are above federal or state guidelines.

Short-term noise levels during construction activities will not be significant due to the following factors:

- The distance separating the residential areas from the site will result in substantial attenuation of construction noise.
- The construction equipment will not normally be operating simultaneously.
- During construction there will be periods of time when no equipment will be operating, and when noise will 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 will be maintained on construction equipment.

3.10.5.1 West Range Site

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 and construction noise would be considered to be a less than significant impact.

Although nighttime construction is not currently anticipated, if construction activities took place during the nighttime hours (after 10:00 p.m.), then noise would be expected to exceed the MPCA residential nighttime noise limit of 50 dBA (L_{50}) at Receptor locations R1, R2, and R3 and could cause impacts. Noise generated by nighttime construction operations would be below 50 dBA at Receptor locations R4 through R8, respectively, and would therefore be considered less than significant at those locations.

Because of 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 West Range Site because of inversion effects. Under certain circumstances, the construction noise could be a source of annoyance to noise sensitive individuals.

Rail line construction would for the most part be located further away from noise sensitive receptors as compared to the West Range Project Site construction or operation. 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 linear construction operation is nearest to the homes represented by each of these receptors. Because of the short term nature of the linear construction operation, rail construction noise would potentially result in a short-term, temporary noise impacts. However, these impacts would be diminish once the construction operation moves away from Receptors R2 and R5.

3.10.5.2 East Range Site

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. Construction noise would be considered to be a less than significant impact. R1 resides 2,000 feet from the plant and is an area with no residential housing. It is anticipated that, should this area become new land use, this will take place, long after construction has been completed.

Although nighttime construction is not currently anticipated, if construction activities took place during the nighttime hours (after 10:00 p.m.), then noise would be expected to exceed the MPCA residential nighttime noise limit of 50 dBA (L_{50}) at Receptor location R1. However, as described above, this area is not populated at this time.

Because of 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.

3.10.6 Impact of Plant Operation Noise on Receptors

3.10.6.1 West Range Site

For the closest community receptors (Locations 1 through 5), the aggregate noise emissions (without any assumed noise control treatments) from the proposed complete project (Phases I and II) were above the indicated Minnesota L_{50} community limits during the nighttime (note: the nighttime L_{10} limit is predicted to be met at these five locations). All locations were well within the daytime limits.

The largest nighttime increase (+4 dB) was shown to be at Location 1 since it is the closest receptor to the project site. It is important to note that Locations 3 and 4, both residences along Scenic Hwy 7, already have existing ambient conditions above the Minnesota regulations owing to the vehicle noise from traffic flow on this nearby roadway. These locations are expected to receive an additional 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).

Even with the operation of Phase I of the project, Locations 3 and 4 are still predicted to have total future noise levels that are on the order of 1 dB higher than the existing conditions. Further, Location 1, the closest and most critical receptor, is estimated to have Phase I only noise emissions that will raise the total noise environment by 2 dB and will exceed the nighttime L_{50} limit.

3.10.6.2 East Range Site

It is not anticipated that during operation of the plant, any of the receptors will receive levels above MPCA guidelines during either daytime or nighttime operation. This is attributable to the distances involved between the East Range Site and the nearest sensitive receptors.

3.10.7 Impact of Rail Noise and Vibration on Receptors

3.10.7.1 West Range Site

Table 3.10-17 lists the estimated future noise levels generated by train operations associated with the project. Freight train noise levels would range from 38 to 58 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. 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. Further, the maximum noise levels generated by freight train operations would be clearly below the ATPA guideline of 70 dBA at each residential receptor location and would not be considered 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.

Noise generated by rail yard operations have also been estimated and summarized in Table 3.10-17. 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. When compared to the FRA and ATPA noise guidelines, noise generated by yard operations would not be expected to be significant.

3.10.7.2 East Range Site

The impacts on East Range receptors would be reduced relative to those for the West Range Site.

3.10.8 Impact of Traffic Noise on Receptors

3.10.8.1 West Range Site

Due to the proximity of the proposed access roadway running between Big Diamond Lake and Dunning Lake, there are a number of impacted receptors. In defining these impacted receptors, both FHWA and MPCA (Mn/DOT) regulations were examined.

According to the FHWA and MPCA (Mn/DOT) definitions of impacted receptors:

- No receptors meet the criteria for "approaching the NAC." As stated, FHWA and Mn/DOT classify "approaching the NAC" when the predicted level is 1dB below the criterion level. For example, 69 dBA is considered "approaching" the FHWA NAC category B level of 70 dBA.

- No receptors meet the FHWA definition of a "Substantial Increase in Level" as defined by a 5dB increase over the Federal NAC category B criteria of 70dB, or a 75dB 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 1dB - 6dB over and above the MPCA "nighttime" L_{10} criteria of 55dB.
- "Nighttime" construction times (10PM-7AM) yield the most impacted receptors per MPCA definition. A total of ten locations are primarily located at Big Diamond Lake and Dunning Lake.
- "Daytime" construction times yield 1 impacted receptor, that of MR19 due to its 275 foot proximity to the proposed roadway.
- "Nighttime" 20 year project plant service traffic levels reveal 5 impacted receptors due to their close proximity to the proposed roadway and the reduced MPCA guidelines of 55dBA/L_{10} during this time frame.
- "Daytime" 20 year projected plant service traffic levels reveal no impacted receptors per FHWA or MPCA (Mn/DOT) guidelines.
- According to MPCA and Mn/DOT policy, noise impacts have been identified which require a noise mitigation analysis.

3.10.8.2 East Range Site

The proposed highway is not at a new location, nor is it a radical realignment. The highway is to be renovated and no existing lanes are to be added. Additionally, the reconstruction and use of the highway resides within an area of no residential housing.

Therefore, there is no impact from noise at any receptor within the East Range analysis area.

3.10.9 Mitigation Measures

3.10.9.1 Mitigation of Construction Noise

Construction noise has been deemed to be within federal and MPCA guidelines for daily construction (between the hours of 7AM-10PM). While there are impacts created during construction occurring later than 10PM, it is not currently anticipated that construction will be occurring during these times.

In addition, although steam blasts occurring during the final stages of construction may exceed MPCA noise guidelines, the MPCA does not account for short duration "impulsive" noise, and these are anticipated to be lasting for extremely short durations and for a limited period of time.

Therefore, no mitigation for construction noise is warranted.

3.10.9.2 Mitigation of Facility Noise

3.10.9.2.1 West Range Site

Since nighttime exceedances are predicted at one or more receptor locations, regardless of whether the Project is implemented with the Phase I configuration only or with the combined, Phase I & Phase II layout, noise mitigation measures are indicated to ensure compliance with the Minnesota MPCA standards during plant operations. It should be noted that nighttime noise levels from non-plant sources, such as rail and traffic movements, were taken to be at such low levels that the critical nighttime noise environment at community receptor locations would be controlled by the Project contributions. Thus, controlling the noise emissions from plant sources would preclude nighttime exceedances at these residential receptors.

To address the plant-controlled noise exceedances, the ranked listing of noise contributors was studied to evaluate which set of equipment should have noise control options applied for an efficient mix of noise mitigation treatments. Then, an iterative process of reducing the highest contributors via the effective application of noise control treatments was performed. This took the form of making reasonable adjustments to the input noise levels to account for such treatments as installing silencers on inlets/exhausts or using low-noise equipment. This process was continued to achieve an efficient, cost-effective, and reasonably-achievable mix of noise course characteristics that will result in predicted compliance at all receptor locations.

This mixture of treatments included the specification of known 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 process continued until a feasible and reasonable set of equipment/systems noise mitigation treatments yielded levels that were predicted to be in compliance with the project limits. Specifically, all receptor locations are predicted to either be below the MPCA nighttime limits (both L_{50} and L_{10}) or are shown to produce no increase in the future noise environment, as compared to the measured existing conditions. The latter result is pertinent at Locations 3 and 4 which are already above the MPCA nighttime limits. Any additional noise levels, either from the Project or from other non-Project sources, will be minimized to the extent feasible.

The effective noise mitigation treatments that were used in the compliant plant design model are a combination of vendor specification limits, acoustical designs in specific systems, and/or external treatments on selected equipment items or systems.

The originally assumed noise emissions values and the subsequent noise mitigation features are summarized in Table 3.10-21 and presented in Appendix 5:

Table 3.10-21
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.
ASU Area Cooling Tower (56 dBA at 400' from tower edge)	None indicated at this time.
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 ft 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.
Main Power Transformers (46 dBA at 400' or 59 dBA at 100')	None indicated at this time.
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 Area Cooling Tower Pumps (94 dBA at 1')	None indicated at this time (due to additional barrier benefits from Project layout).
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 ft 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.
Power Block Boiler Feed Water Pumps (91 dBA at 1')	None indicated at this time; (provided vendors can supply this noise-limited equipment).
Stackers (65 dBA at 50' or ~87dBA at 1')	None indicated at this time; (provided vendors can supply this noise-limited equipment).
Reclaimers (70 dBA at 50' or ~90 dBA at 1')	None indicated at this time; (provided vendors can supply this noise-limited equipment).
Transfer Towers (78 dBA at 50')	None indicated at this time; (provided vendors can supply this noise-limited equipment).
Conveyors (61 dBA at 50' or ~82dBA at 1')	None indicated at this time; (provided vendors can supply this noise-limited equipment).
Rail Thaw Building (73 dBA at 50')	None indicated at this time; (provided vendors can supply this noise-limited equipment).
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 Building (60 dBA at 50')	Same as immediately above.

Noise Source (Original Noise Emissions Rating)	Conceptual Noise Mitigation Feature(s)
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.
Flare (36 dBA at 50' from base)	None indicated at this time; (provided vendors can supply this noise-limited equipment). [This assumes flare use is only for emergency/upset conditions and the normal operations, as indicated here, are with a pilot flame only.]
Sulfur Recovery Unit (73 dBA at 50' or ~90 dBA at 1')	None indicated at this time; (provided vendors can supply this noise-limited equipment).
SynGas Compressor (88 dBA at 3')	None indicated at this time; (provided vendors can supply this noise-limited equipment).
TailGas Compressor (92 dBA at 3')	None indicated at this time; (provided vendors can supply this noise-limited equipment).
All Blowers (86 dBA at 3')	None indicated at this time; (provided vendors can supply this noise-limited equipment).
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 Pump Sets (various)	Noise limit specification to equipment vendor; no more than 85 dBA at 3'.
All other Mechanical Equipment not specified above (various)	Noise limit specification to equipment vendor; no more than 85 dBA at 3'.
All other Electrical 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'.

Projected and attenuated levels are presented within Appendix 5.

There are no noise mitigation measures mentioned above for items or systems that are deemed to be technically infeasible at this time. These measures and features will be updated, refined, and confirmed during detailed design efforts to ensure both project compliance and fit-for-purpose cost control.

Following the engineering and construction phases, the noise mitigation design will be tested via a compliance verification field survey to measure the as-built project noise emissions along the boundary and at selected off-site receptor locations.

3.10.9.2.2 East Range Site

Operational plant noise has not been shown to exceed state noise guidelines at any of the receptors. This is primarily due to distance as the East Range plant will be located approximately 5,000 feet from the nearest residential receptors.

However, it is recommended that the minimum amount of noise mitigation procedures will be applied to air exchange systems in order to operate in a reasonably quiet fashion for both residents of Hoyt Lakes and the employees working on site.

3.10.9.3 Mitigation of Rail Line Noise

3.10.9.3.1 West Range Site

Operational rail noise will be mitigated through limiting the number of trains arriving in a 24-hour period (limited to a maximum of three arrivals and departures per day).

3.10.9.3.2 East Range Site

Train noise, both in the construction phase and the operational use of during plant operations is not expected to increase the overall noise level substantially within the city of Hoyt Lakes and the surrounding residential housing. Therefore no mitigation is warranted.

3.10.9.4 Mitigation of Traffic Noise

3.10.9.4.1 West Range Site

A mitigation analysis is required to be completed to determine if measures, such as a noise wall, are reasonable and effective in attenuating the noise at those locations which exceed noise standards.

To consider use of a noise wall, one of the following factors must exist:

- The noise standards are presently in excess of state noise standards.
- The predicted noise levels are expected to be in excess of the state noise standards for the design year of the project.
- The noise levels are predicted to be “substantially” above current noise levels in the project design year. “Substantial” is defined as a 5dB or greater increase in noise.
- The predicted noise level for the design year approaches or exceeds the acceptable limit. “Approaching” is defined as noise levels being within 1dB of the FHWA NAC. In this instance, levels predicted as 69dB are considered approaching the FHWA NAC of 70dB.

If one or more of the above conditions are met, noise walls must be considered, based upon cost reasonableness and noise wall feasibility.

“Cost reasonableness” defines a ratio of cost per square foot to effectiveness of attenuation. This is determined by dividing the total cost of a wall (Mn/DOT currently estimates this as $15 per square foot) by the total decibel reduction for residences that are predicted to have a >5dBA reduction in noise. A “reasonable” cost is defined as a cost less than $3250/dBA.

"Feasibility" involves whether a noise wall may be built considering proper setback, sight lines, and location.

Taking these factors into consideration, there were five receptors within the traffic analysis that merited noise wall consideration (MR15 – 19). A 20-foot noise wall (Mn/DOT maximum), 2200 feet long, was placed within the MINNOISE model between the new roadway segment and MR11-MR19 to gauge effectiveness (for detailed MINNOISE information for noise wall analysis, please refer to Appendix 5.

The noise wall analysis uses worst case "nighttime" conditions for receptors due to the greater impacts occurring between 10PM-7AM ("nighttime as defined by the MPCA).

The results of the noise reduction and cost analysis is provided in Table 3.10-22.

Table 3-10-22
Economic Analysis for Sound Wall

Receptors	Protected Residences	L10 Attenuation with 20' Wall	Total Attenuation with 20' Wall (>5)
MR1	1	0(<5)	0
MR2	1	0(<5)	0
MR3	1	0(<5)	0
MR4	1	0(<5)	0
MR5	1	0(<5)	0
MR6	1	0(<5)	0
MR7	1	0(<5)	0
MR8	1	0(<5)	0
MR9	1	0(<5)	0
MR10	1	0(<5)	0
MR11	1	1.6(<5)	0
MR12	1	2(<5)	0
MR13	1	2.5(<5)	0
MR14	1	3.4(<5)	0
MR15	1	5.1	5
MR16	1	7.4	7
MR17	1	7.6	8
MR18	1	7.1	7
MR19	1	5.7	5
MR20	1	0(<5)	0
Length of Wall: 2200'	Cost of 20' Wall (@$15/sq.ft) $660,000		20' Wall Feasibility (660,000/32dB) $20,625

A 2,200-foot wall placed between receptors MR15-MR19, which correspond directly to the homes located along the north of Big Diamond Lake, results in a price per total decibel reduction of $20,625. The criteria for a noise wall must meet the MnDOT minimum of $3,250 per total decibel reduction and, therefore, a 20-foot noise wall does not meet the minimum criteria and is not feasible.

3.10.9.4.2 East Range Site

The repaving of the highway serving the East Range Site is not expected to produce higher traffic noise. There is no substantial realignment of its corridor, nor is it located within an area of residential housing or to include new and additional lanes.

To qualify for FHWA noise analysis and abatement, the proposed roadway must include substantial realignment and additional lanes.

The proposed highway project is not on a new location, is not a significant change in horizontal or vertical alignment, and will not increase the number of through lanes. Therefore, the requirements of 23 CFR 772, federal procedures for abatement of highway traffic noise and construction noise, do not apply and no noise mitigation is warranted.

3.11 ELECTROMAGNETIC FIELDS

This section includes calculated electromagnetic field levels for the Plan A and Plan B HVTL routing options proposed in Section 1.12.1.2.1 for the West Range IGCC Power Station and for the Preferred/Alternate HVTL routes proposed in Section 1.12.1.2.3 for the East Range Power Station. The 230kV and 345kV HVTLs included in this study consist of a number of different line segments that account for the different structure configurations, phasing arrangements, number of circuits, and presence of existing 115 kV HVTLs in the given corridor.

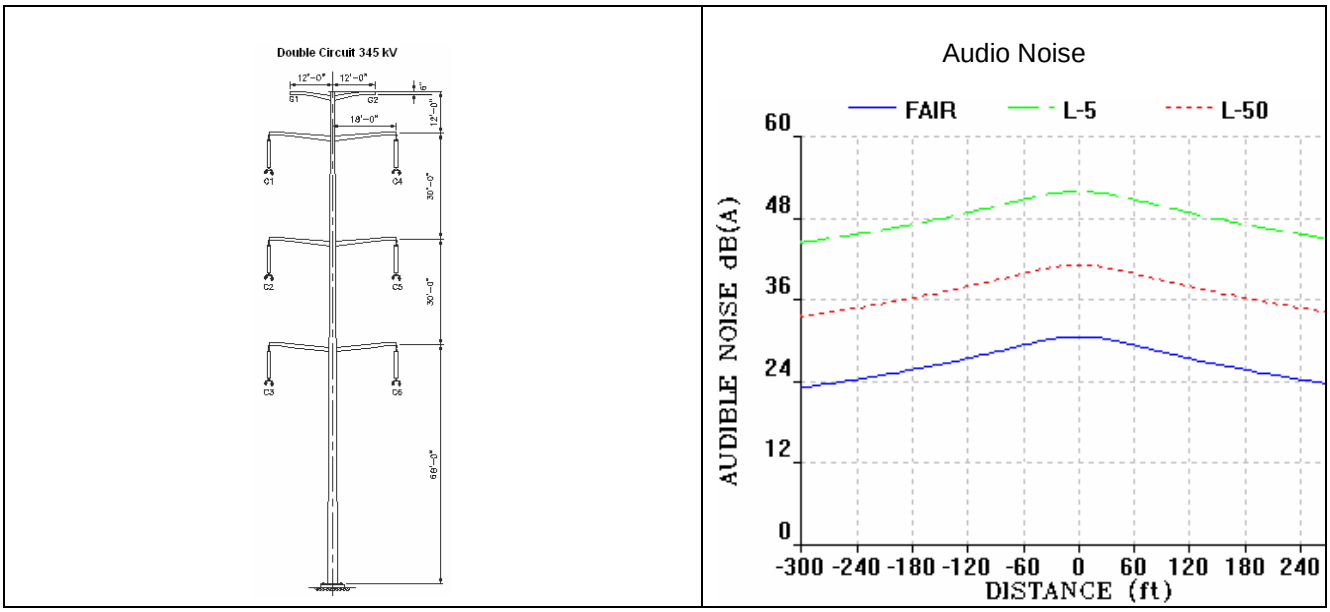
3.11.1 Magnetic Field Calculations

3.11.1.1 West Range IGCC Power Station

3.11.1.1.1 Plan A Double Circuit 345kV Preferred/Alternate Route (WRA-1 /WRA-1A))

The electromagnetic field levels for the two configurations of 345kV double circuit structures to be used in the Plan A routes are shown in Figures 3.11-1 (the vertical configuration double circuit kV structures) and 3.11-2 (for the vertical configuration double circuit 345kV structure with 115kV underbuild).

Figure 3.11-1 Plan A 345kV Preferred and Alternate Route Vertically Configured Double Circuit Structure



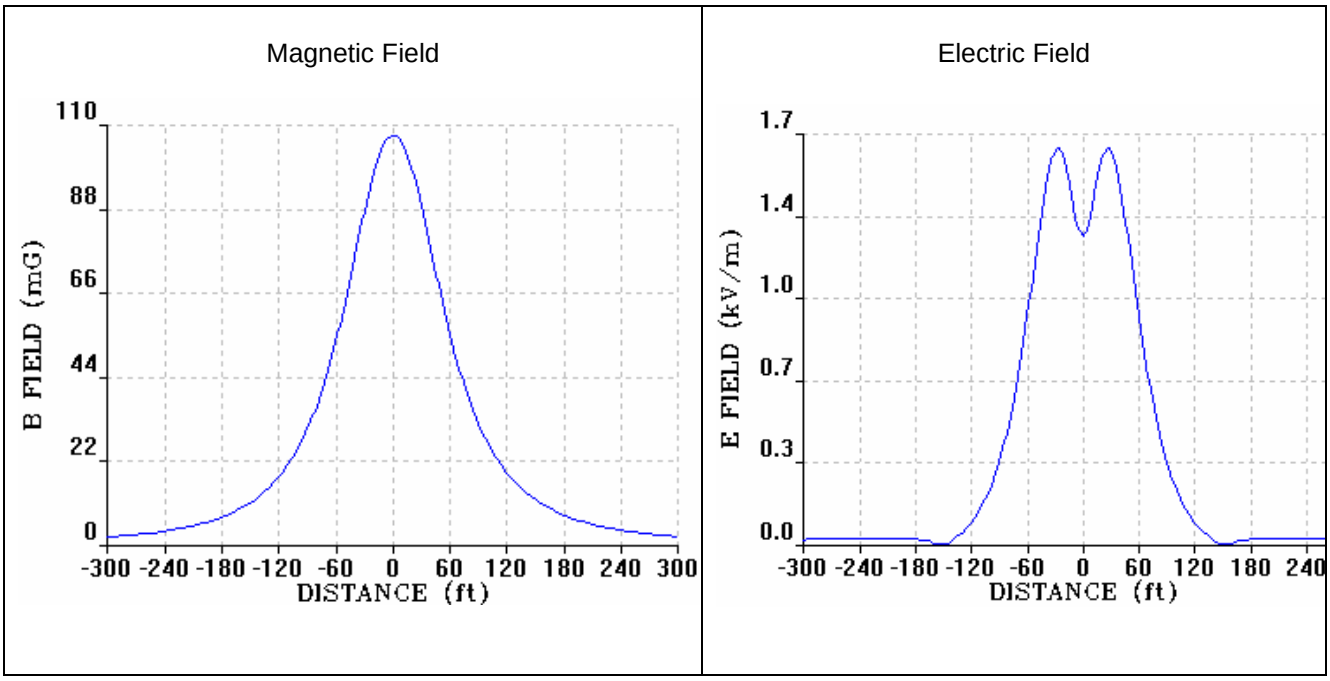
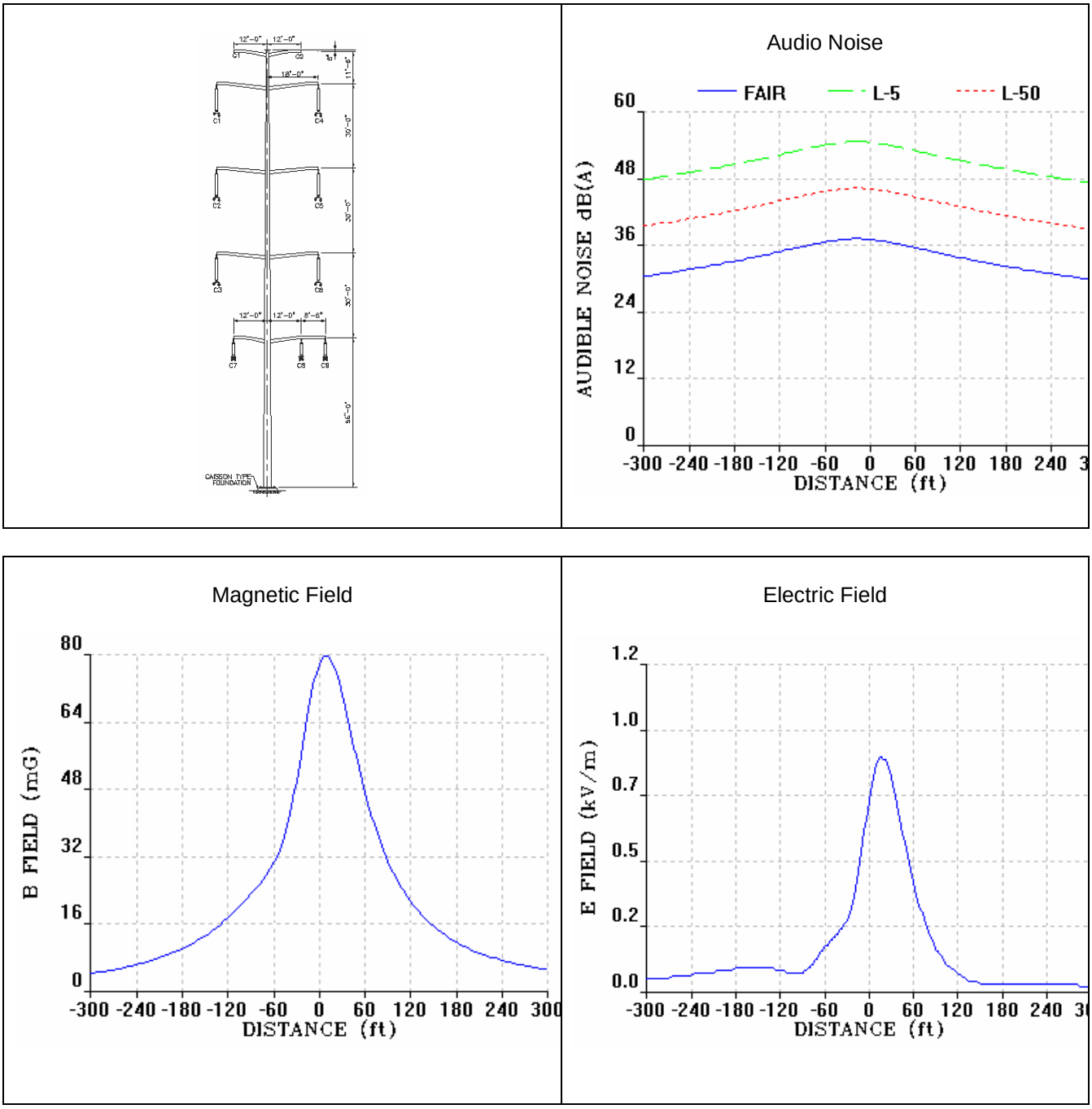


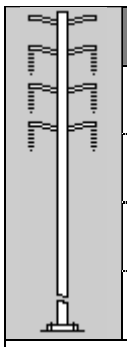
Figure 3.11-2 Plan A 345kV Preferred and Alternate Route Vertically Configured Double Circuit Structure



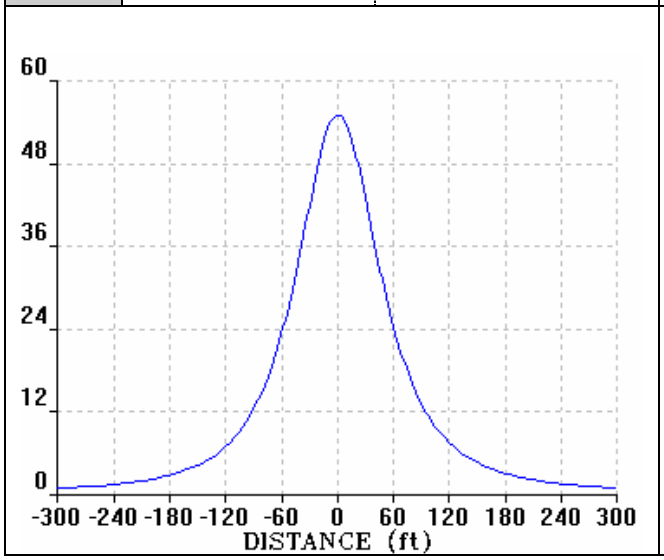
3.11.1.2 West Range – Plan B Phase I Double Circuit 230kV HVTL on Preferred and Alternate Routes

The double circuit 230 KV option travels east from the plant's generator switchyard to the existing Minnesota Power ("MP") Line 45 and then south past an abandoned substation continuing south over new ROW to MP Lines 83/20, approximately 8.9 miles on double circuit 230kV structures. It follows the existing MP ROW to Blackberry Substation 1.1 miles on double circuit 230kV line with 115kV underbuild. 600 MW for each line was considered for the EMF calculation at the Mesaba Plant. The current assumed for the 115 KV circuit was 900 A. The 230 KV line was modeled with a 1590 MCM Lapwing ACSR conductor, and a 636 MCM Grosbeak ACSR was used for the 115 KV line. The electromagnetic fields for the two vertically configured 230kV structures are shown in Figures 3.11-3 and 3.11-4.

Figure 3.11-3.
EMF for 230 KV – 2 CKT Vertical Configuration Lapwing 1590 MCM 45/7



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



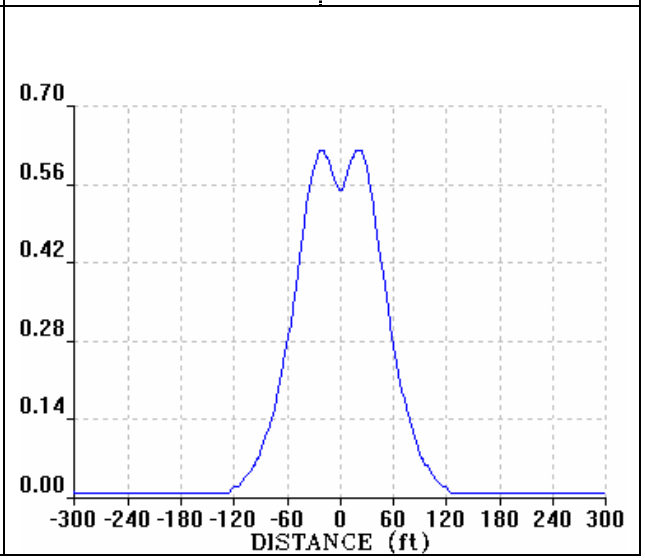
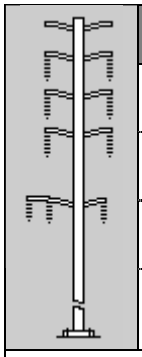
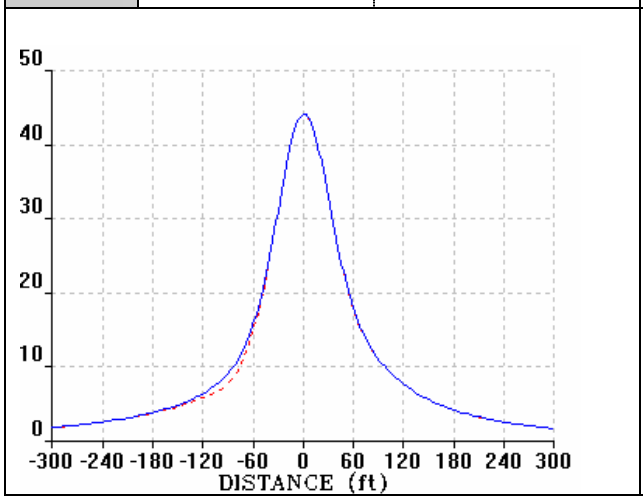
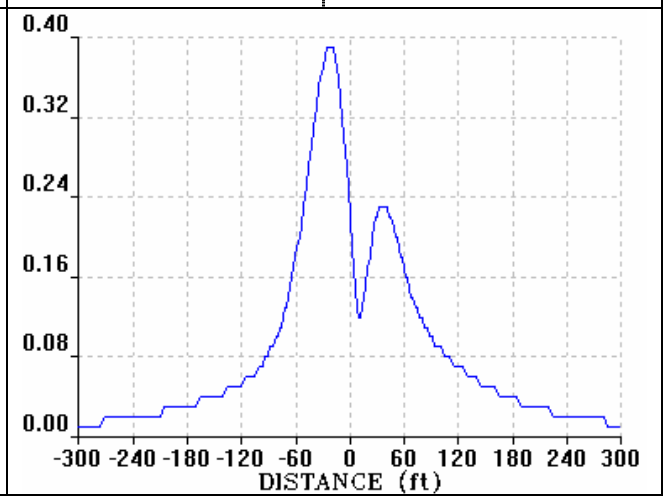


Figure 3.11- 4.
EMF for 230 KV – 2 CKT Vertical Configuration Lapwing 1590 MCM 45/7
115 KV Underbuild Horizontal Configuration Grosbeak 636 MCM 26/7



Magnetic Field (mG)		Electric Field (kV/m)	
At CL	44.15	At CL - 20	0.390
At CL + 50 ft	22.11	At CL -50 ft	0.239
At CL + 100 ft	9.74	At CL + 100 ft	0.088
At CL + 300 ft	1.72	At CL + 300 ft	0.013

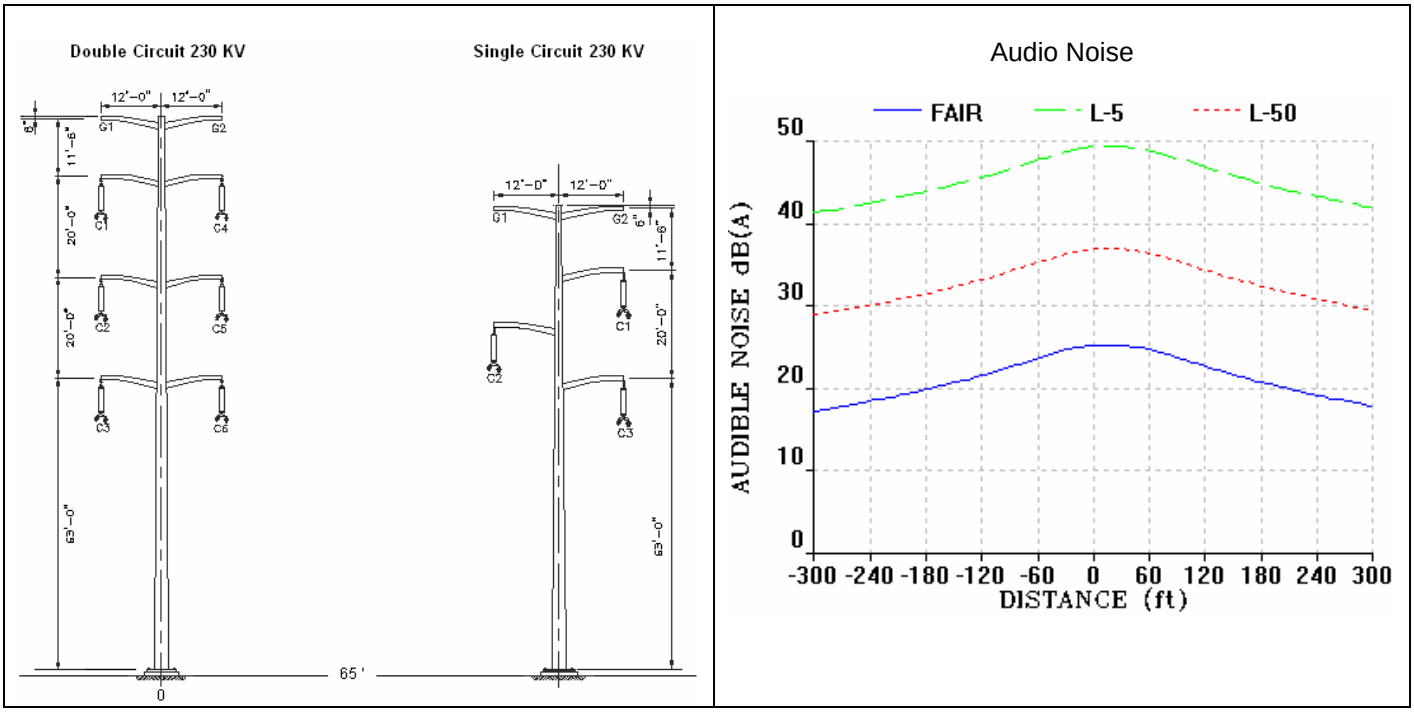




3.11.1.3 Plan B Phase II Preferred 230kV HVTL Route

The predicted EMF for the single circuit 230kV delta structure traversing the Plan B Phase II Preferred Route (WRB-2) is shown in Figures 3.11-5 and 3.11-6 for the segment of the route sharing ROW with the Plan B Phase I Preferred HVTL Route and the segment traversing the Plan B Phase II Preferred Route alone, respectively.

Figure 3.11-5 Plan B Phase II Preferred 230kV Route (Shared ROW with Plan B Phase I HVTL)



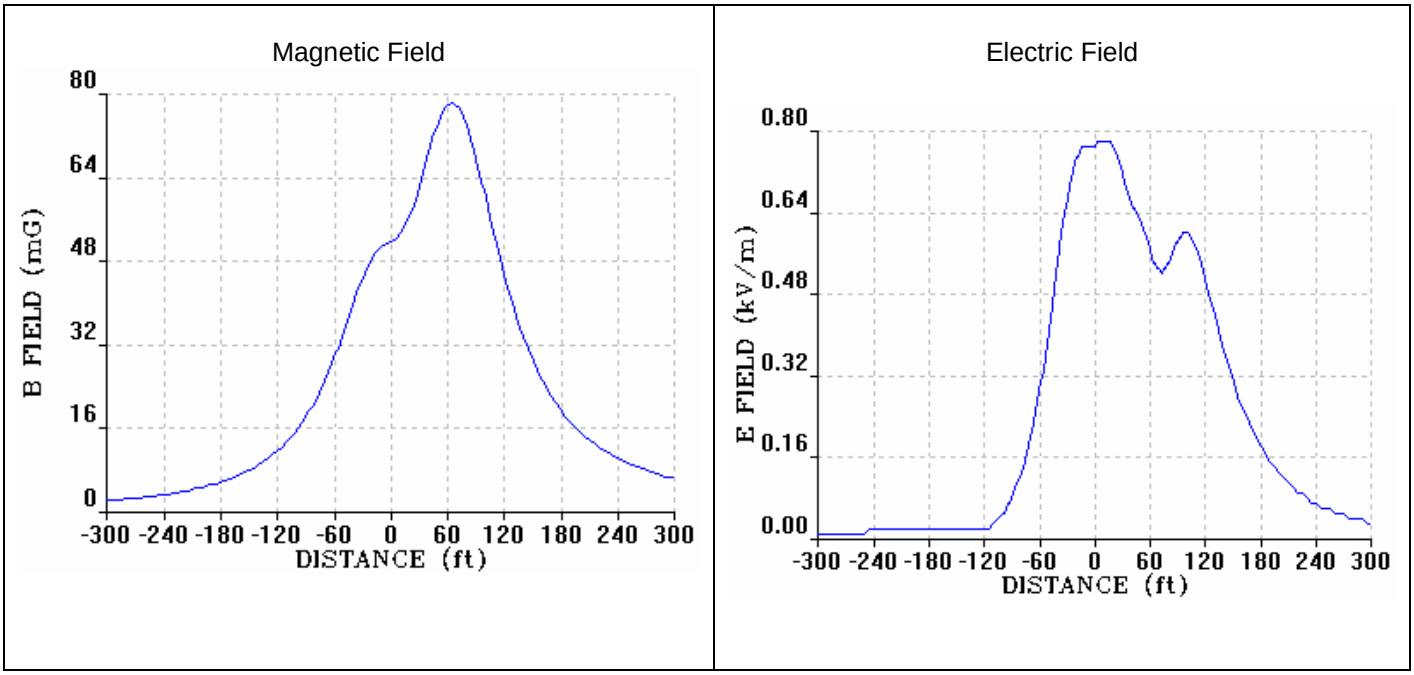
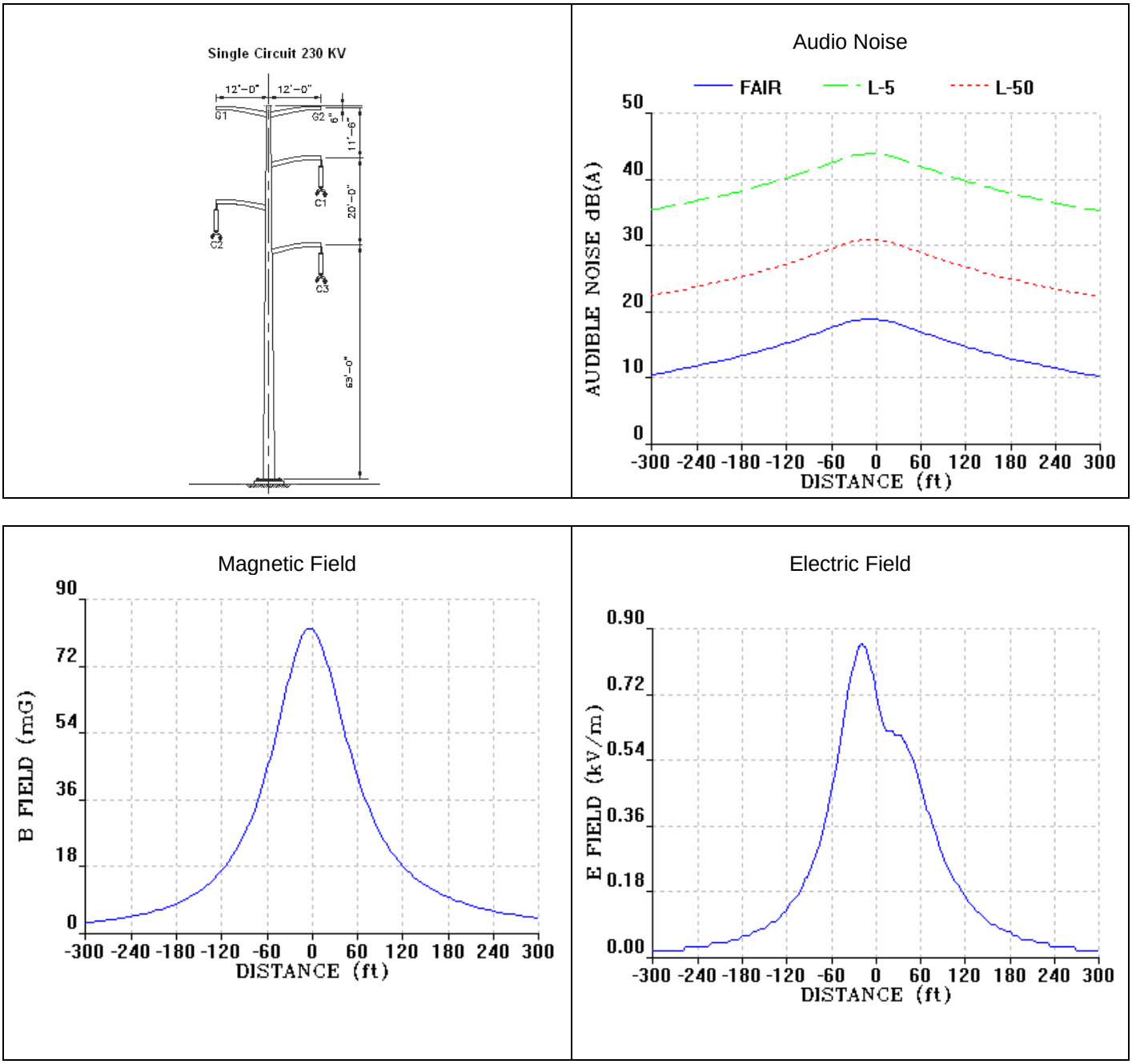


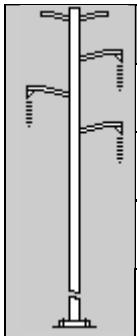
Figure 3.11-6 Plan B Phase II Preferred 230kV Route (Unshared ROW)



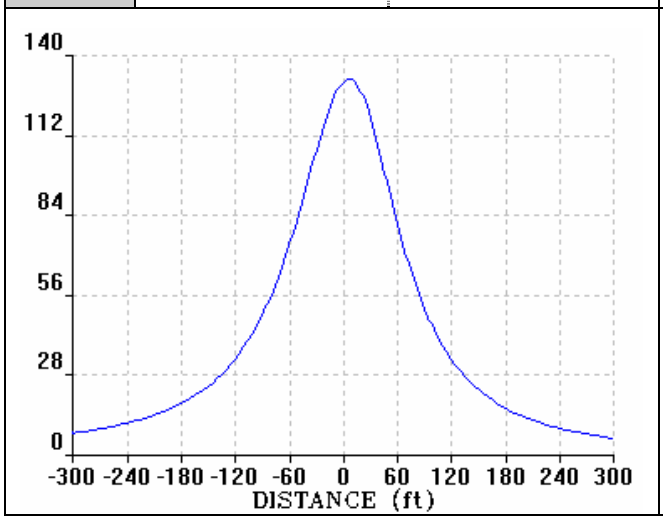
3.11.1.4 West Range. Plan B Phase II 345 kV Delta Single Along Lines 45, 28 and 62

This option travels north three miles from the plant to Line 45 on single circuit 345kV delta configured structures. It then travels east along Line 28 approximately 7.8 miles and southwest on Line 62 approximately 6.7 miles to Blackberry Substation on single circuit 345kV delta configured structures with 115kV underbuild. A short section between structures 62L and 28L is a new ROW and will be a single circuit 345kV delta configured structure. Generation of 1200 MW was considered for the EMF calculation at the Mesaba Plant and 900 A were used for the 115 KV line underbuild. Bundled 1272 MCM Pheasant ACSR conductors were used for the 345 KV line and 636 MCM Grosbeak ACSR conductor was used for the 115 KV underbuild.

Figure 3.11-7.
EMF for 345 KV – 1 CKT Delta Configuration Bundle Pheasant 1272 MCM 54/19



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



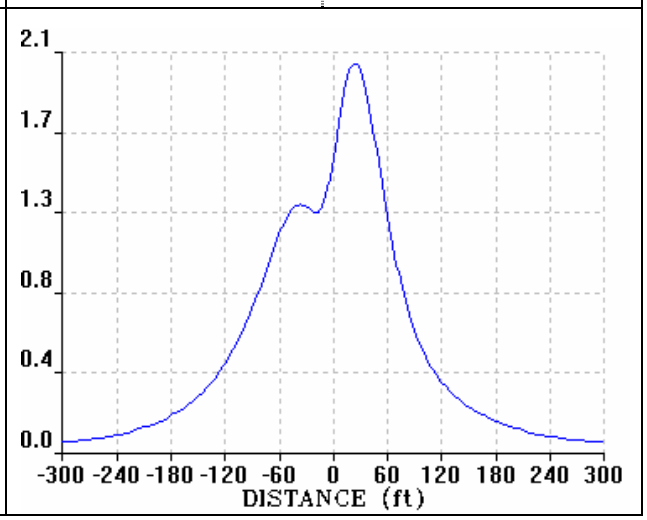
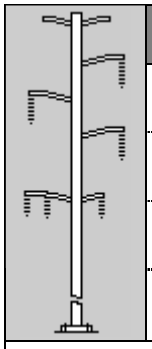
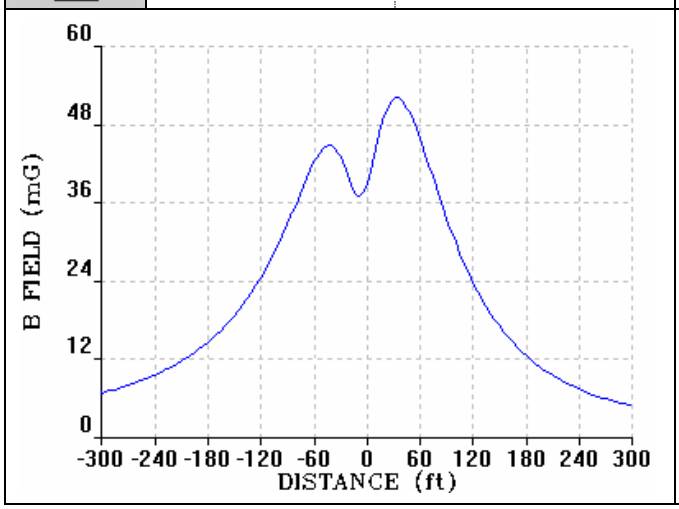


Figure 3.11-7 shows the electric and magnetic field levels for the 345 KV single circuit with a delta configuration without a 115 KV underbuild on the new ROW route. Values at centerline, 50 feet, 100 feet and 300 feet are included for both fields. The EMF graphics range from -300 to 300 feet.

Figure 3.11-8.
EMF for 345 KV – 1 CKT Delta Configuration Bundle Pheasant 1272 MCM 54/19
115 KV Underbuild Horizontal Configuration Grosbeak 636 MCM 26/7



Magnetic Field (mG)		Electric Field (kV/m)	
At CL + 36	52.07	At CL + 36	0.688
At CL + 50 ft	49.38	At CL + 50 ft	0.657
At CL + 100 ft	30.00	At CL - 100 ft	0.414
At CL -300 ft	6.86	At CL - 300 ft	0.056



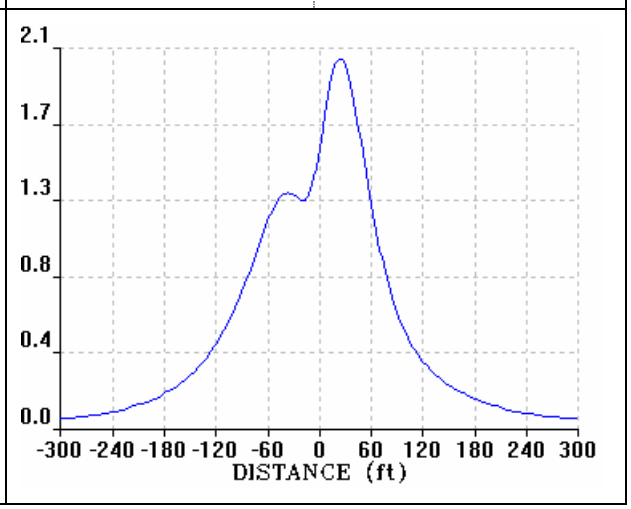
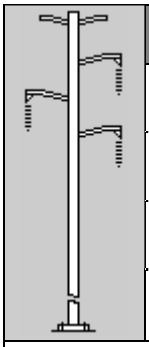


Figure 3.11-8 shows the electric and magnetic field levels for the 345 KV single circuit with delta configuration with 115 KV underbuild. Values at centerline, 50 feet, 100 feet and 300 feet are included for both fields. The EMF graphics range from -300 to 300 feet.

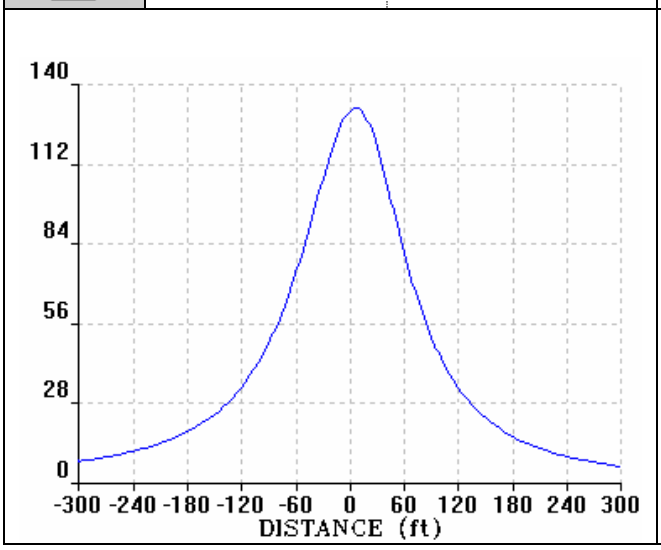
3.11.1.5 East Range - Single Line 345 kV Delta Along Lines 39 and 37

This line travels southwest from the Mesaba Plant past the Laskin Generation site to Forbes Substation approximately 35.5 miles. The first 2.5 miles are on new ROW and will be constructed on steel poles with a delta configuration. The next 23.6 miles is 345 KV vertical configuration and 115 KV vertical configuration on a single shaft steel pole to the Village of Eveleth on MP Line 39. The next 2 miles are on new ROW connecting to MP Line 37 at the Thunderbird Mine Substation and is 345kV delta configuration construction. The next 7.4 miles are 345 KV and 115 KV vertical configurations on the same structure on MP Line 37 into Forbes Substation. Bundle 1272 MCM Pheasant ACSR conductors were used for the 345 KV line and 636 MCM Grosbeak ACSR conductor was used for the 115 KV underbuild.

Figure 3.11-9.
EMF for 345 KV – 1 CKT Delta Configuration Bundle Pheasant 1272 MCM 54/19



Magnetic Field (mG)		Electric Field (kV/m)	
At CL	130.82	At CL + 24	2.042
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



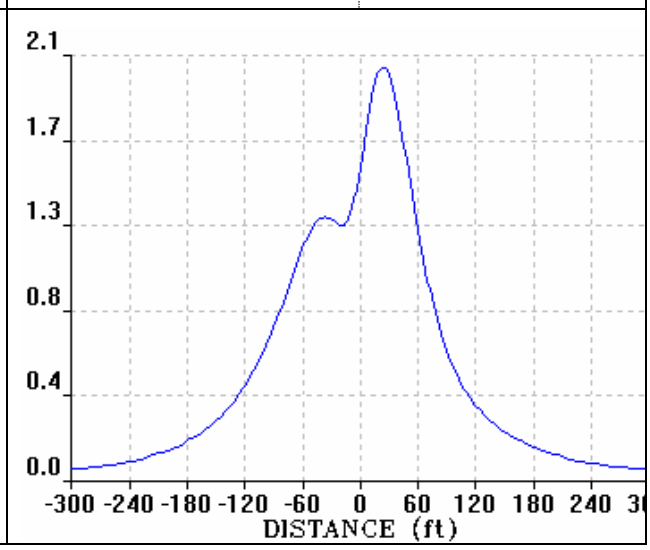
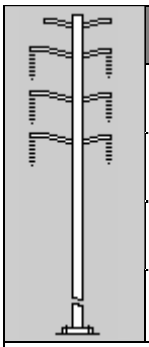
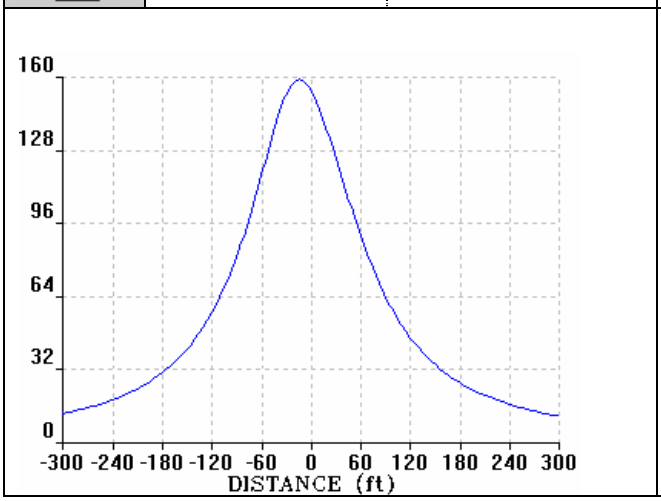


Figure 3.11-9 shows the electric and magnetic field levels for the 345 KV single circuit with delta configuration without a 115 KV underbuild on the new ROW route. Values at centerline, 50 feet, 100 feet and 300 feet are included for both fields. The EMF graphics range from -300 to 300 feet.

Figure 3.11-10
EMF for 345 KV – Vertical Configuration Bundle Pheasant 1272 MCM 54/19
115 KV - Vertical Configuration Rail 954 MCM 45/7



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



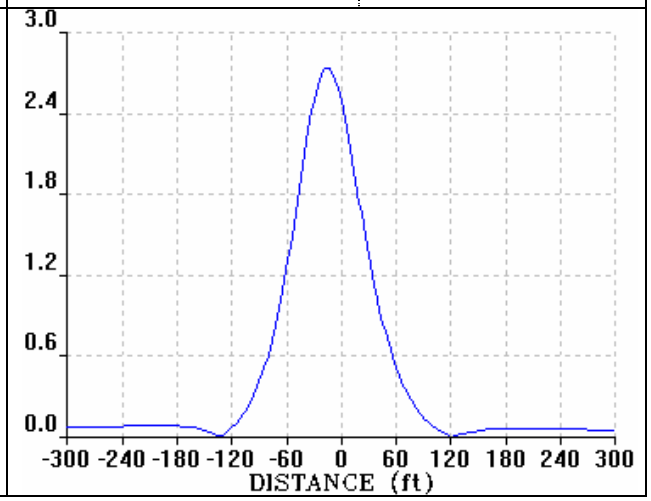


Figure 3.11-10 shows the electric and magnetic field levels for the 345 KV vertical configuration and 115 KV vertical configuration on a single steel pole. Values at centerline, 50 feet, 100 feet and 300 feet are included for both fields. The EMF graphics range from -300 to 300 feet.

3.11.2 Mitigation Measures

In the United States, there are no federal standards limiting occupational or residential exposure to 60 Hz EMF. Only six states (Florida, Minnesota, Montana, New Jersey, New York and Oregon) have set standards limitations for electric fields and two states, Florida and New York have standards for magnetic fields as shown in Table 3.11-11.

Table 3.11-11
State Transmission Line Standards and Guidelines

State	Electric Field		Magnetic Field	
	On ROW	Edge ROW	On ROW	Edge ROW
Florida	8 KV/m[a] 10 KV/m[b]	2 KV/m		150 mG[a] (max load) 200 mG[b] (max load) 250 mG[c] (max load)
Minnesota	8 KV/m			
Montana	7 kV/m	1 KV/m[e]		
New Jersey		3 KV/m		
New York	11.8 KVB/m 11 KV/m[f] 7 KV/m[d]	1.6 KV/m		200 mG (max load)
Oregon	9 KV/m			

[a] For lines of 69-230 KV [b] For 500 KV lines [c] For 500 KV lines in certain existing ROW
[d] Maximum for highway crossings [e] May be waived by the landowner [f] Maximum for private road crossings

Based on Table 3.11-11, the maximum electric field on the ROW will be 8 KV/m. At the edge of the right-of way the maximum electric field will be assumed as 2 KV/m. The maximum limit for the magnetic field at the edge of the ROW will be assumed to be 200 mG.

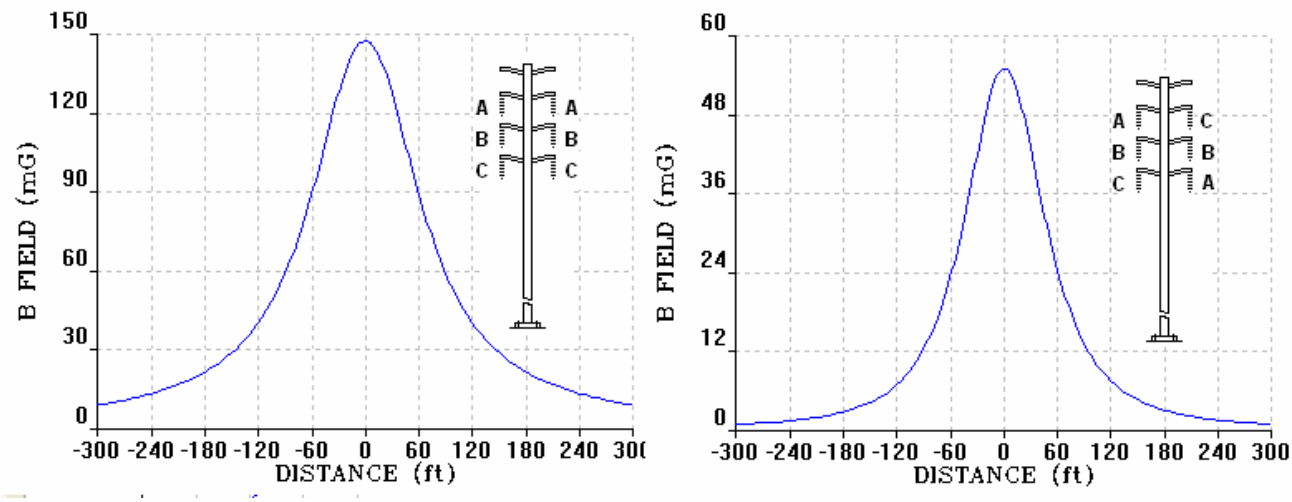
Different methods for reducing and keeping the electromagnetic field within the limits adopted above have been applied in the present EMF study. These methods and the EMF results are explained in this section.

Distance. The amount of EMF exposure is related to the distance from the transmission line. The strength of both the electric and magnetic fields from transmission lines is inversely proportional to the square of the distance from the source conductors. The proposed ROW and structure heights for the 230 KV and 345 KV lines are sufficient to keep EMF exposure within valid ranges, as shown in Figures 3.11-1 to 3.11-10.

Compaction. The configuration and distance between phases also has an impact on the EMF exposure. The amount of EMF exposure is reduced when the phases are compacted. A single circuit compacted triangular configuration has been adopted for both the West Range transmission and the East Range transmission to keep the EMF influence below the limits established by the EMF Standards.

Phase cancellation. Phase cancellation significantly reduces EMF from transmission lines. For the 230 KV double vertical circuit lines, the phase arrangement ABC-CBA reduces the magnetic field by approximately three times in comparison with an ABC-ABC arrangement as shown in Figure 3.11-12.

Figure 3.11-12
Phase Arrangement Comparison for 230 KV Line 2 CKT



For the 230 KV double vertical circuit lines with the 115 KV line underbuild the phase arrangement ABC-CBA-ABC_{115} reduces the magnetic field by more than 2 times in comparison with the ABC-CBA-CBA_{115} arrangement, as illustrated in Figure 3.11-13.

Figure 3.11-13.
Phase Arrangement Comparison for 230 KV Line 2 CKT–115 KV Line Underbuild

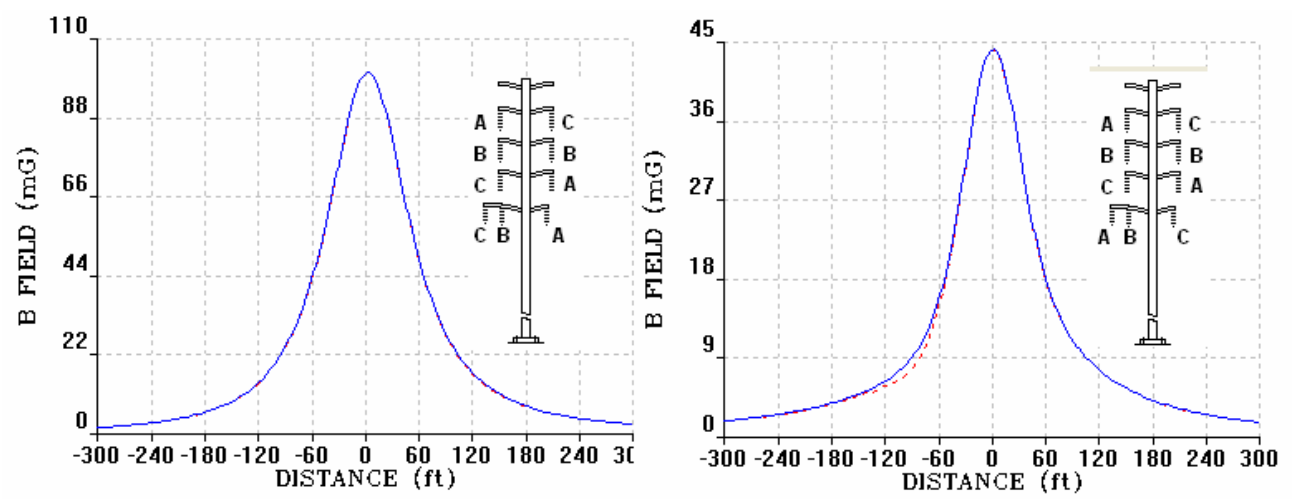
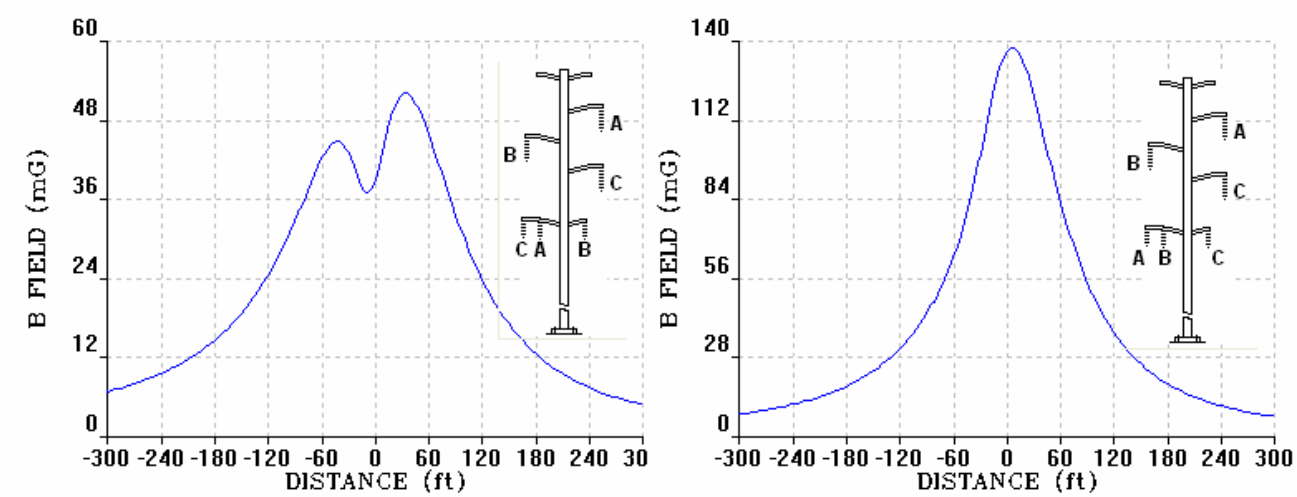


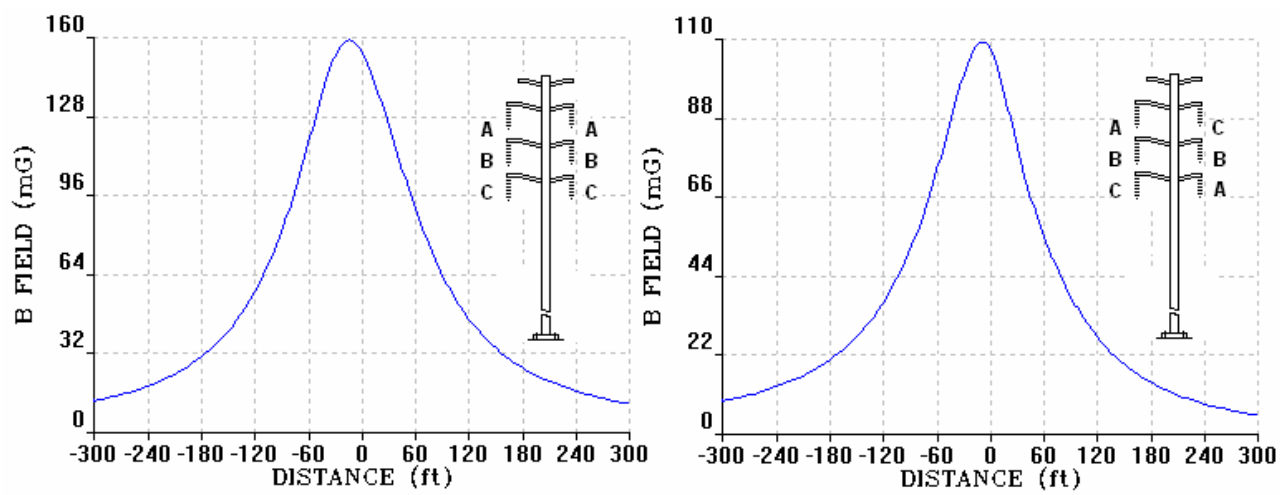
Figure 3.11-14 shows a reduction of the magnetic field by approximately 3 times when comparing the configuration ABC-CAB with the arrangement ABC-ABC of the 345 KV triangular structures with 115 KV circuit underbuild.

Figure 3.11-14.
Phase Arrangement Comparison for 345 KV Line with 115 KV Underbuild



An approximate 45% reduction of the magnetic field can be achieved when the vertical phasing ABC-ABC is changed to the vertical arrangement ABC-CBA on the 345 KV line with parallel 115 kV line, as shown in Figure 3.11-15

Figure 3.11-15.
Phase Arrangement Comparison for 345 KV Line with Parallel 115 KV



3.12 TRANSPORTATION AND TRAFFIC

3.12.1 Level of Service

3.12.1.1 West Range Site

3.12.1.1.1 Roads

The proposed access roadway (Access Road 1) that will serve the West Range Site will be a new two-lane roadway with shoulders, 17,000 feet in length, beginning at a new access point on State Highway 169, approximately 7,000 feet east of County Highway 7. The new road will cross underneath the adjacent rail line and proceed north, then curve west between Big Diamond and Dunning Lakes before terminating as it connects with County Highway 7, just southwest of the plant site. The plant would be served by a 4,900 foot paved driveway (Access Road 2), about 32 feet wide, connecting the plant site with Access Road 1. This proposed access roadway is shown in Figure 1.5-7.

Access to the HVTL, gas, and other utility corridors will come from various existing roadways at the points that they are crossed by the proposed utilities wherever possible to avoid impacts. As design and construction progress, there could be a need for temporary access roads to be constructed to facilitate utility construction.

One benefit of 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 State Highway 169. It will also reduce traffic volumes on the southerly portion of County Highway 7, an area that has had problems with slope stability. In addition, the new roadway will have a better intersection with State Highway 169 than existing County Highway 7, including longer sight distance and flatter grades.

Access Roads will have wetland impacts, and also pass near several residences in the area between Big Diamond and Dunning Lakes. Noise and wetland impacts of the roadway are discussed in more detail in Section 3.10 and 3.6 of this document.

3.12.1.1.2 Railroad

The proposed railroad will be a single track using a 100 wide permanent ROW. Railroad tracks, especially tracks designed for unit coal trains, have limited parameters for curvature and grades. See Table 1-47. These criteria make it difficult to avoid impacts to the environment. These impacts are discussed in more detail throughout Section 3.

The grading impacts, based on cut and fill sections will vary from 60 feet to 760 feet wide. Except for the track bed, the disturbed areas will be revegetated.

3.12.1.2 East Range Site

3.12.1.2.1 Roads

The proposed access roadway that will serve the East Range Site will be a new two-lane loop-type roadway, about 10,000 feet in length, with two access points off of CR 666, just east of the plant (Access Road 1). Other roadway improvements that are proposed include a 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 County Roads 110 and 666. The proposed roadway system is shown in Figure 1.5-10.

Access to the HVTL, gas, and other utility corridors will come from various existing roadways at the points that they are crossed by the proposed utilities wherever possible to avoid impacts. As design and construction progress, there could be a need for temporary access roads to be constructed to facilitate utility construction.

The reconstruction of Hampshire Drive, and the mill and overlay of County Road 666 will be performed in areas that have been previously disturbed, and will therefore have minimal environmental impacts. The proposed access roadway (Access Road 1) will impact several wetlands. Noise and wetland impacts of the roadway system are discussed in more detail in Sections 3.10.3.2 and 3.6.2.9, of this document, respectively.

3.12.1.2.2 Railroad

The proposed railroad will be a single track using a 100 feet wide permanent ROW. Railroad tracks, especially tracks designed for unit coal trains have limited parameters for curvature and grades. See Table 1-12-9. Adherence to the design criteria does not allow the Proponent to adjust the alignment to avoid environmental impacts. The environmental impacts resulting from this intolerance of change are discussed throughout Section 3 of this ES.

The grading impacts, based on cut and fill sections will vary from 60 feet to 760 feet wide. Except for the track bed, the disturbed areas will be revegetated.

3.12.2 Traffic Projections

3.12.2.1 West Range Site

3.12.2.1.1 Roads

A traffic volume forecast was completed for the West Range site. This forecast shows existing traffic volumes, as well as forecast volumes during construction (2008) and 20 years after construction (2028). Existing traffic volumes are discussed in Section 2.

The 2008 (Build) volumes were developed by applying a historical 1.5% annual growth rate to the existing traffic volumes to expand them out to year 2008 (2008 No-Build), and then adding the construction related traffic volumes.

The 2028 (Build) volumes added the West Range Project's plant related traffic to the 2028 No-Build scenario traffic volume forecast. Again, the 2028 No-Build volumes were developed by applying the same 1.5% annual growth rate to the existing volumes.

The traffic forecasts presented in Table 3.12-1 show that volumes on State Highway 169 and County Highway 7 (north of the plant site) will have modest traffic increases that are not significantly different from the forecasted No-Build scenarios. The proposed access roadway, between State Highway 169 and the plant site, will see its highest volumes (around 3,100 vehicles per day) during peak construction periods (expected in 2008), then will drop off after construction with an estimated 1,550 vehicles per day in 2028. The section of existing County Highway 7 that lies between the plant site and the existing intersection with State Highway 169 will see its volume drop by more than 50% as many vehicles will choose to use the proposed access roadway instead. The forecast traffic volumes are shown below.

Table 3.12-1

FORECAST TRAFFIC VOLUMES ON TH 169 & CSAH 7:
WITH EXCELSIOR/MESABA ENERGY WEST RANGE PROJECT -- 2008 & 2028

	TH 169		CSAH 7		New CSAH 7	
Year	West of CSAH 7	East of CSAH 7	North of New CSAH 7	South of New CSAH 7	West of Excelsior/Mesaba Energy Plant Entrance	East of Excelsior/Mesaba Energy Plant Entrance
2000	5,800	5,500	1,100	1,100	0	0
2002	6,500	5,800	N/A	N/A	0	0
2004	7,200	5,700	N/A	N/A	0	0
Forecast 2008 Build	8,900	7,100	1,500	470	1,250	3,100
Forecast 2028 Build	10,500	8,400	1,700	460	1,250	1,550

None of the roadway segments show forecasted volumes that could not be comfortably handled by the type of roadway proposed (or currently in place, as the case may be).

3.12.2.1.2 Railroad

See Sections 1.7.1.1 and 1.12.3.1.2.

3.12.2.2 East Range Site

3.12.2.2.1 Roads

A traffic volume forecast represented in Table 3.12-2 was completed for the East Range site. This forecast shows existing traffic volumes, as well as forecast volumes during construction (2008) and 20 years after construction (2028).

Historic data showed growth rates on the existing system ranging from 1.0% per year to 3.4% per year. The 2008 (Build) volumes were developed by applying these historical growth rates to

the existing traffic volumes to expand them out to year 2008 (2008 No-Build), and then adding the construction related traffic volumes.

The 2028 (Build) volumes added the East Range Project's plant related traffic to the 2028 No-Build scenario traffic volume forecast. Again, the 2028 No-Build volumes were developed by applying the same historic annual growth rates to the existing volumes. The forecast volumes are shown below in Table 3.12-2.

Table 3.12-2

FORECAST TRAFFIC VOLUMES
WITH EXCELSIOR/MESABA ENERGY EAST RANGE PROJECT -- 2008 & 2028

	CSAH 110		County Road 666		Hampshire Road
Year	West of County Road 666	East of Hampshire Road	North of CSAH 110	East of Hampshire Road	Between CSAH 110 and County Road 666
1995	4,400	520	N/A	N/A	N/A
1999	2,950	650	930	830	N/A
2003	2,950	710	750	520	N/A
Forecast 2008 Build	**4,375**	**2,125**	**2,175**	**3,150**	**1,575**
Forecast 2028 Build	**3,925**	**1,525**	**1,625**	**1,400**	**675**

Note: N/A = Traffic volume data not available.

The two primary roadways in the area of the East Range Site are CR 666 and 110. The volume of traffic on CR 666 will peak during plant construction at about 3,150 trips per day and will be lower thereafter. The volume on CR 110 will also peak during construction at 4,375 trips per day to the west and 2,125 to the east. These levels of traffic on rural two-lane highways should not cause travel delays.

The only problem area identified was the intersection of County Highways 666 and 110 in Hoyt Lakes, which was predicted to have some back-ups at peak hours, such as shift changes, during the peak construction periods. This problem was eliminated by reconstructing Hampshire Drive and encouraging traffic to/from the east to use this as a cut-through route between CR 666 and 110.

None of the roadway segments show forecasted volumes that could not be comfortably handled by the type of roadway proposed (or currently in place, as the case may be).

3.12.2.2.2 Railroad

See Sections 1.7.1.1 and 1.12.3.1.3.

3.12.3 Mitigation Measures

3.12.3.1 West Range Site

Alignments for the proposed access roadways were selected that minimized impacts to lakes, wetlands and other natural resources. Mitigation and replacement of wetlands are discussed in Section 3.6.5. Where possible, existing roads were used. The alignments were also routed to avoid residences to minimize noise and property impacts.

There is a potential for damage to incur to existing roads utilized during construction. Damage caused to existing roads due to construction activities will be restored to their prior condition.

3.12.3.2 East Range Site

Alignments for the proposed access roadways were selected that minimized impacts to lakes, wetlands and other natural resources. Existing roads, such as CR 666 were used where possible to avoid impacts. Mitigation and replacement of wetlands are discussed in Section 3.6.4.

There is a potential for damage to incur to existing roads utilized during construction. Damage caused to existing roads due to construction activities will be restored to their prior condition.

3.13 HISTORIC AND CULTURAL RESOURCES

Section 106 of the National Historic Preservation Act requires consideration of the effects of an undertaking on historic, archaeological and cultural properties determined eligible for listing on the National Register of Historic Places ("NRHP"). Consultation between the federal agencies, the State Historic Preservation Office ("SHPO") and federally-recognized tribes is required. A review of historic, archaeological and cultural resources was conducted of the proposed project to determine if these resources exist, or have the potential to exist, and if they may be impacted. The following sections describe the cultural, historical and archaeological resource studies performed for the Mesaba Energy Project and outlines additional studies that will be required.

3.13.1 State Agencies

The Mesaba Energy Project is or will be receiving United States Department of Energy funding and loan guarantees, United States Army Corps of Engineers permits, and state funding and permits. Because the project will be receiving these funds, it must comply with Section 106 of the National Historic Preservation Act of 1966, as amended, and with other applicable federal and state mandates. Consultation with the applicable federal agencies, the Minnesota SHPO and representatives of federally recognized Native American tribes ("Tribes") is required.

Reports generated from investigations performed at the West Range Site, East Range Site and associated utilities will be forwarded to the SHPO and other appropriate agencies for review and comment. Construction will not commence until appropriate consultation, identification, and treatment of historic, archaeological and cultural resources has occurred.

3.13.2 Archaeological Resources

3.13.2.1 West Range Site and Associated Corridors

A Phase I archaeological evaluation will be required to determine if NRHP eligible archaeological sites are present within the project's area of potential effect ("APE"). The 106 Group recommends that there be an adjustment to the sensitivity model and testing strategy outlined in Section 2.14.1. The Minnesota SHPO and appropriate federal agencies and tribes will be consulted to address the proposed testing strategy area prior to any additional testing. Reports outlining the results of the investigation will be forwarded to the SHPO and other appropriate agencies for review and comment. Construction will not commence until appropriate consultation, identification, and treatment of historic, archaeological and cultural resources has occurred.

3.13.2.2 East Range Site and Associated Corridors

From September 22 to 23, 2005, the 106 Group conducted a Cultural Resource Assessment of the East Range Site. There are no known NRHP listed or eligible archaeological sites within the East Range Site. Based on the low potential of much of the survey areas for intact archaeological resources, combined with the absence of archaeological material there, the 106 Group does not recommend additional archaeological work at the East Range Site.

A Phase I archaeological survey has not been conducted along the corridors associated with the East Range site. A Phase I archaeological survey and evaluation will be required to determine the level of potential impacts to NRHP eligible archaeological sites within the APE.

3.13.3 Architectural Resources

3.13.3.1 West Range Site and Associated Corridors

The 106 Group recommends a Phase I architectural history investigation for properties over 45 years of age within the recommended APE to determine their eligibility for listing on the NRHP. The potential impacts to architectural resources will be assessed after this investigation is completed.

3.13.3.2 East Range Site and Associated Corridors

During the cultural resources assessment for the East Range Site, two architectural history resources were identified within the East Range plant site, the potentially eligible Two Harbors to Tower Junction Segment of the DM&IR and the NRHP-listed E. J. Longyear First Diamond Drill Site (Longyear Site, SL-HLC-001). Further evaluation of the Two Harbors to Tower Junction is needed to determine its eligibility for listing on the NRHP and a determination of effects of the proposed project on the Longyear Site, and railroad line, if this site is selected for construction.

3.13.4 Native American Tribal and Religious Practices

The cultural assessments of both the East and West Range Sites and associated corridors do not address traditional Native American Tribal and Religious Practices. As part of the cultural resources identification and evaluation process, further assistance with the federal agencies in addressing Native American tribal and religious practices is necessary. This will include inviting Native American tribes to consult on the Mesaba Energy Project and exploring whether there are traditional cultural properties within the project area. All federally-recognized tribes with historic or current affiliation to Minnesota and the project area have been invited to participate in the consultation process, and be signatories to a Programmatic Agreement. Initial consultation letters were sent in September 2005 from the Department of Energy to all federally recognized tribes who have expressed a cultural and historical interest in Minnesota.

3.13.5 Area of Potential Effect

The APE for archaeological resources is defined as all areas of potential effects from aspects of direct, physical impacts through the construction of the IGCC Power Station itself, as well as its Associated Facilities and transportation systems (road and railroads), HVTL, and natural gas pipelines. Often the actual pipeline, railroad, or transmission footpad does not encompass the true potentially impacted area. In most cases, the equipment and activity involved with the construction is the greatest impact. The method and equipment used in the construction of the IGCC Power Station and its Associated Facilities are very different; likewise, the ROW used to define the individual APEs for each will differ.

Existing railroad, pipeline, and transmission corridors are defined by the proposed centerline and ROW. These corridors include room for equipment access and activity, possible extra workspaces, access roads, staging areas, borrow areas, realignments, and centerline errors. At this time, it is unclear how close the proposed centerlines will be placed from the existing railroad, pipeline, and transmission lines. Since these areas were not originally surveyed, upon construction it is proposed that all undisturbed areas in high potential areas be surveyed.

Proposed new construction for railroad, pipelines, and transmission corridors are defined by the proposed centerlines and ROWs. As with the existing corridors, new construction corridors include additional room for equipment access and activity, possible extra workspaces, access roads, staging areas, borrow areas, and realignments. These areas will be surveyed.

If the East Range is the preferred alternative then an APE study will be needed for the plant and associated corridors to identify specific areas where historic architectural resources may be affected by the project.

3.13.6 Mitigation Measures

To date, the level of potential impact to NRHP registered or eligible archaeological sites, resources or architectural resources has not been determined. Reports outlining these investigations will be provided to SHPO and other appropriate agencies for review and comment. Construction will not commence until appropriate consultation, identification, and treatment of historic, archaeological and cultural resources has occurred.

3.14 SOCIOECONOMICS

Summarized in this Section are the likely social and economic impacts of the Mesaba Project, for both the entire Arrowhead Region and for the local areas near the West Range and East Range Sites. Section 2 provided the baseline socioeconomic data for these areas. This socioeconomic impact analysis is divided into the following subsections:

3.14.1 Temporary and Permanent Employment
3.14.2 Availability of Labor
3.14.3 Economic Benefits
3.14.4 Sales and Property Tax Revenues
3.14.5 Housing Availability and Real Estate Values

3.14.1 Regional Study Area

The proposed Mesaba Project represents a large new investment in northern Minnesota; therefore, not only are the potential impacts assessed on areas near the proposed sites, but also on the entire Arrowhead Region. As described in more detail in Section 2.14, the Proponent selected the regional study area to be the Minnesota Department of Employment and Economic Development's ("DEED") Arrowhead Economic Development Region. This area consists of the following Minnesota counties:

- Aitkin
- Carlton
- Cook
- Itasca
- Koochiching
- Lake
- St. Louis

The West Range and East Range Sites were assessed for local impacts and impacts on surrounding areas: (1) near the City of Taconite, Itasca County, (West Range Site) and (2) near the City of Hoyt Lakes, St. Louis County (East Range Site).

3.14.2 Temporary and Permanent Workers

The University of Minnesota Duluth's Bureau of Business and Economics Research ("BBER") estimated the regional and state economic and employment impacts of the first unit of the Mesaba Project (BBER, 2005). The results of this analysis are summarized below. The temporary and permanent employment data that were used in the BBER study were provided by the Proponent. These employment estimates are summarized in Table 3.14-1, below.

Table 3.14-1
Estimated Employment.

	Temporary Construction Jobs	Permanent Operating Jobs
2007	1,286	
2008	2,708	
2009	2,728	
2010	2,985	11
2011	574	96
Typical Year		107

As shown in Table 3.14-1, total direct construction jobs are expected to peak in the year 2010 at 2,985 jobs. The majority of these jobs are skilled trades. Note that these data do not distinguish between full and part-time jobs, so all job numbers are reported as total jobs—not full-time equivalents.

3.14.3 Availability of Labor

For this major construction project, labor will be drawn from throughout the Arrowhead Region and beyond. DEED workforce data for the Arrowhead Region indicates that in 2005, the regional labor force was 167,000, with 158,000 currently employed. DEED estimates that there is, in general, an ample supply of labor in the area, but the aging population threatens to create a labor shortage in some industries by 2015 (DEED, 2005). The extent to which temporary and permanent jobs are filled by local residents is in part driven by the local labor market characteristics, the availability of unemployed or underemployed skilled construction workers, and prevailing wages. As described in Section 2.14.5, 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 from the taconite, other mining products, and forestry continues to increase. Some researchers believe 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 even widen if employment in the manufacturing, iron mining, and forest products industries in the Northeast region again declines (BBER, 2005).

Given the labor market characteristics in northeast Minnesota, the Mesaba Project likely would not need to compete with other local businesses to attract skilled labor for the permanent jobs, and thus would be able to hire operational and maintenance staff at prevailing wages. Under these circumstances, the Mesaba Project will have a positive impact on reducing the unemployment rate and minimal impact on wages in the Northeast region. Overall, given the size of the labor force in the Arrowhead region relative to the number of permanent jobs

expected to be created, the absolute magnitude of the effect on labor availability is not expected to be significant.

3.14.4 Economic Benefits

BBER estimated the regional and state economic and employment impacts of the Mesaba Project using an economic impact software model called IMPLAN 2.0 (BBER, 2005). BBER modified the inputs and assumptions as necessary for the Arrowhead Region and the State of Minnesota. Detailed modeling assumptions, algorithms, and results are available in the BBER report. In summary, using construction and operating cost and employment estimates provided by the Proponent, BBER used the IMPLAN 2.0 model to predict the secondary (indirect and induced) economic and job multiplier benefits of the Mesaba Project, for both the Arrowhead Region and the State of Minnesota. The economic development benefits are similar for either the West Range or East Range Site.

3.14.4.1 Model Inputs

Table 3.14-2 summarizes the major construction cost assumptions that BBER used as inputs to the IMPLAN Model to estimate the additional employment and economic impacts generated by the project during construction.

Table 3.14-2
Construction Cost Inputs and Jobs for IMPLAN Model, in 1994 Dollars

	Capital Costs	Labor, Rent, Interest, Profits	Total Expenditure	Total Construction Jobs
2007	$ 60,585,936	$ 69,404,248	$ 129,990,184	1,286
2008	127,629,088	146,205,568	273,834,656	2,708
2009	128,577,236	147,291,520	275,868,756	2,728
2010	140,670,992	161,145,744	301,816,736	2,985
2011	27,029,352	30,963,492	57,992,844	574
Total	$ 484,492,424	$ 555,010,572	$ 1,039,502,996	N/A

Note: Jobs are full and part time.

As shown in Table 3.14-2, based on the information provided in early 2005, BBER assumed a total project construction cost of $1.039 billion, consisting of $484.5 million capital costs and $555 million in labor and other costs. Assumed construction costs are shown for each year of the expected five-year construction period. Total direct construction jobs are expected to peak in the year 2010 at 2,985 jobs. Note again that the IMPLAN 2.0 model does not distinguish between full and part-time jobs, so all job numbers are reported as total jobs—not full-time equivalents.

In Table 3.14-3, below, the operating cost assumptions used in the IMPLAN 2.0 model, for the start up years of 2010 and 2011, and for a typical operation year, are provided.

Table 3.14-3
Operating Cost and Job Inputs Used for
IMPLAN 2.0 model, in 2004 Dollars

	Operating Cost	Wages, Rents, Interest, and Profit	Total Expenditure	Total Operating Jobs
2010	$8,883,032	$21,121,438	$30,004,470	11
2011	79,979,536	190,169,680	270,149,216	96
Typical Year	88,866,144	211,299,648	300,165,792	107

Note: Jobs are full and part time.

As shown in Table 3.14-3, BBER assumed total project operating expenditures during a typical year to be about $300 million dollars, consisting of $211 million per year in wages, rents, interest and profits, and about $88.8 million per year in fuel, material, and other operating costs. BBER assumed 107 total new jobs (full and part-time) would be directly created to operate the plant.

3.14.4.2 Model Results

In order to understand the IMPLAN model results, the following three terms must be defined: (1) Direct Effects, (2) Indirect Effects, and (3) Induced Effects.

"**Direct Effect**" means the direct expenditures or jobs created for the Mesaba Project. The Proponent provided this information to BBER.

"**Indirect Effect**" means jobs created and spending generated by local companies to provide goods and services to support the project; these jobs may be more likely than construction jobs to come from local area. BBER estimated these data using the IMPLAN 2.0 model.

"Induced Effects" means expenditures and jobs due to increased consumer spending created by increased local and regional disposable income. BBER estimated these data using the IMPLAN 2.0 model.

Table 3.14-4, below, shows the BBER modeled economic output created by the Mesaba project in the Arrowhead Region for each year of the five-year construction period. Table 3.14-5 shows the BBER modeled number of jobs created. Both the temporary construction jobs and the permanent operating jobs are likely to result in significant induced effects to the local economies near the new facility due to workers' spending in the region. Some of these induced impacts would be long term, resulting in significant benefits to the local economy.

3.14.4.3 Construction Period Economic and Employment

Table 3.14-4 shows the IMPLAN 2.0 modeled economic activity expected in the Arrowhead Region during the five-year construction period as a result of the Mesaba Project.

Table 3.14-4
Construction Period Economic and Job Impacts for Arrowhead Region, from IMPLAN Model, in 2004 Dollars

	Direct	Indirect	Induced	Total
Capital Cost	$ 484,492,424	$ 84,512,618	$ 133,386,670	$ 702,391,740
Value Added	$ 555,010,572	$ 94,839,722	$ 220,531,166	$ 870,381,467
Total Output	$ 1,039,502,996	$ 179,352,340	$ 353,917,836	$ 1,572,773,207

These data show that based on estimated direct construction costs of about $1.04 billion, BBER calculates that during construction the Mesaba Project will generate about $179 million in indirect economic activity and $354 million in induced economic activity in the Arrowhead Region, for a total construction period output of about $1.57 billion. This results in a construction period regional output multiplier of about 1.5. (That is, $1.57 billion in total estimated regional output divided by $1.04 million in construction costs.) This construction period economic multiplier remains valid at higher construction costs. That is, if estimated construction costs increase, the modeled regional and state economic activity due to construction will increase proportionately, as well.

The IMPLAN 2.0 modeling results for jobs created in the region during project construction are shown below in Table 3.14-5. The IMPLAN model estimates that in addition to 2,985 jobs required directly in the peak construction year of 2010, an additional 1,776 jobs would be indirectly created or induced in the region, for a total of 4,761 temporary construction jobs for peak year of 2010.

Table 3.14-5
Construction Period Jobs Created in Arrowhead Region, in Total Jobs, Both Full-Time and Part-Time, Based on IMPLAN 2.0 Modeling

	Direct	Indirect	Induced	Total
2007	1,286	217	548	2,051
2008	2,708	457	1,155	4,320
2009	2,728	460	1,163	4,352
2010	2,985	503	1,273	4,761
2011	574	97	245	615

Note: Jobs are counted as full and part-time employment

A breakdown of the types of expected construction period jobs in both the Arrowhead Region and the state is provided in Table 3.14-6 below. In the peak year of 2010, in addition to 2,985 direct construction jobs, 503 new indirect jobs are expected to be created in the region to provide goods and services to the project itself, distributed across a number of industries, including architectural and engineering services, wholesale trade, truck transportation, rental and maintenance of heavy machinery, food and beverage services, and insurance and real estate industries. In addition, another 1,273 new induced jobs are modeled to be created due to increased consumer spending in the region, in industries such as wholesale trade, food and beverage services, general merchandise stores, building materials, real estate and healthcare. Overall, the project was modeled to result in an estimated 4,761 jobs in the region in the peak construction year of 2010.

Table 3.14-6.
Mesaba Employment Impacts from Construction,
Arrowhead Region and Minnesota, Peak Construction Year 2010, by Industry Sector

Source: IMPLAN

Arrowhead	***Jobs***
Construction	3,079.0
Retail Trade	381.7
Health & Social Services	269.6
Accommodation & Food Services	206.5
Professional- Scientific & Tech Services	179.7
Other Services	151.7
Administrative & Waste Services	79.1
Finance & Insurance	68.0
Wholesale Trade	60.5
Manufacturing	58.1
Arts- Entertainment & Recreation	45.0
Transportation & Warehousing	40.7
Real Estate & Rental	40.6
Educational Services	34.4
Information	27.3
Government	15.9
Agriculture, Forestry, Fish & Hunting	9.1
Management of Companies	7.1
Utilities	6.9

Minnesota	***Jobs***
Construction	3,087.0
Retail Trade	385.9
Health & Social Services	285.4
Accommodation & Food Services	209.9
Professional- Scientific & Tech Services	205.0
Other Services	191.0
Administrative & Waste Services	153.5
Finance & Insurance	99.9
Wholesale Trade	90.2
Manufacturing	104.3
Arts- Entertainment & Recreation	56.0
Transportation & Warehousing	64.9
Real Estate & Rental	76.7
Educational Services	50.0
Information	28.7
Government	9.7
Agriculture, Forestry, Fish & Hunting	17.6
Management of Companies	13.8
Utilities	7.2

3.14.4.4 Operating Period Economic and Employment Impacts

Although the economic and job benefits of project construction are considerable, they will be temporary—extending through about five years, with peak impacts concentrated during a three-year period. (Again, this assumes the construction and economic impact of only the first unit of the Mesaba Energy Project.) Operating benefits and jobs, on the other hand, will last the entire life of the plant. Operating period economic activity impacts are shown first (Table 3.14-7) followed by the estimate of jobs created (Table 3.14-8).

Table 3.14-7
Total Economic Impacts From IMPLAN Model for Typical Year, Economic Output in 2004 Dollars

	Direct	Indirect	Induced	Total
Operating Costs (raw materials, fuel, other)	$ 88,866,144	$ 12,010,121	$ 16,298,309	$ 117,174,567
Value-Added	211,299,648	11,325,331	26,968,493	249,593,489
Total Output	300,165,792	23,335,452	43,266,802	366,768,056

As shown in Table 3.14-7, based on direct annual operating expenditures of about $300 million per year, BBER estimates that the Mesaba Project will typically generate an additional $66 million in indirect economic activity ($23 million) and induced spending ($43 million) in the Arrowhead Region. Therefore, the operation period regional multiplier is about 1.2. As described in detail in the BBER Report, the statewide economic multiplier is slightly higher, about 1.28.

Table 3.14-8 summarizes the project's estimated impact on job creation in the Arrowhead Region.

Table 3.14-8
Operating Period Jobs Created by Project, From IMPLAN Model, Based on 107 Direct Part-Time and Full-Time Jobs at the Plant

	Direct	Indirect	Induced	Total
Typical Year	107	157	134	398

Table 3.14-8 shows that the Proponent expects to need about 107 full and part-time employees to operate the first unit of the project. In addition to these direct jobs, the IMPLAN model predicts that the Mesaba Project will indirectly create an additional 157 permanent jobs across a number of industries, including architectural and engineering services, wholesale trade, truck transportation, rental and maintenance of heavy machinery, food and beverage services, and insurance and real estate industries. Also, the IMPLAN 2.0 model estimates the project will

generate an additional 134 permanent jobs because of induced impacts from increased consumer spending in local industries such as wholesale trade, food and beverage services, general merchandise stores, building materials, real estate and healthcare industries, for a total regional increase of 398 full and part-time jobs in a typical operating year. As described in the BBER Report, statewide employment estimates are slightly higher than for the region alone. A breakdown of the types of expected permanent jobs created in the region due to plant operation is provided below in Table 3.14-9.

Table 3.14-9.
Mesaba Energy, Employment Impacts from Operations,
Arrowhead Region, Typical Year, by Industry Sector

Source: IMPLAN	**Projected Employment**			
IMPLAN Sector	***Direct***	***Indirect***	***Induced***	***Total***
Utilities	**107.0**	**0.1**	**0.5**	**107.6**
Other Services	0.0	38.4	13.4	51.7
Accommodation & Food Services	0.0	17.9	20.7	38.6
Retail Trade	0.0	1.1	32.3	33.5
Transportation & Warehousing	0.0	27.4	2.9	30.4
Health & Social Services	0.0	0.0	28.4	28.4
Professional- Scientific & Tech Services	0.0	22.6	4.6	27.2
Construction	0.0	16.5	0.8	17.3
Administrative & Waste Services	0.0	10.1	3.6	13.7
Finance & Insurance	0.0	4.9	5.3	10.2
Wholesale Trade	0.0	4.2	3.8	8.0
Information	0.0	4.2	2.0	6.3
Educational Services	0.0	2.1	3.6	5.7
Real Estate & Rental	0.0	2.4	3.3	5.7
Manufacturing	0.0	3.3	1.9	5.1
Arts- Entertainment & Recreation	0.0	0.6	4.4	5.0
Government	0.0	0.8	1.3	2.1
Agriculture, Forestry, Fish & Hunting	0.0	0.0	0.8	0.8
Management of Companies	0.0	0.3	0.4	0.7
Total	**107.0**	**156.9**	**134.2**	**398.1**

3.14.4.5 Benefits of Reducing Unemployment

If construction workers needed for the Mesaba Project come from outside Minnesota, a portion of the socioeconomic benefits will accrue to states where these workers hold permanent residences. Typically, such workers will work in Minnesota, but reside in other neighboring states. Although there are 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. According to an article published in the Union Advocate, about 80 percent of labor used by Tenaska Inc. to build a gas-fired plant in Southwest Minnesota came from Colorado, Wyoming, Texas, and Mississippi. In this case, given the higher long-term unemployment rates in the Arrowhead Region, a new IGCC plant is likely to provide significant employment to local residents.

Labor economists argue that high levels of unemployment are costly not only to the individuals directly affected but also to regional and national economies. Avoiding the costs of unemployment thus leads to both private benefits (i.e., benefits to individuals directly affected) as well as social benefits (i.e., benefits to the region as a whole). Some of the potential benefits from reducing unemployment discussed in the economic literature are:

- Increased productivity
- Increased individual income
- Reduced poverty
- Reduced criminal activity / policing costs
- Reduced costs of mental and physical health services
- Reduced costs of support services
- Improved life opportunities
- Reduced benefits payments
- Increased tax revenue
- Improved fiscal position

A decrease in unemployment means an increase in worker productivity that leads to an increase in individual incomes. These in turn lead to reductions in poverty and unemployment benefits. Unemployment can also breed higher crime rates that require more public spending in law enforcement activities, social benefits, and state-sponsored health and other support costs. Researchers have found evidence that unemployment negatively affects physical and psychological well-being (e.g., increased alienation, low self esteem, and depression). Such conditions may discourage workers from actively searching for work, leading to higher poverty rates. These, along with the added disadvantage of lower tax revenues, have a negative impact on state and Federal fiscal positions. Moreover, a reduction in unemployment could potentially lead to reducing the high poverty rate in St. Louis County, which currently is about three times as high as the statewide rate.

Although the region is currently experiencing a boom due to higher iron ore demand from China, some experts in the area believe that this is a transitory effect. Long-term trends in unemployment in St. Louis and Itasca Counties indicate that there is greater potential for socioeconomic benefits for the Arrowhead Region compared to other areas of the State of

Minnesota. Thus, overall it seems prudent to invest in a large power plant in the Arrowhead Region because of its potential to diversify and enhance regional economic growth.

3.14.5 Housing Availability and Real Estate Value

According to 2000 census data, there are a total of about 35,300 vacant housing units in the Arrowhead Region. Of these, 27,600 (78%) are for seasonal, recreational, or occasional use. Thus, approximately 7,700 year-round housing units are potentially available for temporary or permanent housing during the construction period and after. Although a detailed assessment of the location of these units relative to the two sites under consideration has not been completed, given the new housing development in the Hoyt Lakes area (Minnesota Power lease property, for example), and the proximity of other significant population centers to both sites, there is adequate housing available for a temporary influx of workers. Long-term, housing for the 100 direct new employees and their families, as well as for other indirect or induced employees in the area will be available within commuting distance of either Taconite or Hoyt Lakes.

Regarding real estate impacts, the median housing value of homes in Taconite, near the West Range Site, and in Hoyt Lakes, near the East Range Site, is about $40,000 (2000 Census). Lakefront property in the area, however, has a considerably higher property value due to the demand for seasonal and recreational housing in the area. The homes located near the West Range Site may be reduced in value because of the proximity of the rail operations and view of the new plant itself. However, the influx of construction and operation jobs, and the associated economic benefits of the project will, in general, create housing demand in the area and increase income. This increased housing demand and income in turn will increase real estate values in the area. There are few, if any, homes located near enough the East Range Site to be negatively affected by the project. As in Taconite, in Hoyt Lakes the influx of temporary and permanent workers for the facility will increase housing demand and property values.

3.14.6 Community Services

3.14.6.1 Impacts on Emergency Services

The existing emergency, fire, and police services are described above in Section 2.15. For either the City of Taconite or Hoyt Lakes, a new large-scale electric generating plant, using high-temperature and high-pressure steam and flammable gas, presents a fire and explosion risk. In addition, the storage and use of large quantities of Powder River Basin western coal presents potential fire and other hazards. Temporary and permanent population increases in the area could also strain local government services.

However, based on conversations with the city administrators at the City of Taconite and Hoyt Lakes, the proposed project would not strain the ability of either municipality to meet emergency service obligations.

3.14.6.1.1 City of Taconite

In the case of the City of Taconite, the current volunteer fire department will likely have to be expanded from the current 14 up to perhaps a staff of 20, which is about the number of fire and

emergency personal in Grand Rapids and Cohasset. The Cohasset fire and emergency response team of 21 has served the Minnesota Power Clay Boswell plant successfully for over 25 years, with a response requirement of three or four visits a year. Also, as at the existing coal-fired power plant at Boswell, the City of Taconite expects the IGCC Power Station Management to similarly train its own first responders and first aid specialists to respond until local emergency personnel arrives. In a large emergency, Itasca County, Grand Rapids, and Cohasset fire and EMT personnel will respond pursuant to existing mutual aid agreements with the City of Taconite.

3.14.6.1.2 City of Hoyt Lakes

In the case of Hoyt Lakes, many city services were originally constructed to serve a much larger city than now exists. The current population of about 2000 is 40% less than it was in 1980, and far below the 5,000 to 10,000 population expected at one time. The city's wastewater treatment plant, for example, was originally designed for a population of 5,000 to 10,000 people. There is no longer enough population to support a hockey team for the existing ice arena, nor is there any longer an operating local grade school, although the buildings still exist. Currently, the number of EMT and fire calls for the cooperative 25-person regional EMT and fire department is just enough to support the cost of the service (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 needing to increase the number of personnel in the existing cooperative agreement with neighboring communities. In fact, the construction of the Mesaba One project in Hoyt Lakes will not even serve to offset the loss of jobs and population caused by the LTV shutdown in 2001. It is possible that if the Mesaba Project and other projects in the area are constructed, new EMT and fire equipment and personnel will be necessary for Hoyt Lakes, but the increase could easily be supported by the increased local municipal tax revenue generated by the projects.

3.14.7 Mitigation Measures

As described is Section 2, both the City of Taconite and Hoyt Lakes would potentially have to add new voluntary or part-time fire and EMT personal to address the increased emergency risk due to the project as well as the temporary and permanent population increase due to this and other planned projects their areas. These new emergency personnel will be funded out of the additional property taxes generated directly by the projects, as well as the increased property tax assessments from new or increased property values.

3.15 SAFETY AND HEALTH

3.15.1 Operational Occupational Hazards

Operational occupational hazards include potential exposures to hazardous substances, heat, noise, and unhealthy atmospheres. See Section 1.8.10 for a discussion regarding the Health and Safety Policies and Programs to be implemented by the Proponent.

3.16 Environmental Justice

The U.S. Department of Energy defines "environmental justice" as follows:

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

In addition, the CEQ's December 1997 Environmental Justice guidance (CEQ, 1997) provides guidance regarding whether human health effects on minority populations are disproportionately high and adverse, and requires agencies to consider the following three factors to the extent practicable:

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

(b) 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 defined 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

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

3.16.1 Site Specific Evaluation

The largest minority population in the Arrowhead Region is that of American Indians (2.6%). A map of the racial distribution of the region is also discussed in Section 2.14. Depending on which site is selected for the Mesaba Project, the Proponent may have to purchase or otherwise acquire private land. The project may also create new noise and visual impacts on nearby residents despite best efforts to mitigate these impacts. The Proponent therefore evaluated whether the project might have disproportionate impacts on any nearby minority or high poverty areas by evaluating the demographic characteristics of the areas surrounding the proposed project at both the West Range, and East Range Sites, as well as the areas along the potential transmission line routes. Demographic information used for this study was obtained from the 2000 U.S. Census and the Minnesota Demographers Office. In general, as described in Section 2.14, the areas near the two sites currently under consideration are racially homogenous (less than 3% minority), as is the Arrowhead Region as a whole.

3.16.2 West Range Site

The racial demographics of the census tracts and block groups around the West Range Site and associated transmission routes were examined and compared with the demographics of Itasca County. The minority population in the census tract of the West Range Site is 2.8%, and ranges between 2.0% to 3.6%, depending on census block. The overall minority population for Itasca County is 4.1%.

Therefore, the demographics of the block groups surrounding the site, the City of Taconite, and surrounding area consist of minority population percentages that are slightly less than those found at the county or state levels. Further, the percentage of population that earns above the poverty level is approximately the same in these block groups than the rest of Itasca County and the Arrowhead Region. Based on these data, no significant numbers of minorities or low-income people are represented in the vicinity of the proposed project location, and it is unlikely that the project will create a disproportionate impact on minorities or those below the poverty line.

3.16.3 East Range Site

The racial demographics of the census tracts and block groups around the East Range Site and associated transmission routes near the City of Hoyt Lakes were examined and compared with the demographics of St. Louis County. The minority population in the census tract of the East Range Site is 1.3%, and ranges from 1.0% to 2.0%, depending on census block. The overall minority population for St. Louis County is 4.9%.

Minority population percentages in the area near this site are less than those found at the county or state levels. Further, the percentage of population that earns above the poverty level is approximately the same in these block groups than the rest of St. Louis County and the Arrowhead Region. Based on these data, no significant numbers of minorities or low-income people are represented in the vicinity of the proposed project location, and it is unlikely that the project will have a disproportionate impact on minorities or those below the poverty line.

Overall, the potential for the project to have a disproportionate impact on minority or low-income populations appears to be low, and there are no nearby areas with significant concentrations of minorities or poverty.

3.16.4 American Indian Consumption of Mercury Contaminated Fish

In addition to evaluating site-specific environmental justice issues immediately near the plant sites and associated transmission routes, other potential disproportioned impacts on minority populations were also evaluated. One potential impact that was identified for further evaluation was the potential that mercury emitted from the project might disproportionately affect American Indian populations in the region due to their higher consumption of fish.

The 1994 Federal Executive Order on environmental justice contains the following guidance:

> Federal agencies, whenever practicable and appropriate, shall collect, maintain, and analyze information on the consumption patterns of populations who principally rely on fish and/or wildlife for subsistence. Federal agencies shall communicate to the public the risks of those consumption patterns.
>
> Subsistence consumption of fish and wildlife: Dependence by a minority population, low-income population, Indian tribe or subgroup of such populations on indigenous fish, vegetation and/or wildlife, as the principal portion of their diet.
>
> Differential patterns of subsistence consumption: Differences in rates and/or patterns of subsistence consumption by minority populations, low-income populations, and Indian tribes as compared to rates and patterns of consumption of the general population.
>
> Executive Order No. 12898, 59 Fed. Reg. At 7630 (Section 4-401) (1994).

Mercury contamination of fish in northern Minnesota lakes is well documented, as is the potential health impacts on small children and pregnant women from consuming large amounts of mercury-contaminated fish. Although there are only limited direct data on higher fish consumption rates among Minnesota tribes than in the general public, there is anecdotal evidence. In addition, higher tribal fish consumption rates for American Indians have been documented in other areas of the country (NEJAC, 2002). In any case, American Indians in Minnesota have been cautioned to limit their fish consumption in order to avoid potential health impacts, particularly children and pregnant women. Therefore, even if there is not a documented disproportionate health impact on American Indians due to higher subsistence level fish consumption, mercury-contamination does limit tribal member's ability to safely use fish as part of a traditional subsistence diet.

3.16.5 Mitigation Measures

Mitigation measures include steps to avoid, mitigate, minimize, rectify, reduce, or eliminate the impact associated with a proposed agency action. The proposed Mesaba Project will capture 90% of the mercury in the fuel before it is released to the environment. The total amount of mercury emitted, therefore, will be less than would be emitted by a similarly sized conventional coal-fired power plant. The 90% efficient mercury control technology will serve to minimize the amount of mercury contamination of fish in nearby lakes that is caused by the proposed Mesaba Project. While the project will contribute some mercury to the global mercury pool, the IGCC technology and associated mercury control represents the best mercury control technology available for a coal-fired power plant today. Finally, the successful commercial demonstration of the IGCC technology by the project will accelerate its widespread deployment, resulting in significantly fewer emissions in Minnesota over time from other states and regions.

3.17 Environmental Monitoring

Surface water sampling will be performed on a periodic schedule to establish an understanding of the existing surface water quality of the proposed sources of process water for the facility and local surface water bodies. The purpose of the sampling is to also establish a baseline set of water quality data of the local surface waters potentially used to discharge blowdown water from the facility.

Surface water samples have been and will be collected from the Canisteo mine pit, the Arcturus/Gross Marble/Hill Annex Mine Pit complex, and the Prairie River, and Little Diamond, Big Diamond, and Holman Lakes. Samples will be analyzed by a certified laboratory for organic and inorganic parameters.

Surface water elevations of local lakes and water bodies have been surveyed on a periodic schedule since July 2005. This work is expected to continue to determine how the levels of the lakes and surface water bodies fluctuate seasonally. This information will be particularly useful in evaluating any changes to surface water bodies when process water for the facility is pumped from local surface waters.

The four groundwater monitoring wells installed in the shallow sand and gravel aquifer at the West Range Site will continue to be used for periodically recording groundwater elevations, and can be used for groundwater quality sampling as warranted or deemed necessary. As the facility is constructed one or two of these wells will likely need to be abandoned and properly sealed. When necessary, the wells will be sealed by a licensed well drilling firm in accordance with the Minnesota Well Code (MN Rules Chapter 4725).

The facility will coordinate regular monitoring and recording of static and pumping levels in the public water supply wells for the cities of Bovey, Calumet, Coleraine, Marble, and Taconite. Specifically, facility staff will work with city staff to record this information at least on a quarterly basis until the water levels in these surface water bodies have been lowered to their normal operating levels. This collection of groundwater elevation data will be useful in assessing hydrologic impacts to the local and regional source water aquifers from lowering the surface water levels in the Canisteo and Arcturus/Gross-Marble/Hill Annex mine pits.

3.18 Regulatory Compliance and Permits Requirements

See Table 1.2-1.

MESABA ENERGY PROJECT

ENVIRONMENTAL SUPPLEMENT:

SECTION FOUR

Prepared by

EXCELSIOR ENERGY

June 16, 2006

Barr Engineering Co.
4700 West 77th Street
Minneapolis, MN 55435
(952) 832-2600

URS Corporation
8181 East Tufts Avenue
Denver, Colorado 80237
(303) 694-2770

Short Elliott Hendrickson
3535 Vadnais Center Dr.
St. Paul, MN 55110
(800) 325-2055

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4.0 AGENCY CONTACTS

The following list contains the names, addresses, and contact information for agencies and individuals that were contacted to obtain environmental information.

NAME	TOPIC	PHONE	E-MAIL
Air Quality			
Minnesota Pollution Control Agency			
Sandberg, Rich	Air Permitting	(651) 296-7769	Rich.Sandberg@pca.state.mn.us
Reinertsen, Jenny	Air Permitting	(218) 734-4760	Jenny.Reinertsen@pca.state.mn.us
Smith, Don	Air Permitting	(651) 296-7625	Don.Smith@pca.state.mn.us
Becker, Dennis	Air Dispersion Modeling and AERA	(651) 297-7364	Dennis.Becker@pca.state.mn.us
Nelson, Chris	Air Dispersion Modeling	(651) 296-7750	Christopher.Nelson@pca.state.mn.us
Kessler, Katrina	Water Quality	(651) 296-7376	Katrina.Kessler@pca.state.mn.us
Dymond, Mary	Human Health Risk and AERA	(651) 296-7992	Mary.Dymond@pca.state.mn.us
Ranck, Vanessa	Human Health Risk and AERA		
Monson, Bruce	Mercury and Fish Data	(651) 296-7607	Bruce.Monson@pca.state.mn.us
National Park Service			
Shepard, Don	Air quality in National Parks	(303) 969-2075	Don_Shepherd@nps.gov
Pohlman, David	Air quality in National Parks	(651) 290-3801	David_Pohlman@nps.gov
Notar, John	Air quality in National Parks	(303) 969-2079	John_Notar@nps.gov
Holbeck, Chris	Air quality in Nation Parks (Voyageurs NP)	(218) 283-9107 ext 6148	Chris_Holbeck@nps.gov
Romanski, Mark	Air quality in National Parks (Isle Royale NP)	(906) 487-9080 ext 23	Mark_Romanski@nps.gov
US Forest Service			
Wickman, Trent	Air Quality in Superior National Forest and the BWCA	(218) 626-4372	TWickman@fs.fed.us
OTHER – Contractor to National Park Service and US Forest Service			
Gebhart, Howard	Air quality consultant to NPS and Forest Service	(970) 484-7941	HGebhart@air-resource.com
Cultural Resources			
U.S. Department of Energy			
Hargis, Richard	Programmatic and Agreement & Cultural Resources	(412) 386-6065	Richard.Hargis@netl.doe.gov
Pukanic, George	Programmatic and Agreement & Cultural Resources	(412) 386-6068	George.Pukanic@netl.doe.gov
U.S. Forest Service			
Okstad, Walt	ARPA Permit	(218) 626-4321	Wokstad@fs.fed.us

Office of the State Archaeologist			
Koenen, Bruce	Archaeological License	(612) 725-2729	Bruce.Koenen@state.mn.us
Anfinson, Scott	Archaeological License	(612) 725-2411	Scott.Anfinson@state.mn.us
Environmental			
Minnesota Department of Natural Resources			
Kavanaugh, Chris	Biological Assessment Issues (West Range)	(218) 999-7821	Chris.Kavanaugh@dnr.state.mn.us
U.S. Army Corps. Of Engineers			
Peterson, Tim	Wetland Permitting (West Range)	(218) 834-6630	Timothy.W.Peterson@mvp02.usace.army.mil
U.S. Fish and Wildlife Service			
Burke, Paul	Threatened and Endangered Species on the West Range Site	(612) 725-3548 ext 205	Paul_Burke@fws.gov
Natural Resources			
Minnesota Department of Natural Resources			
Kavanaugh, Chris	Fisheries Concerns and 316B Guidance (West Range)	(218) 999-7821	Chris.Kavanaugh@dnr.state.mn.us
U.S. Department of Agriculture			
Rokus, Mike	Preliminary Soil Survey (East Range)	(218) 749-8343	Mike.Rokus@mn.usda.gov
Kroll, Jeff	Prime Farmland (East Range)	(218) 749-8343	Jeff.Kroll2@mn.usda.gov
Itasca County National Resources Conservation Service			
Oja, Mike	Prime Farmland (West Range)	(218) 326-6595	Mike.Oja@mn.usda.gov
Railroad			
BNSF Railway			
Dinkle, James		(312) 850-5699	James.Dinkle@bnsf.com
Canadian National Railroad			
Stein, Dan		(218) 628-4135	Daniel.Stein@cn.ca
St. Louis County Regional Rail Authority			
Manzoline, Bob		(218) 254-0086	Bob.Manzoline@ironworld.com
Transportation			
Itasca County Highway Department (West Range)			
Christy, Dave	Roadway Alignments, Ownership, Design Standards	(218) 327-2853	Dave.Christy@co.itasca.mn.us
Carter, Tony	Roadway Alignments, Ownership, Design Standards	(218) 327-2853	Tony.Carter@co.itasca.mn.us
Minnesota Department of Transportation			

Larson, Brian	Plans for TH 169, Access Point for New Roadway (West Range)	(218) 723-4960 ext 3322	Brian.Larson@dot.state.mn.us
Erickson, Daniel	Plans for TH 169, Access Point for New Roadway (West Range)	(218) 723-4960 ext 3305	Daniel.Erickson@dot.state.mn.us
Levenson, Mark	Existing Traffic Volumes and Forecasts (West and East Range)	(651) 296-8535	Mark.Levenson@dot.state.mn.us
Water Appropriation/Surface Water			
Minnesota Department of Natural Resources			
Peloquin, Mike		(218) 327-4417	Mike.Peloquin@dnr.state.mn.us
Christman, Howard	Floodplains	(218) 327-4106	Howard.Christman@dnr.state.mn.us
Liebfried, Bob	Canisteo Mine Pit	(218) 327-4232	Bob.Liebfried@dnr.state.mn.us
Japs, Jim		(651) 297-2835	Jim.Japs@dnr.state.mn.us
Adams, John	Hill Annex Complex	(218) 327-4110	John.Adams@dnr.state.mn.us
Railson, Steve	Hill Annex State Park	(218) 247-7215	Steve.Railson@dnr.state.mn.us
Kavanaugh, Chris	Fisheries	(218) 999-7821	Chris.Kavanaugh@dnr.state.mn.us
Maurer, Paul	Hill Annex State Park	(218) 327-4388	
Minnesota Pollution Control Agency			
Dexter, Jim	Construction Stormwater	(218) 529-6253	James.Dexter@pca.state.mn.us
Thomas, John	Industrial Stormwater	(218) 723-4928	John.Thomas@pca.state.mn.us
Estabrooks, Tom		(218) 725-7763	Tom.Estabrooks@pca.state.mn.us
Kessler, Katrina	EPA CWA 316(b)	(651) 296-7376	

MESABA ENERGY PROJECT

ENVIRONMENTAL SUPPLEMENT:

SECTION FIVE

Prepared by

EXCELSIOR ENERGY

June 16, 2006

BARR
Barr Engineering Co.
4700 West 77th Street
Minneapolis, MN 55435
(952) 832-2600

URS
URS Corporation
8181 East Tufts Avenue
Denver, Colorado 80237
(303) 694-2770

SEH
Short Elliott Hendrickson
3535 Vadnais Center Dr.
St. Paul, MN 55110
(800) 325-2055

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