7. WEST RANGE (PREFERRED) SITE ENVIRONMENTAL IMPACTS

Section 2.1 of this Application describes the general locations of both the preferred West Range Site and the alternate East Range Site. Section 2.5 provides a detailed description of the West Range Site. This section describes the potential impacts of Mesaba One and Mesaba Two on the natural environment at the West Range Site, including the impacts of the IGCC Power Station and its Associated Facilities, HVTLs, and natural gas pipelines.

The West Range Preferred and Alternate HVTL Routes are described in Section 2.5.3 and depicted in Figures 2.5-3 through 2.5-12. The routes for the West Range Proposed Natural Gas Pipeline are described in Section 2.5.4 and shown in Figures 2.4-16 through 2.4-20. Routes for the natural gas pipeline are shown in Figures 2.5-13 through 2.5-24.

Environmental impact information for the Alternative Site, the East Range Site, is summarized in Section 8. A more detailed description of the environmental setting for the West Range and East Range Sites is provided in Section 2 of the ES and an assessment of environmental impacts is presented in the ES at Section 3.

7.1 LAND USE IMPACTS

Land use impacts include those related to construction and operation of the IGCC Power Station, its Associated Facilities, the Interconnection Corridors, the Preferred and Alternate HVTL Routes, and the Proposed Natural Gas Pipeline Route. A detailed land use/land cover map showing the IGCC Power Station Footprint and Buffer Land is provided in Figure 7.1-1 and a regional-scale land use/land cover map showing the Proposed and Alternate HVTL Routes and the Proposed Natural Gas Pipeline Route is provided in Figure 7.1-2.

Predicted permanent and temporary land use impacts are presented in Tables 7.1-1 and 7.1-2, respectively for the IGCC Power Station, its Associated Facilities, the Additional Lands, HVTL routes, and natural gas pipeline routes. The temporary and permanent land use impacts for HVTL routes shown is the current land use in the existing right-of-way. Actual permanent impacts due to any of the HVTL routes relate primarily to the small (total less than 0.5 acre) area required for tower foundations, and the clearing of forested areas. Likewise, temporary impacts relate to the near-term impacts of construction in those areas of the Project, many of which are generally amendable to repair and remediation.

Section 2.8 of the ES provides a more detailed description of existing local and regional land use and the information sources related thereto. Section 3.7 of the ES provides a detailed analysis of the permanent and temporary impacts that will accompany development of the West Range Site. The following discussions summarize the information contained and presented in the ES.

Figure 7.1-1 Land Use and Land Cover in the Vicinity of the West Range Site

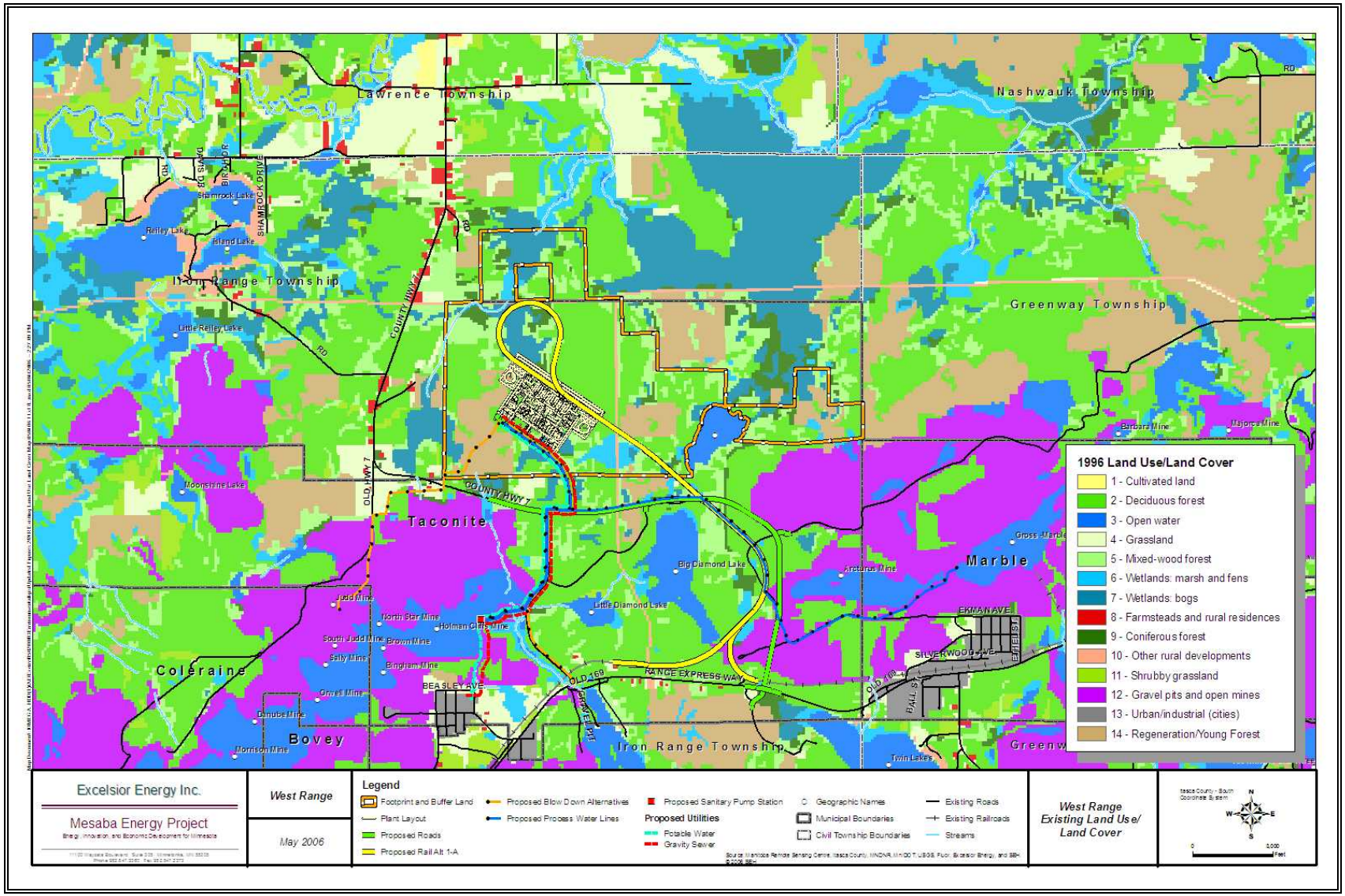


Figure 7.1-1 Land Use/Land Cover Map Showing the Preferred and Alternate HVTL Routes and Proposed Natural Gas Pipeline Route

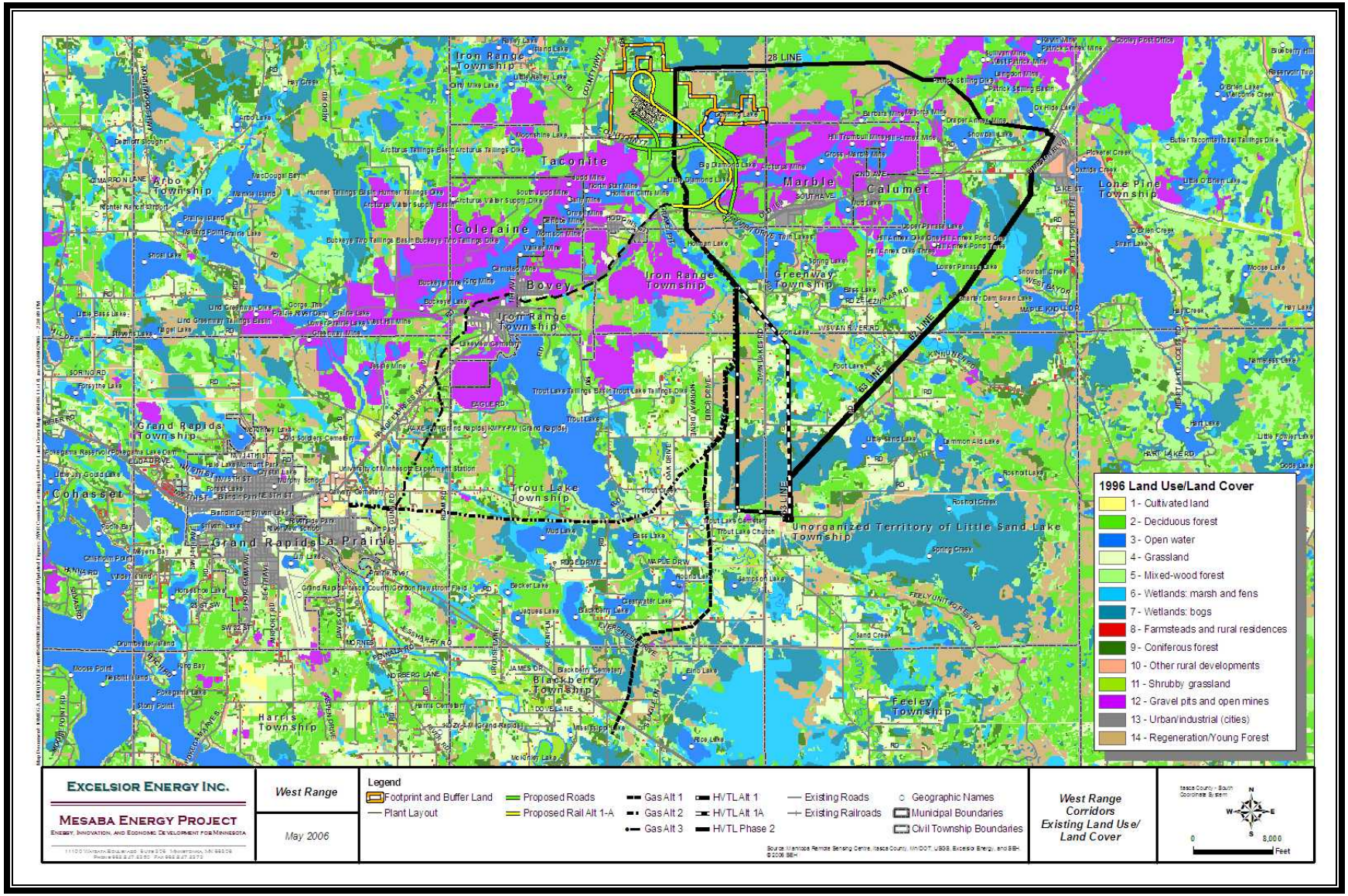


Table 7.1-1 - West Range Site Land Use Permanent Impacts (Acres)

						Process Water Lines			Process Water Blowdown Pipelines					
	West IGCC	**Preferred Route**	**Alternate Route**	**Plan B Alt. Route**	**Gas Pipeline**	**1**	**2**	**3**	**line 1**	**line 2**	**Potable**	**Rail 1**	**Rail 1B**	**Road 2**
Coniferous forest	4.3	8.0	5.5	0	8.1	0	0.1	2.0	0.2	0.2	0.0	2.1	3.6	0.26
Deciduous forest	86.5	41.3	40.1	0	21.1	1.7	12	25.0	18.1	4.0	5.3	32.8	38.8	6.6
Farmsteads and rural residences	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
Grassland	0.0	2.8	12.2	0	14.2	0	0	0	0	6.1	0.6	0.6		0.0
Gravel Pits & Mines	0	0	1.1	0	0	24.5	4.0	21.9	2.4	9.9	4.0	2.4	7.1	0.0
Mixed wood forest	56.2	12.7	9.4	0	17.8	0	4.9	5.7	6.2	0.8	1.8	17.7	11.9	4.0
Open water	0.0	0.8	2.3	0	0.4	0.4	0	0.8	0	0	0	0.3	0	0.0
Other rural	0.0	8.7	5.6	0	12.7	0	0.0	0.2		5.3	0.1	2.0	0.5	0.0
Regeneration/Young Forests	3.1	26.4	15.4	0	16.2	0	0.2	1.6	0.1		0.1	0.3	0.2	0.14
Surveyed Wetlands	30.9	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0
Shrubby grassland	0.0	4.4	1.8	0	7.4	0	2.9	0.1	0	0	0	0	0	0.0
Wetlands - bogs	4.6	24.8	19.9	0	10.2	0	0.2	1.4	2.6		1.2	6.2	7.8	3
Wetlands - marsh and fens	0.0	4.3	7.2	0	3.6	0	0	0	0	0	0.1	4.7	5.2	0.0
Total	**185.6**	**134.1**	**120.5**	**0**	**111.7**	**26.6**	**24.7**	**58.7**	**29.6**	**26.3**	**13.3**	**69.0**	**75.1**	**13.9**

Table 7.1-2 West Range Site Land Use Temporary Impacts (Acres)

						Process Water Lines			Process Water Blowdown Pipelines					
	West IGCC[1]	Preferred HVTL	Alternative HVTL	Plan B Alt HVTL R.	Gas Pipeline	1	2	3	line 1	line 2	Potable H2O	Rail 1	Rail 1B	Road 2
Coniferous forest	52.5	8.0	5.5	9.4	11.5	0	.1	2.5	0.4	.34	.1	5.1	5.4	0.4
Deciduous forest	694	41.3	40.1	68	31.2	2.6	18.5	37.3	27.0	6.1	13.5	69.1	99.8	11.2
Farmsteads	0.0	0.0	0	0.5	0	0	0	0	0	0.1	0	0	0	0
Grassland	1.6	2.8	12.2	67.1	20.3	0	0	0	0	8.8	1.8	.5	0	0
Gravel Pits and open mines	0.0	0.0	1.1	1.5	0	36.6	6.0	32.5	3.5	14.9	9.6	4.1	28.7	0
Mixed wood forest	326	12.7	9.4	28	25.8	0	7.5	9.1	9.6	1.15	4.8	33.2	24.7	6.4
NWI Wetlands	80.8	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0
Open water	2.8	0.8	2.3	1.2	.6	.74		1.6	0	0	0	.7		0
Other rural dev.	21.9	8.7	5.6	174	16.6	0	0	.34	0	0	0	3.6	1.5	0
Regeneration/Young Forests	221	26.4	15.4	22.7	23.2	0	.3	2.3	0.2	8.0	.2	.6	1.9	.25
Surveyed Wetlands	257	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0
Shrubby grassland	0.0	4.4	1.8	.6	10.5	0	0	0	0	0	0	0	0	0
Urban	0	0	0	4.9	0	0	0	0	0	0	.48	0	0	0
Wetlands - bogs	34.6	24.8	19.9	40.4	14.6	0	4.2	.13	3.8	0	2.81	15.8	11.5	4.88
Wetlands - marsh and fens	14.4	4.3	7.2	18.1	5.1	0	0.4	2.4	0	0	.43	6.4	6.3	0
Total	**1708**	**134**	**121**	**436**	**159**	**40.0**	**37.1**	**88.1**	**44.5**	**39.5**	**33.7**	**139**	**179**	**23.1**

7.1.1 Historical Overview

About 71% of the land area of Itasca County is forested with about 20% consisting of organic soils (USDA, 1987). An abundance of "wetland" areas exists throughout the region. Before extensive settlement, vegetation in the area was predominantly conifer/hardwood forest (Sims and Morey, 1972). Early settlement began in the 1860's with settlers who came to harvest timber. Mining (iron ore) exploration began in the 1880's. Some farming commenced in the late 1800's, and by 1920 roughly ten percent of the land was farmed. Past and present mining activity in the area is shown in Figure 7.1-3, which also identifies the locations and extent of mine pits, waste-rock dumps and tailing basins in the vicinity of the West Range Site.

7.1.2 IGCC Power Station Power Station Footprint and Buffer Land

The land use/land cover map provided in Figure 7.1-1 shows that land cover within the IGCC Power Station Footprint and Buffer Land is mostly forested, consisting of coniferous forest, mixed wood forest and regeneration/young forest. Wetlands located within the Station Footprint and Buffer Land represent about 20 percent of the total land area, remarkably consistent with the overall content of organic soils in Itasca County. The land use/land cover map shows a land use category within the Buffer Land labeled as "other rural developments." In this instance, this category represents land used as ROW for existing HVTLs.

Within the Station Footprint forests represent approximately 85-90 percent of the land area, with the remaining area being wetlands. Figure 7.1-4 shows a detailed view of the Station Footprint and identifies the geographical distribution of forest types.

Permanent land use impacts across the entire Station Footprint will occur due to the clearing and grading required to accommodate Mesaba One and Mesaba Two, and to provide acceptable grades for unit coal trains to access the Power Station. A cut through till, coarse alluvium, and bedrock will be required for the railroad alignment (such alignment being oriented in a north-west, south-east direction) located generally adjacent to and east of the Station Footprint. The plant area will require similar cuts and fills in several other locations. Figures 3.2-3 and 3.2-4 in Section 3.2 show the preliminary grading plan prepared for the IGCC Power Station.

Soil conditions on the Station Footprint and the Buffer Land affecting constructability are shown in Figure 7.1-5. The presence of peat and muck, low strength and highly compressible soil types, will cause settlement issues unless properly managed. Along the north end of the rail loop filling will be required.

Approximately 160 acres of forested land and 31 acres of wetlands (out of a total of about 185 acres total) will be cleared and utilized to accommodate the Station Footprint. Topsoil will be stockpiled for later use after clearing and grubbing this area.

Figure 7.1-2 Mining Disturbances in the Vicinity of the West Range Site

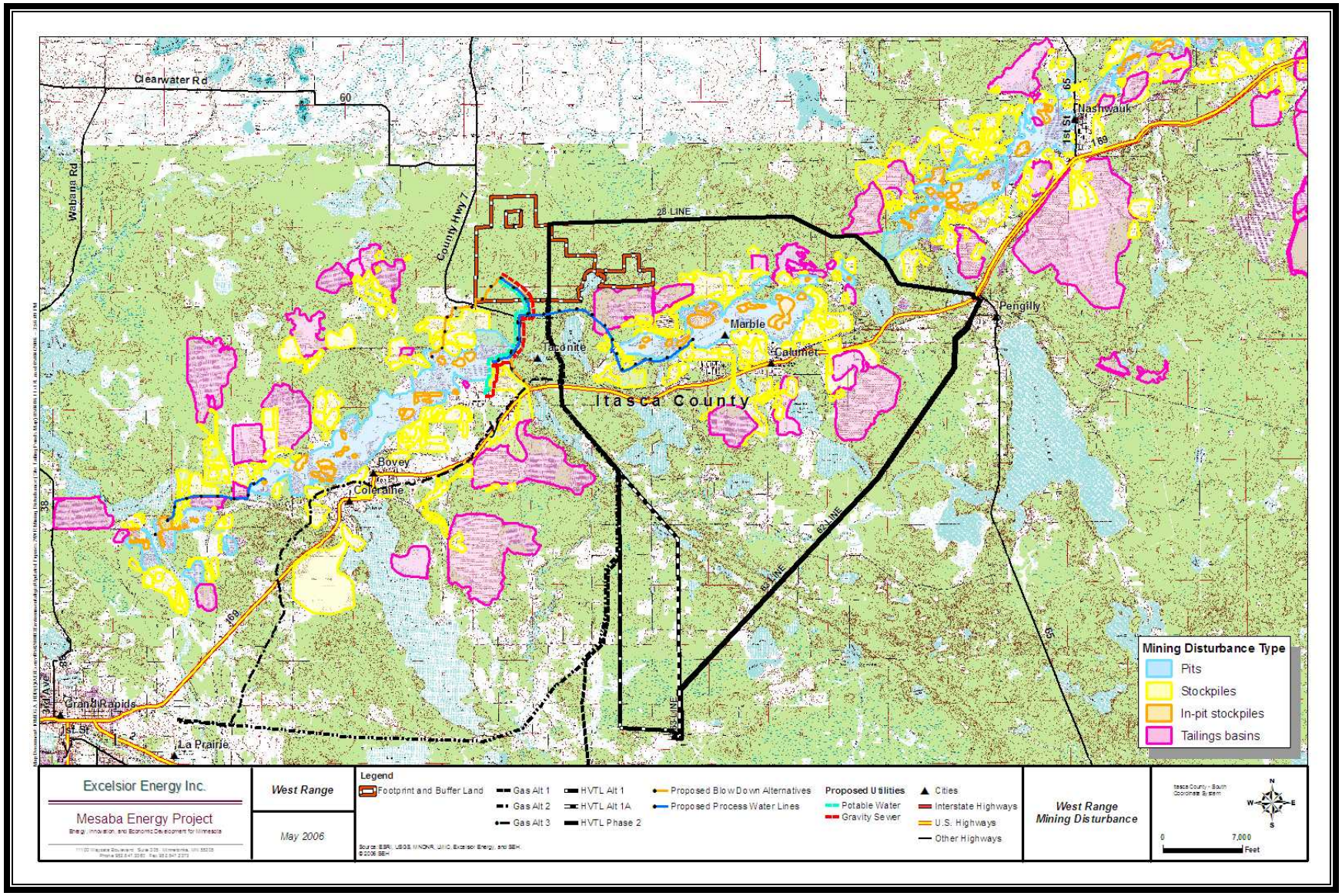
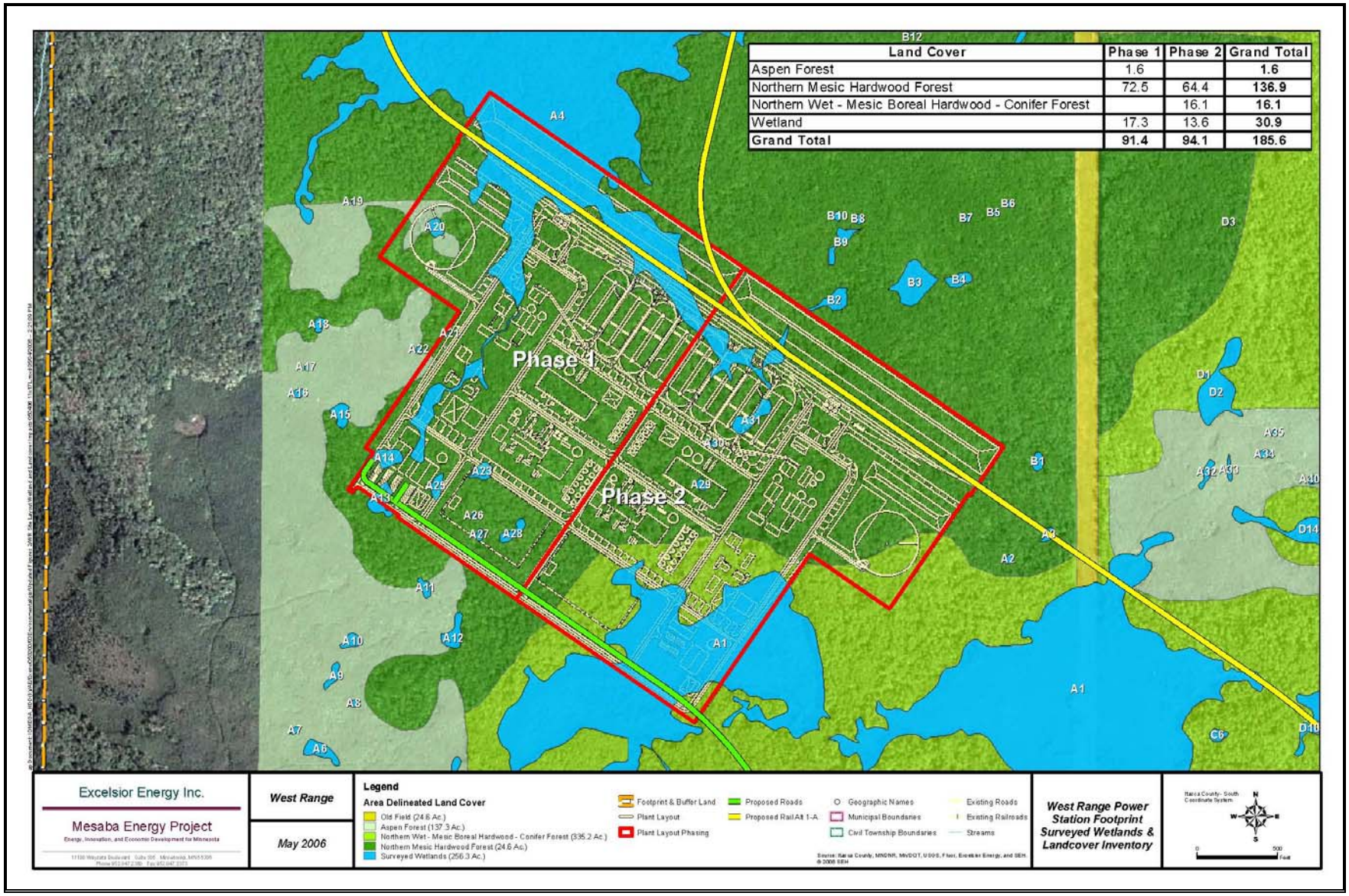
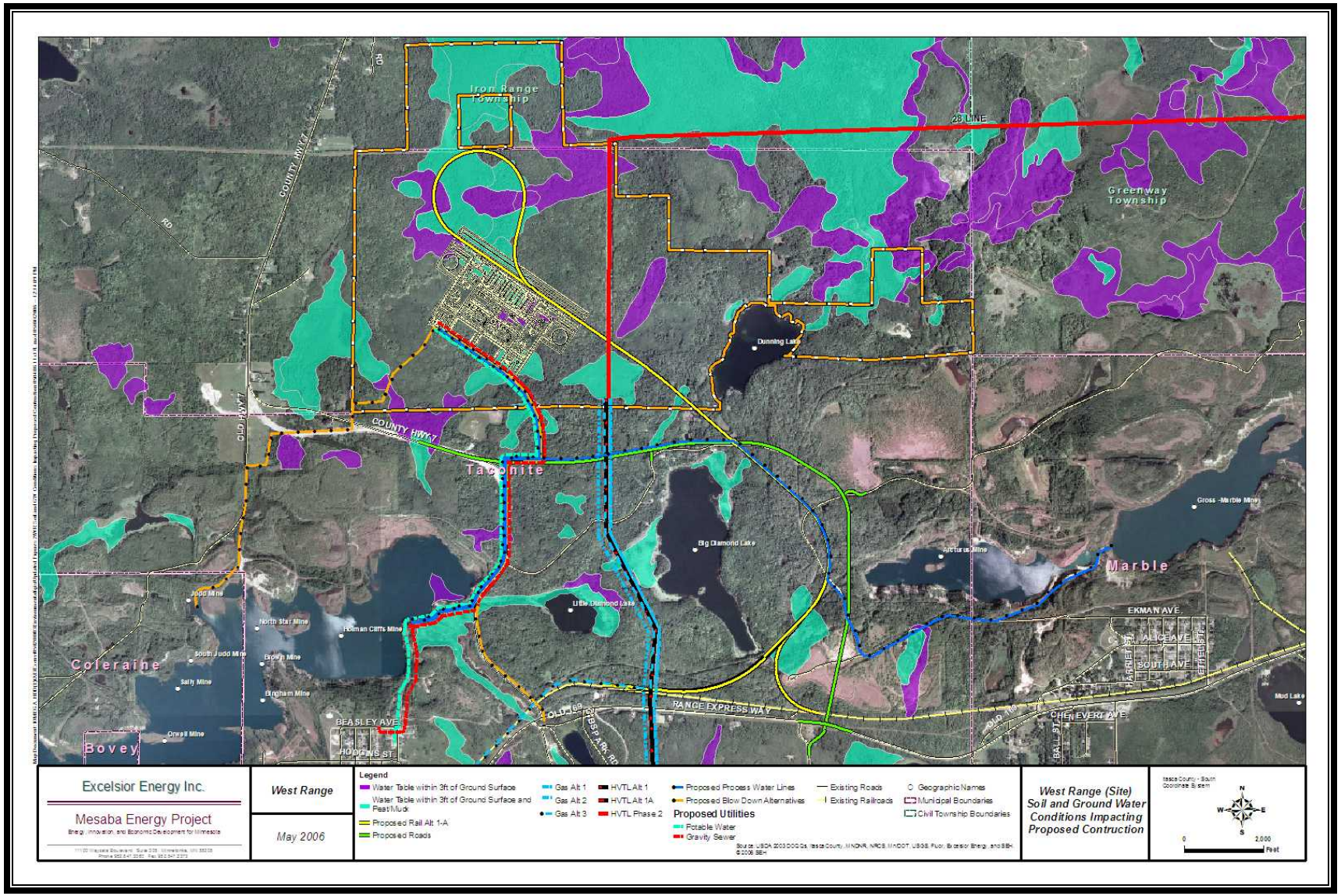


Figure 7.1-3 Distribution of Forested Areas and Wetlands Across the IGCC Power Station Footprint



Land Cover	Phase 1	Phase 2	Grand Total
Aspen Forest	1.6		1.6
Northern Mesic Hardwood Forest	72.5	64.4	136.9
Northern Wet - Mesic Boreal Hardwood - Conifer Forest		16.1	16.1
Wetland	17.3	13.6	30.9
Grand Total	91.4	94.1	185.6

Figure 7.1-4 Difficult Soil Conditions Occurring Within the Station Footprint and Buffer Land That Affect Construction



7.1.3 West Range HVTL Routes

The West Range Preferred and Alternate HVTL Routes are described in Section 2.5.3 and are illustrated with mileposts markings in Figure 2.5-3 through Figure 2.5-12. A milepost map superimposed on a USGS map is provided for the Preferred HVTL Route in Figures 2.2-1 through 2.2-4. The design of the HVTL structures that will be used in each route and the ROW required to accommodate such structures are described in Section 4.

Three West Range HVTL routing options are proposed for consideration. For ease of reference the three proposed routes will be described in this Application as the "Preferred," "Alternate" and "Plan B Phase II Alternate" Routes, respectively.

7.1.3.1 Preferred Route

Land cover within the Preferred HVTL Route is predominately forest. The total length of the route is 8.7 miles. The ROW width required is 150 feet when it is shared with the gas line route and 100 feet without inclusion of the pipeline ROW. Approximately 88 acres, or 66 percent, of the Preferred HVTL Route is forest land. Wetlands comprise approximately 29 acres of the route. The 88 acres of forest land will be permanently cleared to prepare the ROW for HVTL construction. Minimal grading is expected along the route. Between the IGCC Power Station Footprint and the retired Greenway Substation, existing transmission towers will be removed and replaced with new steel transmission towers that will accommodate the proposed new single-pole double circuit 345kV HVTL lines. These towers are typically constructed at existing grade and are supported on drilled shaft foundations. Disturbance of soils is expected to be limited to localized areas around transmission towers and wheel paths for the construction equipment. Trees in the ROW will have to be cleared, but some vegetation will be reestablished once construction is complete.

7.1.3.2 West Range Alternate HVTL Route

The alternate route is described in Section 2.5.3. The ROW width required for the double circuit line is 150 feet when it is shared with the gas line route, 100 feet when alone. Minimal grading is expected in the route, but clearing of trees and other vegetation will be required. Because the Alternate HVTL Route shares some ROW with a roadway, it will require less tree clearing than the Preferred HVTL Route. Approximately 70 acres of forest land would be cleared to construct the Alternate Preferred HVTL Route, with the line crossing twenty-six acres of wetlands. As for all HVTL routes, erosion control practices will be employed during construction. Following construction, vegetation will be re-established along the route to prevent erosion and migration of sediment.

7.1.3.3 Plan B Phase II Alternate Route

This alternate HVTL route consists of approximately 18 miles of new 345-kV line constructed as a "double circuit" on the existing 115 kV HVTL ROW, with the 115kV circuit being moved to the 345 kV structures. Therefore, no further permanent impacts on land use are expected. The new HVTL towers will be taller than the existing structures and, therefore, may have some minimal additional visual and aesthetic impact.

7.1.4 Proposed Natural Gas Pipeline Route

The length of the Proposed Natural Gas Pipeline Route is approximately 13.2 miles. This Route will require a 100-foot ROW for construction activities and a 70-foot permanent ROW for maintenance. Grasslands comprise approximately 30 acres or 19 percent of the route. The route is described in detail in Section 2 and is illustrated relative to significant receptors in Figures 2.4-16 through 2.4-19.

Detailed descriptions of pipeline construction methods and right-of-way requirements are provided in Section 5 of this Application. Minimal grading is expected along the Proposed Natural Gas Pipeline Route. The gas pipeline will be installed either by open cut trenching or by directional drilling. Pipe installation methods will be further evaluated after a geotechnical investigation has been performed in the Proposed Natural Gas Pipeline Route. Approximately 91 acres of forested land will be cleared in creating the pipeline route. Of this, 63 acres will be permanently impacted, with 28 acres reverting back to original condition.

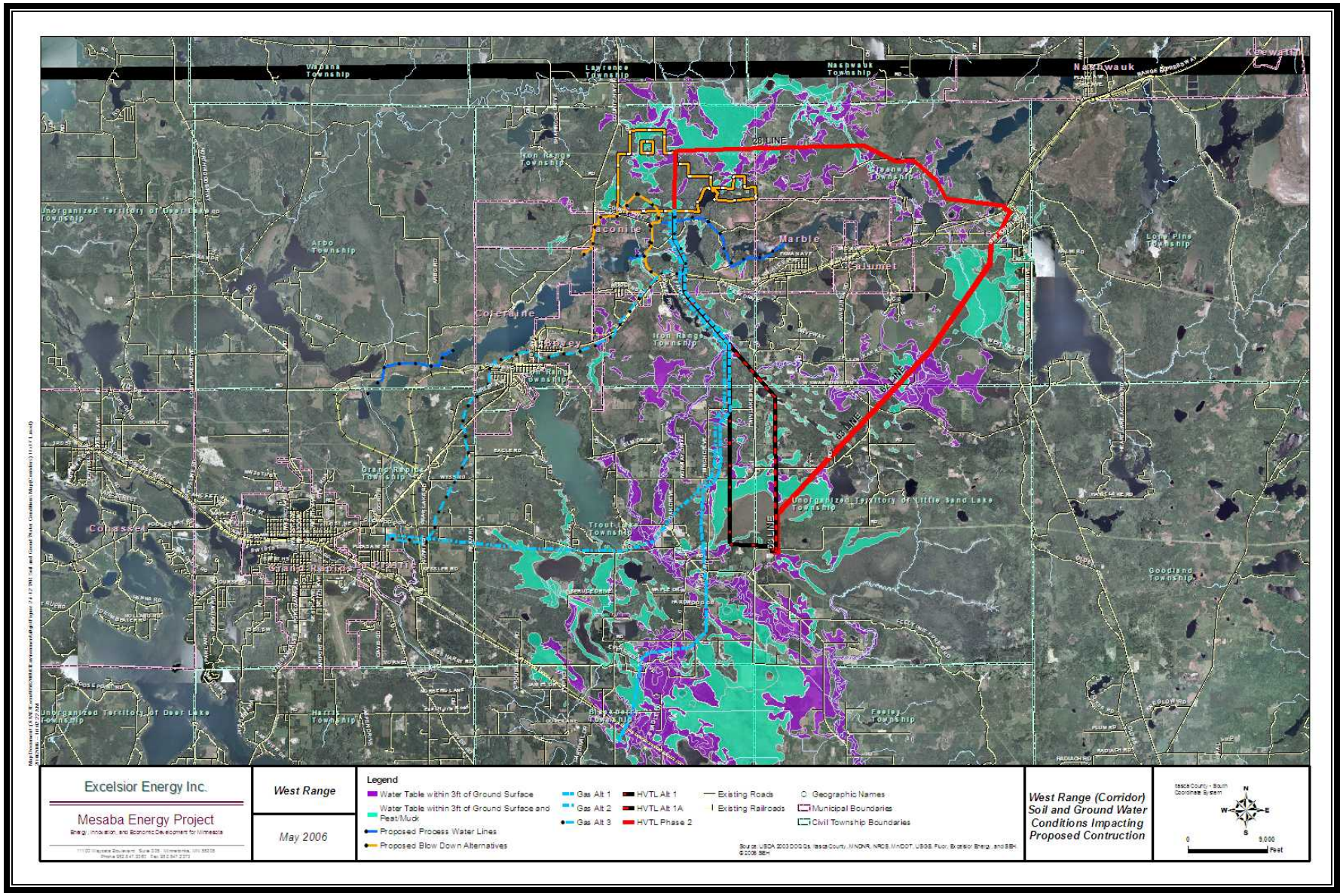
Figure 7.1-6 shows the locations of peat along the route as identified on the Itasca County Soil Survey. Peat is highly compressible and does not support heavy construction equipment. Construction during the winter months will alleviate the difficulty of construction in peat areas. If winter construction is not possible, crane mats and/or low ground pressure equipment `will likely be used.

Soils along the Pipeline Route are believed to be suitable for directional drilling. Directional drilling can maneuver around most boulders if any are encountered within the glacial till. If further geotechnical investigation encounters areas where bedrock is at or above the proposed pipe elevation, special directional drilling will be performed or, alternatively, open trench excavation with blasting will be performed.

If the Proposed Natural Gas Pipeline Route is installed by open cut trenching, trees and other vegetation will be cleared along the entire route. Cleared vegetation will be re-established once construction is complete. This vegetation would consist of grasses or wetland plants as appropriate. Trees will not be planted within the route to accommodate the need for permanent access for future repairs or improvements. The glacial till and lacustrine soils present are generally suitable for excavations for pipe construction. However, in areas where the ground water table is above the depth at which the pipe will be buried, the pipe will need to be designed for buoyant forces. Trench dewatering may be necessary to construct the pipeline.

The glacial outwash is generally suitable for trench excavation, but boulders and cobbles in the till could impede such excavations. Trench excavation in peat will be more difficult since the ground water table is shallow and the soils have low strength. The pipe installed in the peat must also be designed for buoyant forces.

Figure 7.1-5 Soil and Groundwater Conditions Impacting Construction Along HVTL and Natural Gas Pipeline Routes



7.1.5 Process Water Supply Pipeline

At the West Range Site, water will be supplied from three sources, all of which require water supply pipelines. The water supply plan is described in Section 4, and the Process Water Supply Pipeline alignments are shown in Figure 7.1-7.

7.1.5.1 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.

Land use within the West Range Process Water Supply Pipeline Segment 1 corridor is classified as predominately inactive gravel pits and former mines. The length of the corridor is 2.2 miles and requires use of about 24 acres of land that will be permanently impacted. Thirteen acres of the ROW land will be allowed to revert back to original condition.

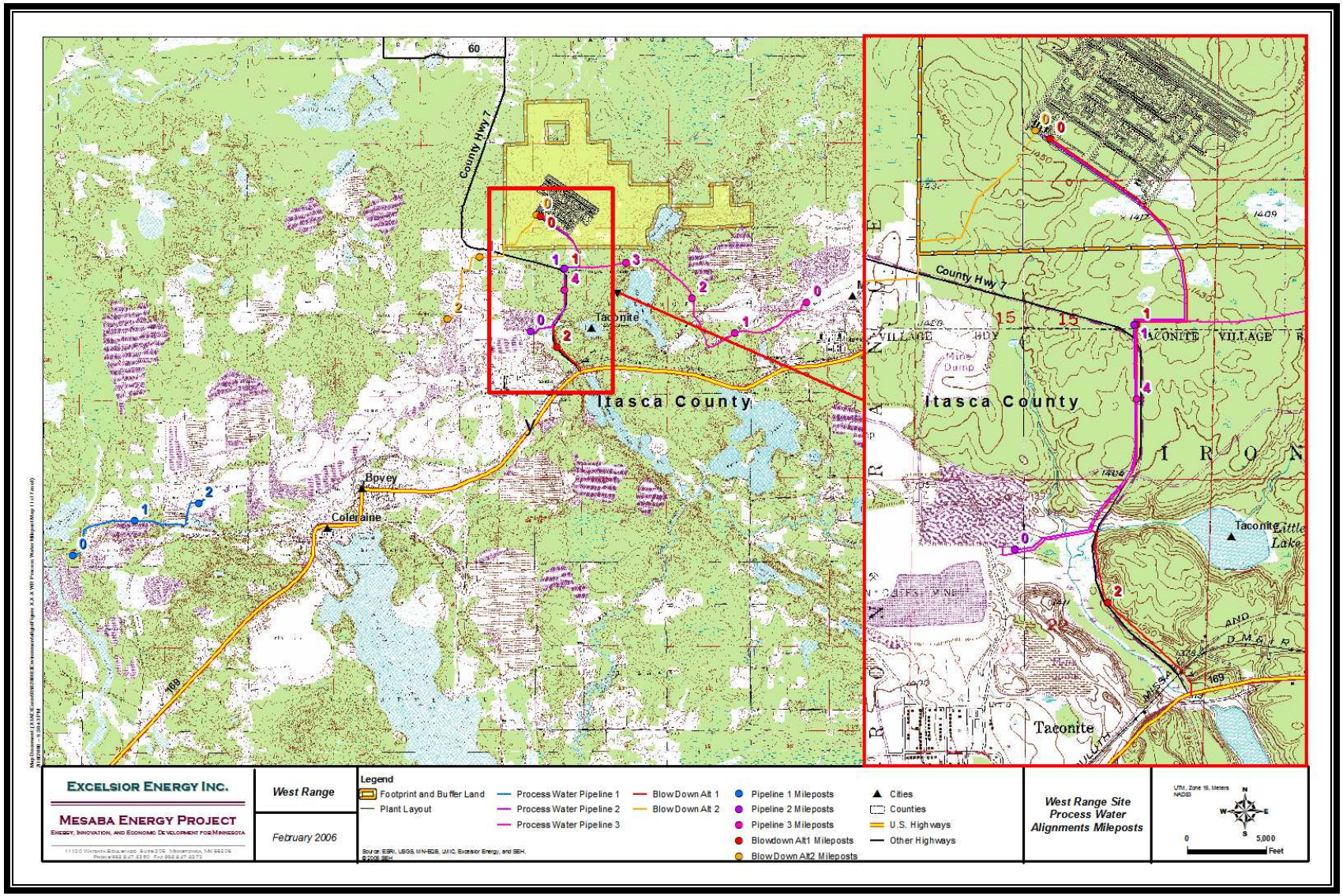
7.1.5.2 Segment 2 - Canisteo Pit to West Range Site

Land use within the West Range Process Water Supply Pipeline Segment 2 corridor is predominately forest land. The length of the corridor is approximately 2.0 miles. Approximately 26 acres of forest land must be cleared to build the Segment 2 corridor, with 18 acres of permanent impact and 8 acres reverting back to original condition.

7.1.5.3 Segment 3 - Gross-Marble Pit to Canisteo Pit

Land within the Process Water Supply Pipeline Segment 3 corridor contains approximately 51 acres of forest land. Approximately 32 acres or 37 percent is inactive gravel pits and open mines. The length of the corridor is 4.8 miles. 51 acres of forest land will be cleared to construct the Segment 3 corridor, resulting in about 34 acres of permanent impact. The remaining 17 acres will be allowed to revert back to original condition. Approximately 32 acres of gravel pits and open mines will be impacted to build Segment 3, resulting in about 22 acres of permanent impact.

Figure 7.1-6 Process Water Supply Pipeline and Process Water Blowdown Pipeline Alignment Milepost Map



7.1.6 Process Water Blowdown Pipelines

Process Water Blowdown Pipeline alignments are shown in Figure 7.1-7 along with the Process Water Supply Pipelines.

7.1.6.1 Process Water Blowdown Pipeline 1

The length of the Process Water Blowdown Pipeline 1 corridor is 2.43 miles. Land use within the corridor is predominately forested with approximately 37 acres of forest land needed to be cleared to for the Process Water Blowdown Pipeline 1 corridor, resulting in about 25 acres of permanent impact. The remaining 12 acres will be allowed to revert back to original condition.

7.1.6.2 Process Water Blowdown Pipeline 2

The length of the Process Water Blowdown Pipeline 2 corridor is 2.16 miles. Land use within the Process Water Blowdown Pipeline 2 corridor is predominately inactive gravel pits and open mines. Sixteen acres of forest land will be cleared to build the Pipeline 2 corridor, resulting in about 10 acres of permanent impact. The remaining 6 acres will be allowed to revert back to original condition. Approximately 15 acres of gravel pits and open mines will be impacted resulting in about 9 acres of permanent impact. The remaining 6 acres will be allowed to revert back to original condition.

7.1.7 Potable Water and Sewer Pipelines

Potable Water and Sewer Pipeline will be installed parallel to each other within the same corridor. Existing land use within the corridor is predominately forest consisting of approximately 19 acres. Gravel pits and open mines comprise 10 acres or 29 percent of the corridor. The Potable Water and Sewer pipelines will be located on a new corridor from the plant to existing CR 7. The pipeline will follow the existing CR 7 alignment for a distance of 3,300 feet, turning west for 1,600 feet to the CMP, then south 2,600 feet to the City of Taconite. Trees and other vegetation will be cleared along the corridor. Where the corridor follows CR 7, portions of a trench could partially overlap the highway, requiring traffic to be diverted around the area of impact. If the pipeline is constructed using a trenchless method such as microtunneling, the highway could remain open to traffic. The Applicant will discuss such construction methods with Itasca County prior to commencement of construction. Native 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. In areas where CR 7 is disturbed, it will be restored to at or near the condition (pavement section, subgrade, etc.) it was prior to construction. Where the pipeline is constructed on City of Taconite street right-of-way, streets will be reconstructed to at or near the condition (pavement thickness, subgrade, curb, etc.) that existed prior to construction of the water and sewer pipeline.

The Process Water and Sewer Pipeline will require a 40-foot permanent ROW and a 100-foot temporary ROW. Approximately 19 acres of forest land will be cleared for the pipeline corridor, resulting in about 7 acres of permanent impact. The remaining 12 acres will revert back to original condition.

7.1.8 Rail Lines

7.1.8.1 Preferred Rail Line Alternative 1 A

Land use within the Rail Line Alternative 1A corridor is predominately forested, containing approximately 108 acres of forested land. Wetlands comprise 16 percent. A cut through till, coarse alluvium, and bedrock will be required for Rail Line Alternative 1A. Along the north end of the rail loop extensive filling will be required, with some occurring over organic soils. 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. Granite bedrock, once removed and processed, is considered to be a suitable construction material. The peat and muck encountered are not considered good construction materials, but may be used for construction of new wetlands.

Bedrock along the Rail Line Alternative 1A corridor consists of Giant's Range Granite, Pokegama Quartzite, and the Biwabik Formation. The profile of Rail Line Alternaive 1A shows cuts of 30 to 78 feet below grade from the crossing with proposed CR 7 to the southeast end of the rail line. These excavations into bedrock will likely require blasting or tunneling. Rock bolting and anchors may be required to stabilize some slopes in the bedrock. Rail Line Alternative 1A will require a 100-foot permanent ROW and a 80 to 450-foot temporary ROW. Approximately 108 acres of forest land will be cleared for the Alternative 1A corridor, resulting in about 53 acres of permanent impact. Fifty-five acres will revert back to original condition.

7.1.8.2 Alternate Rail Line Alternative 1 B

Land use within the Rail Line Alternative 1B corridor is predominately forested, representing 132 acres of the rail line corridor. Gravel pits and open mines comprise the remaining 29 acres. Eighteen acres of wetlands also exist within the corridor. Alternative 1B will require a 100-foot permanent ROW and a 60- to 760-foot temporary ROW. Approximately 132 acres of forest land would be cleared to build the Rail Line Alternative 1B corridor, resulting in about 54 acres of permanent impact. Seventy-eight acres would revert back to original condition.

7.1.9 Access Roads

The West Range Site requires two new access roads. Itasca County will own Access Road 1. The Applicant will own Access Road 2. Both roads will require a 120-foot permanent ROW and a 200-foot temporary ROW.

7.1.9.1 Access Road 1

Itasca County intends to realign CR 7 to provide a better safety and traffic flow in the region, and to accommodate the construction and operation of the IGCC Power Station and a steel manufacturing facility to be located nearby. The County will assume responsibility for licensing, construction and maintenance of this realignment. Soil borings taken to gauge potential issues associated with construction in the area of the IGCC Power Station Footprint and Buffer Land, and the cross sections used in evaluating such issues, are shown in Figures 7.1-9 through 7.1-12.

7.1.9.2 Access Road 2

Access Road 2 will intersect the realigned County Road 7 at about elevation 1,425 feet above msl and descend to the plant site at about elevation 1,400 feet above msl. The ground surface along the route varies from about elevation 1,420 feet above msl to elevation 1,435 feet above msl, requiring the majority of the road to 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 these methods.

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, thus requiring that the road cut 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 the bedrock exists at this elevation.

Figure 2.1-3 in Section 2 above shows the two roads that will be used to access the IGCC Power Station Footprint. Land use within the Access Road 1 and Access Road 2 corridors is predominately deciduous forest containing about 60 acres of forest land. Gravel pits and open mines comprise 23 acres of the road corridors. Excavations as much as 53 feet deep and embankments as high as 56 feet will be required to achieve the required grades for the Access Road 1 and Access Road 2 alignments. Trees and other vegetation will be cleared along the roadway corridor. Vegetation consisting of native grasses or native herbaceous plants will be re-established on embankments and cut slopes where appropriate. Trees will not be re-planted within the clear zone of the roadway and underground utility rights-of-way. Care will be taken in the design of project features to minimize damage to facilities due to frost action in the natural till or embankments constructed from till. Approximately 87 acres of forest land will be cleared to build the west range road corridors, resulting in about 52 acres of permanent impact. Thirty-five acres will be allowed to revert to original condition.

Figure 7.1-7 Soil Borings Useful in Determining Cut and Fill Required for Access Road 2

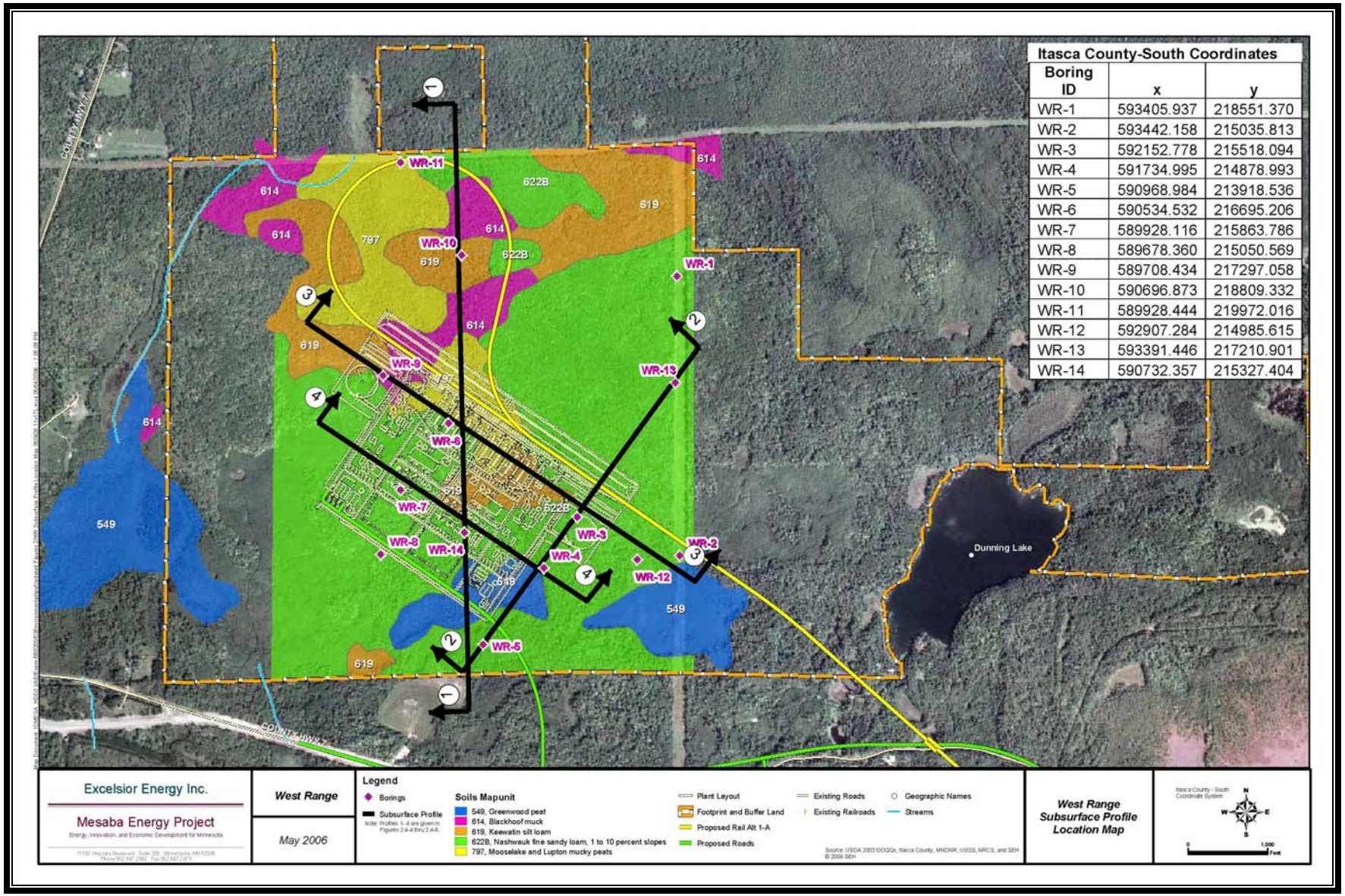


Figure 7.1-8 Subsurface Profile of Cross Section "1-1"

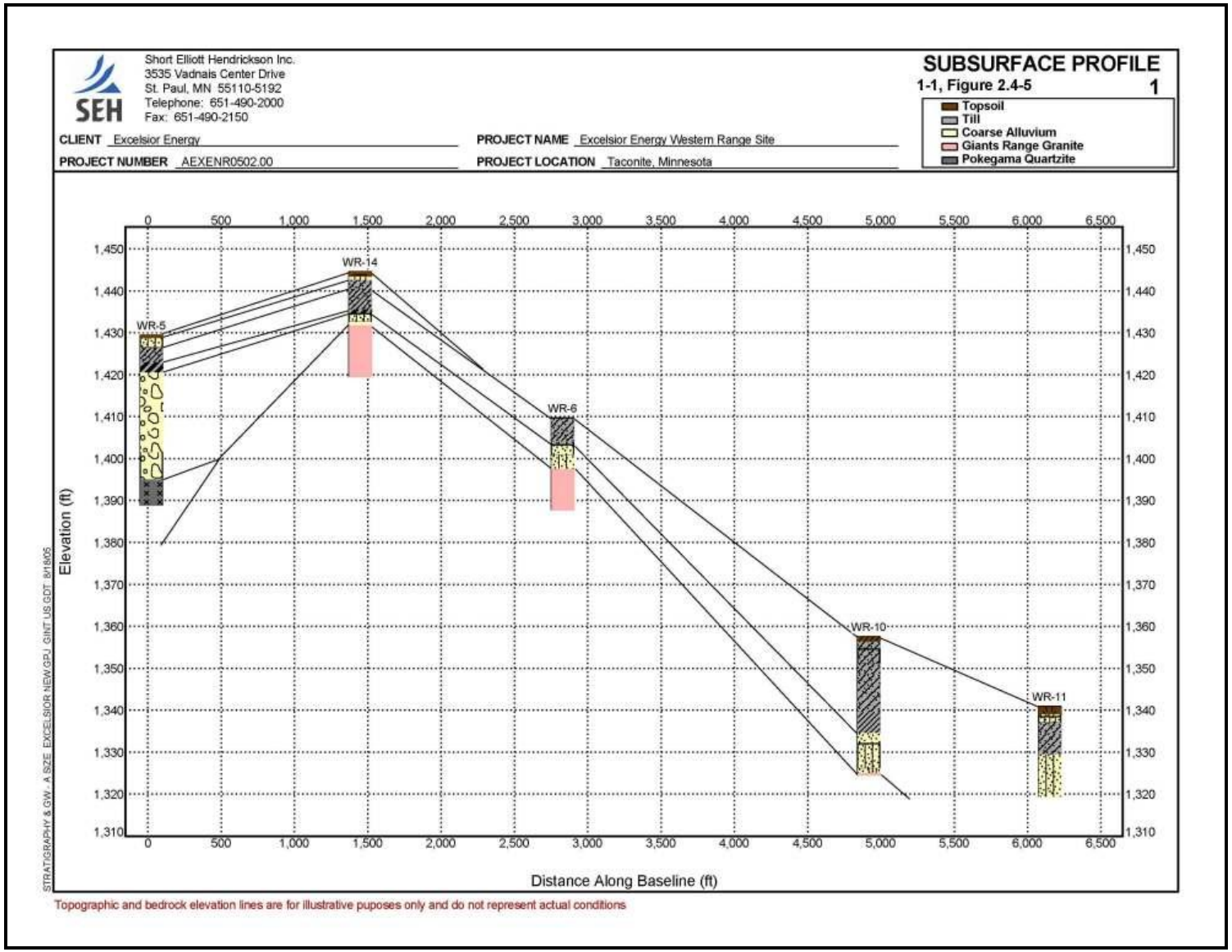


Figure 7.1-9 Subsurface Profile of Cross Section "2-2"

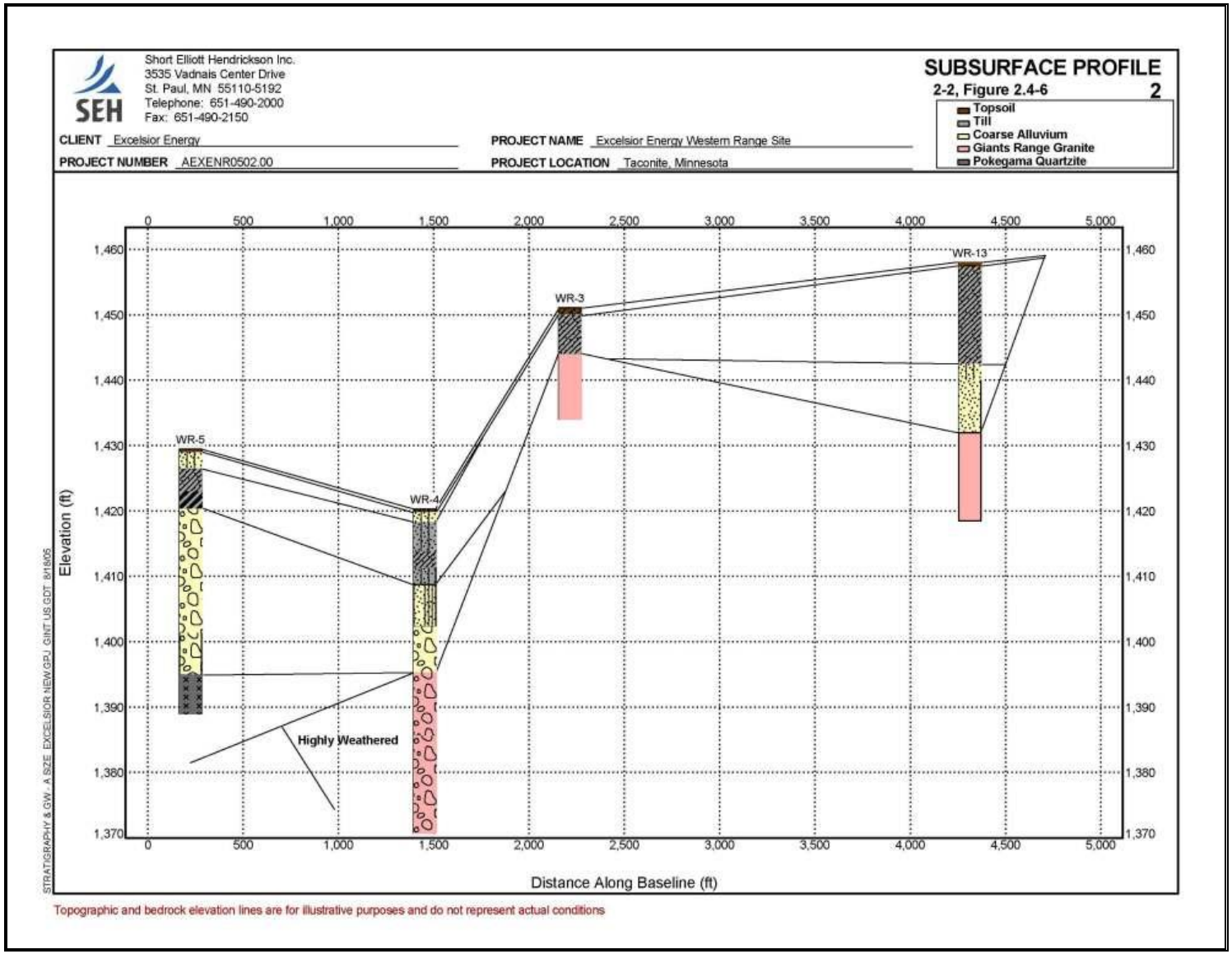


Figure 7.1-10 Subsurface Profile of Cross Section "3-3"

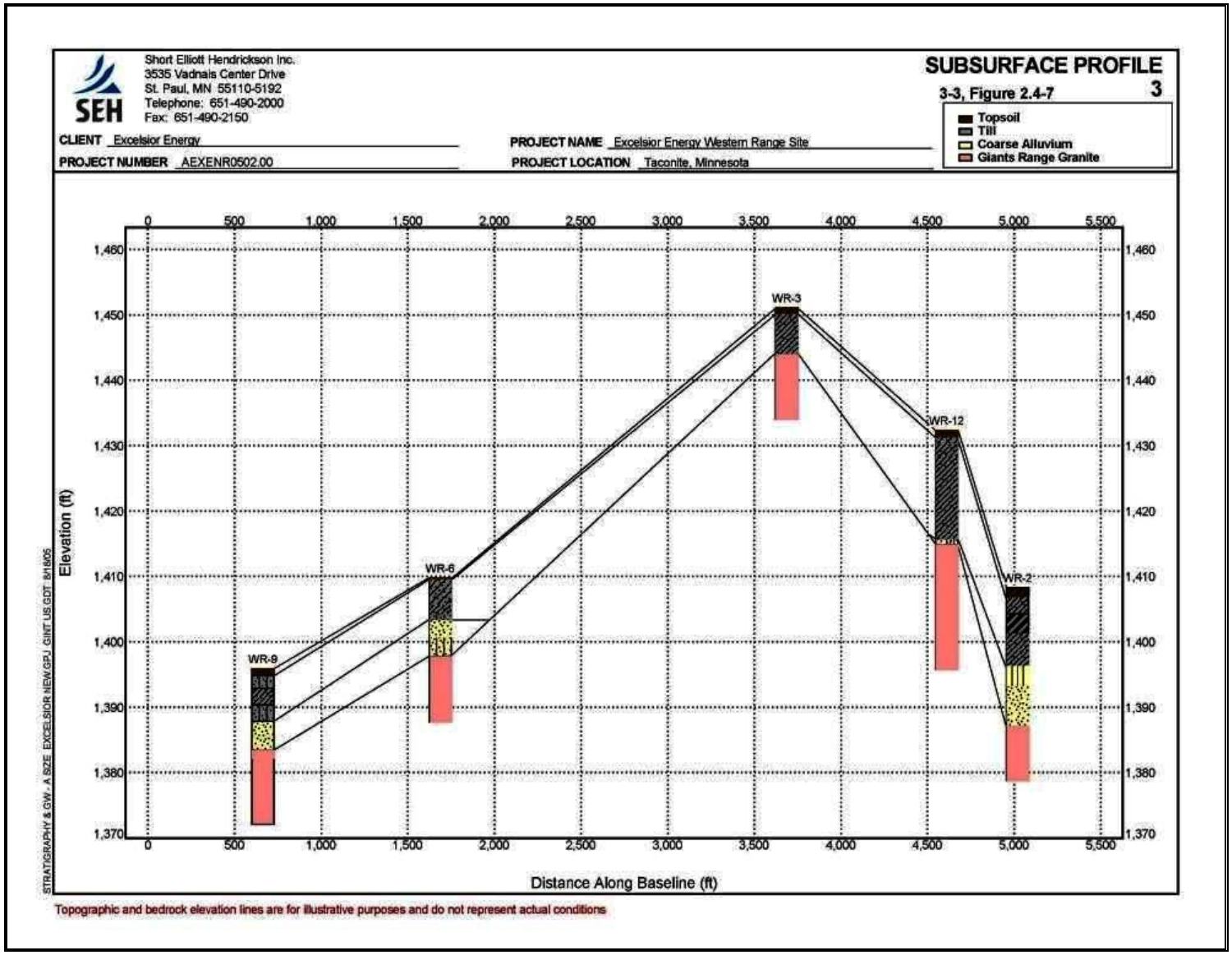
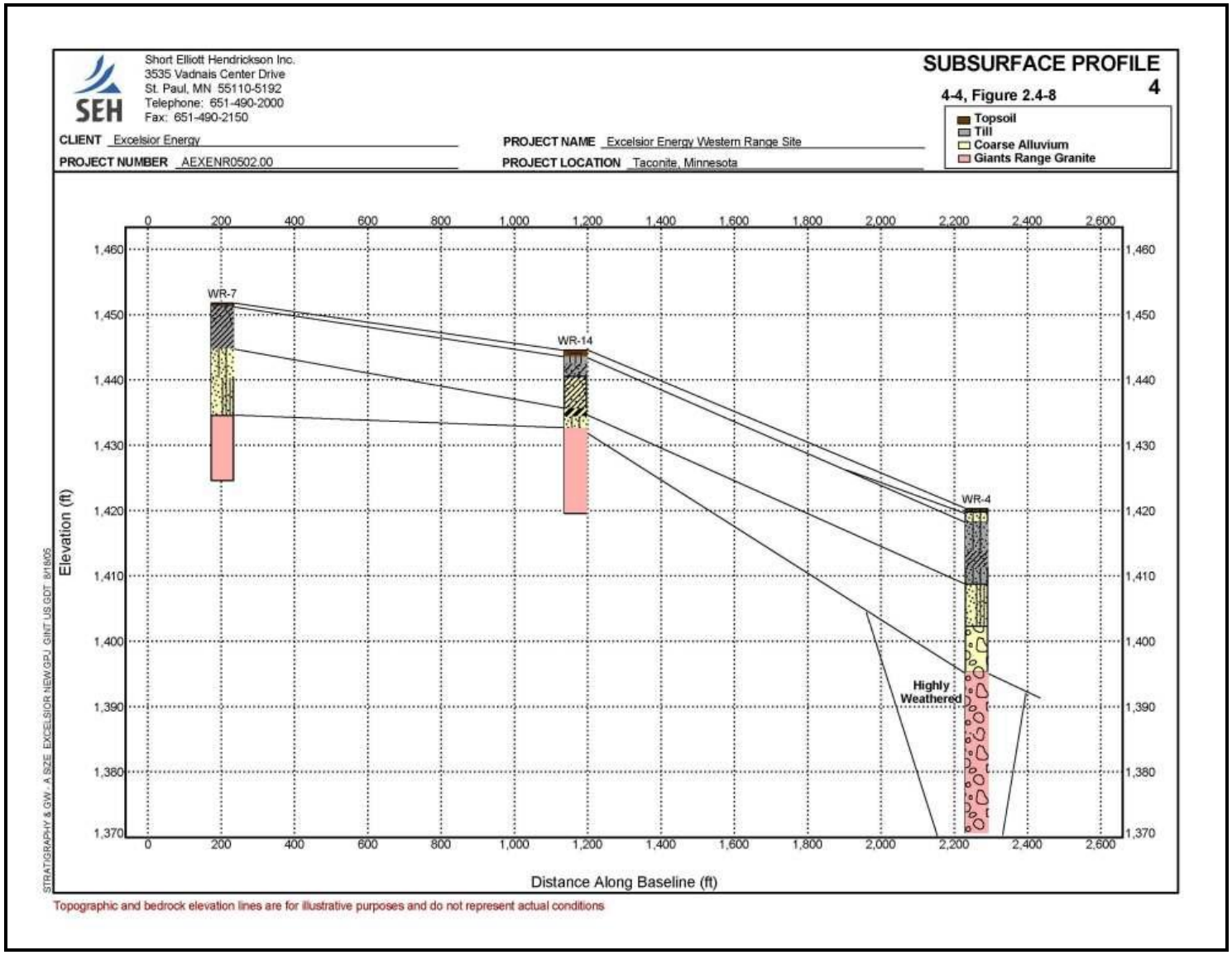


Figure 7.1-11 Subsurface Profile of Cross Section "4-4"



7.1.10 Special Land Uses

7.1.10.1 Recreational Lands

The Receptor Map (Figure 2.5-2) indicates that there are no recreational areas within IGCC Power Station Footprint and Buffer Land, except snowmobile trails that follow existing transmission line ROWs through the Buffer Land (one trail oriented in a north-south alignment along the 28L/45L HVTL tap line to the retired Greenway Substation and the other oriented in an east-west alignment along the 28L HVTL route between the Clay Boswell Station and the Nashwauk Substation). Both trails will likely be required to be diverted and/or closed for construction and operation of the IGCC Power Station.

In addition, the Hill-Annex State Park is about 3.5 miles east of the IGCC Power Station.

Area lakes provide numerous recreational opportunities for area residents. Activities such as swimming, boating, fishing, bird watching and other similar activities are prevalent. Gibs Park is located on Holman Lake about 2.1 miles south-southeast of the IGCC Power Station Footprint. The park includes a fishing pier, swimming beach and picnic area, the fishing pier being a cooperative project between Iron Range Township and the MDNR. Holman Lake will receive cooling tower blowdown from the IGCC Power Station. As cooling tower blowdown will be regulated within prescribed limits and contain predominantly minerals that are present in mine pit waters, no adverse impacts on water or land use will occur.

The forested areas in the Project area apparently also allow for some recreational activities such as hiking, biking, hunting, bird-watching and similar activities. Many of these activities take place on land that is owned by Itasca County but is not specifically designated as a recreation area.

7.1.10.2 Designated Wildlife Areas

There are no designated Federal Wildlife Refuges, Waterfowl Production Areas, or National Preserves within or immediately adjacent to the IGCC Power Station Footprint, Buffer Land, Associated Facilities, or Interconnection Corridors included as part of the West Range Site. No MDNR Wildlife Management Areas (WMAs), Wildlife Refuges, state Scientific and Natural Areas (SNA), designated Game Lakes, or Designated Trout Streams are within or immediately adjacent to such areas.

7.1.10.3 Prime Farmland

Although no active farmland would be disrupted by construction of the IGCC Power Station, its Associated Facilities, or Interconnection Corridors, many of the soils in the West Range Site are officially designated as “prime farmland” or “prime farmland if drained.” As a practical matter, this area and region of the State is not considered to be high quality or desirable farmland. Figure 7.1-12 shows the coverage of soils considered to have potential to be prime farmland in the vicinity of the West Range Site. According to the 1996 Land Cover/Land Use Map, no cultivated farmlands are located within one-mile of the centerline of the Preferred or Alternate HVTL Routes. Several tracts of cultivated farmland are located within one-mile of the centerline of the Proposed Natural Gas Pipeline Route and the Process Water Supply and Process Water

Process Water Blowdown Pipeline corridors. No cultivated farmland is located near the preferred rail line access corridor.

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

The only Associated Facilities of the West Range Site that lie outside the City limits of Taconite and Marble (Taconite and Marble abut one another at the eastern-most boundary of Taconite and both are statutory cities) are the LMP pumping station, Segment 1 of the Process Water Supply Pipeline, and the outfall at its point of termination of the Segment 1 pipeline. Figure 7.1-13 shows a map of these features and their proximity to soils meeting the criteria of "prime farmland" or "prime farmland if drained." The proposed HVTL segments do not impact prime farmland.

7.1.11 Regional Zoning

The IGCC Power Station Footprint and Buffer Land are located completely within an area zoned for industrial uses. The current zoning designations for property in the immediate vicinity of the Station Footprint and Buffer Land is shown in Figure 7.1-14. Zoning within the region including the Preferred and Alternate HVTL Routes and Proposed Natural Gas Pipeline Route is shown in Figure 7.1-15.

Figure 7.1-12 Prime Farmland and Other Important Farmlands in the Vicinity of the West Range Site

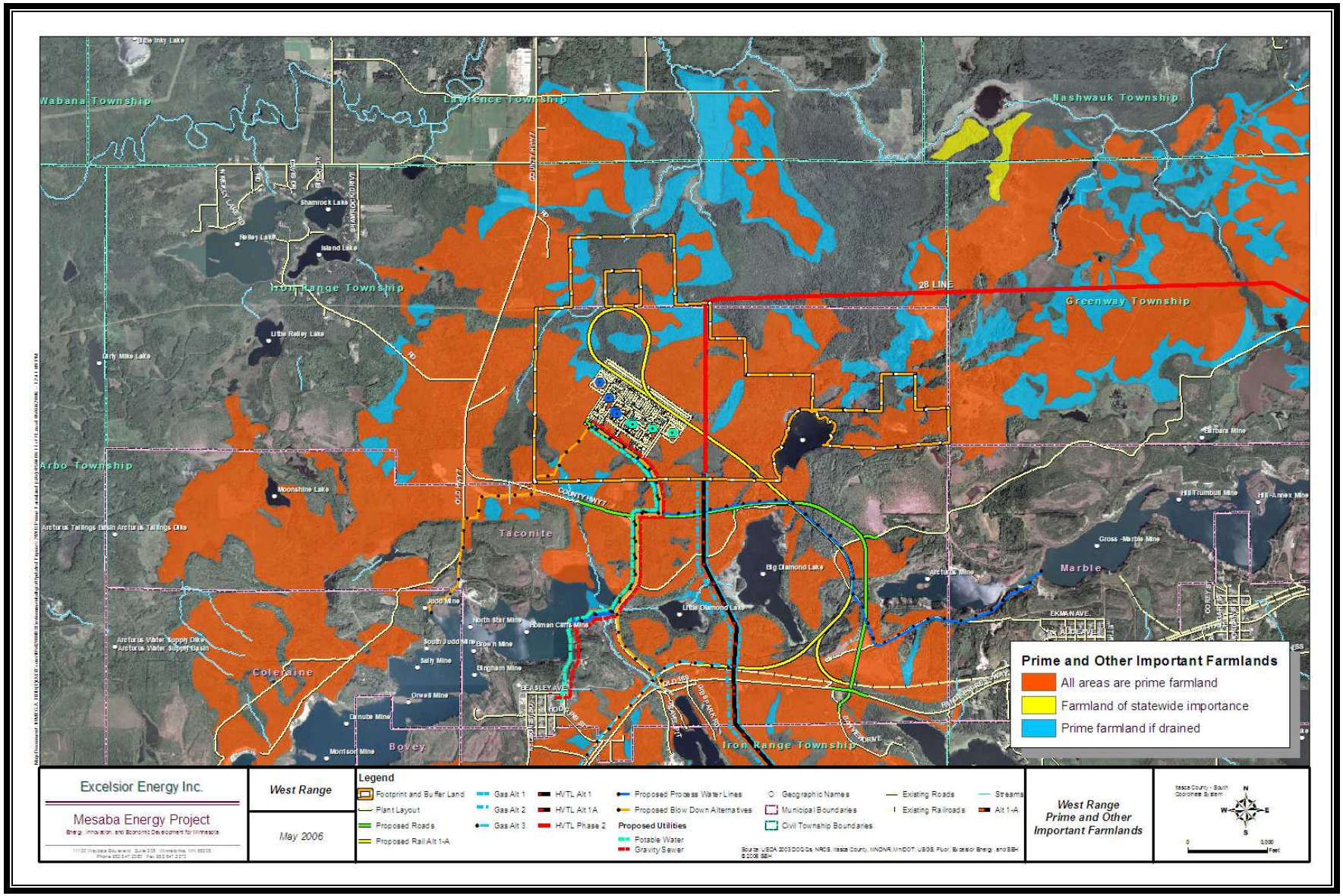


Figure 7.1-13 Prime Farmland and Other Important Farmlands in the Vicinity of Process Water Supply Pipeline Segment 1 the West Range Site

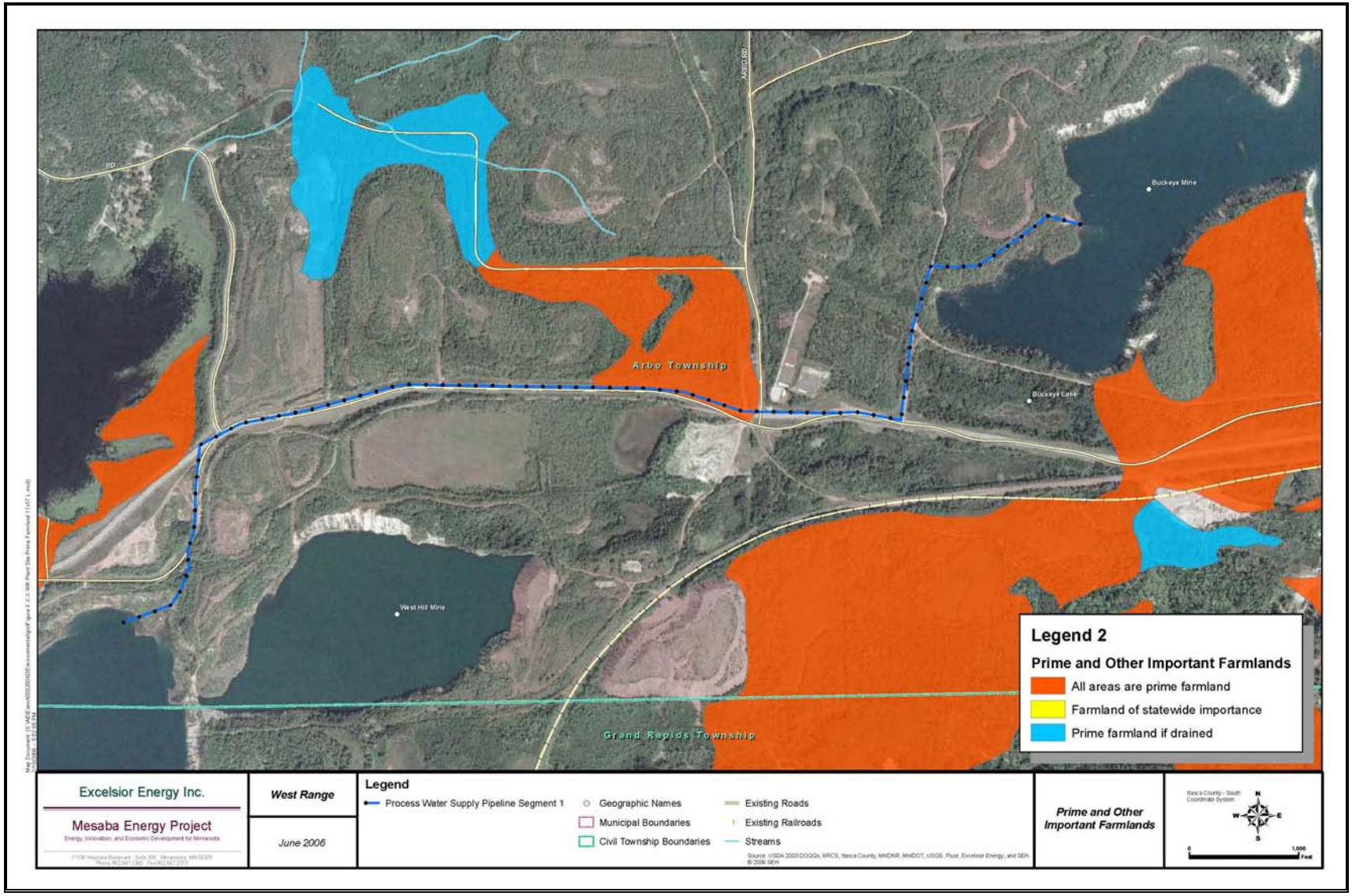


Figure 7.1-14 Zoning in the Immediate Area of the West Range Site

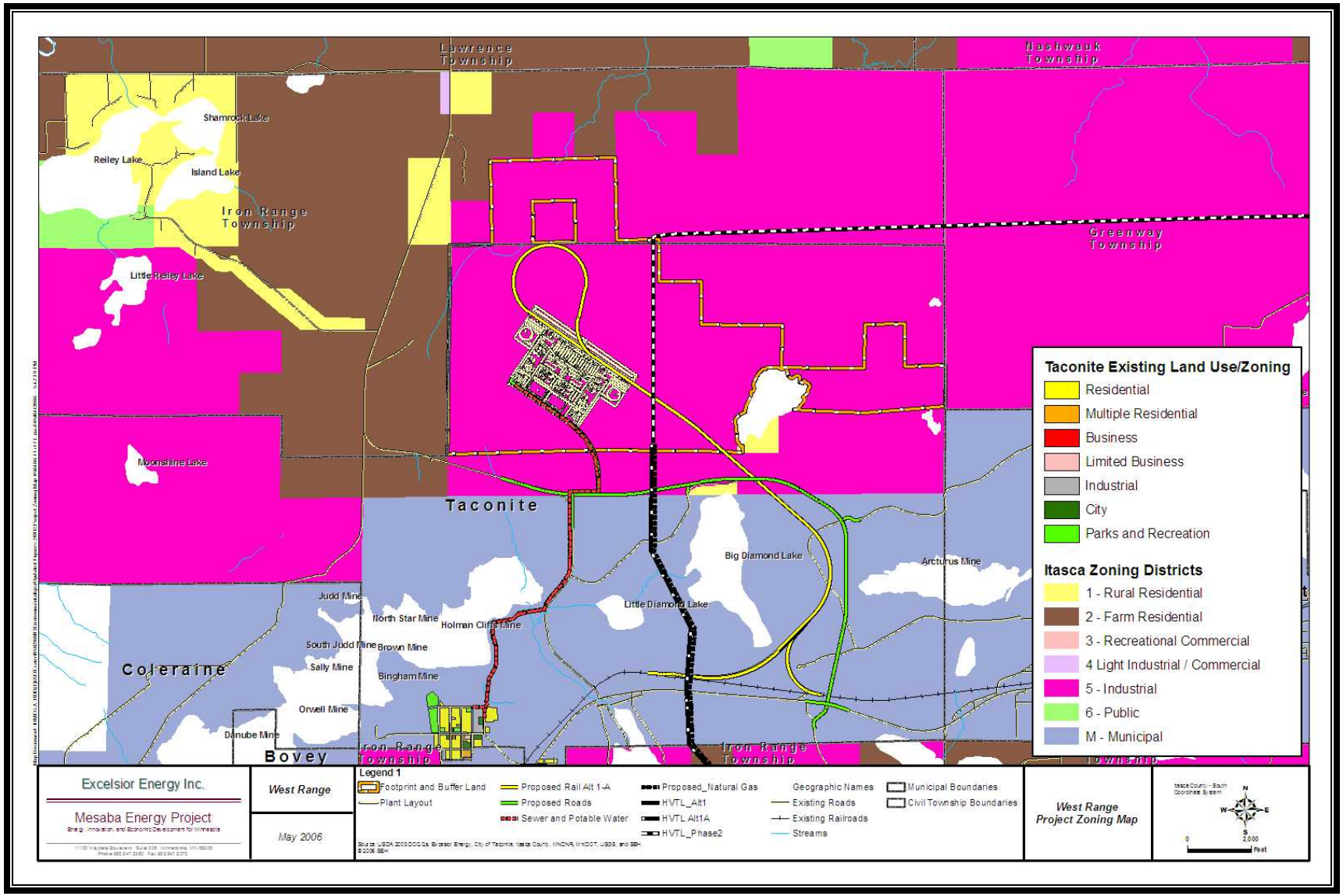
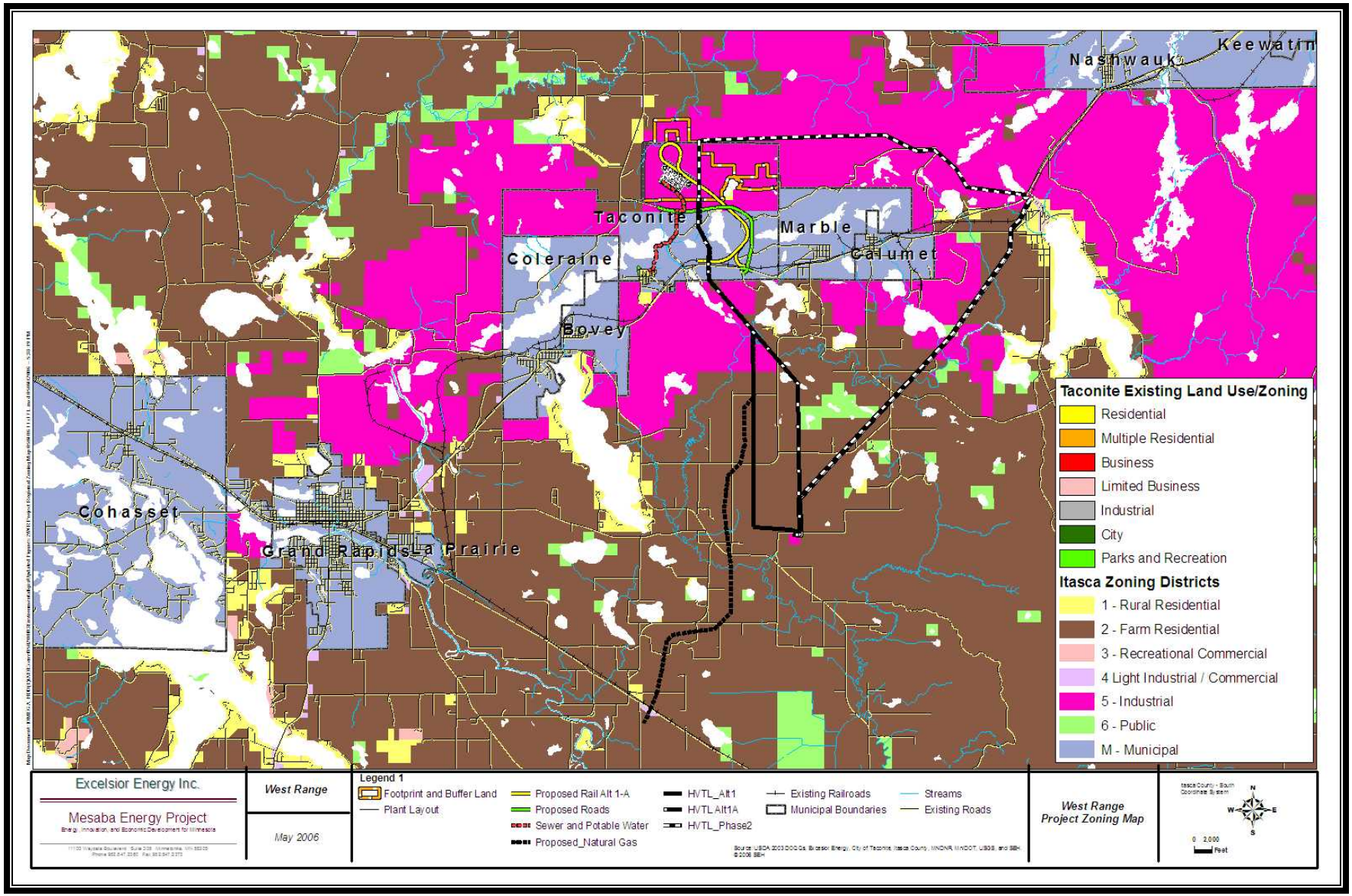


Figure 7.1-15 Zoning in the Region Surrounding the West Range Site, HVTL Routes, and Natural Gas Pipeline Route



The Applicant does not expect any industry to be adversely impacted by the construction and operation of the IGCC Power Station at the West Range Site. Area tourism and recreation areas will not be adversely impacted by the Project. The Hill-Annex State Park will benefit from the IGCC Power Station operations at the West Range Site because the water levels in the Hill-Annex Mine Pit would be better managed, thereby allowing full or expanded use of the Park (See Section 3.6.1.1 for a description of the West Range water management plan).

7.2 NEARBY RESIDENCES AND OTHER SIGNIFICANT RECEPTORS

Significant receptors are locations where people gather in groups or spend extended periods of time. Significant receptors also include locations where children, elderly, or the infirm live or spend time, and include residences, schools, daycare centers, recreation centers, playgrounds, nursing homes and hospitals. Figure 2.5-2 above shows the location of residences and other significant receptors in the vicinity of the West Range Site. Figure 7.1-14 also indicates that the residences on Big Diamond and Dunning Lakes are located immediately adjacent to an area zoned "Industrial." Presumably, owners of such residences purchased such properties with knowledge of such zoning and/or did not object to such designation.

7.2.1 IGCC Power Station Footprint and Buffer Land

7.2.1.1 Distance of Nearby Receptors from IGCC Power Station Emission Points

The closest residence located 0.7 miles west of the IGCC Power Station (see Table 7.2-1 below and Figure 7.2-1). Other residences that are located to the northwest, southwest, southeast, and east-southeast are located about 390 to 850 feet further away than the closest residence.

The residences most likely to be affected by construction and operation of the IGCC Power Station are located to the southwest on the north shore of Big Diamond Lake ("BDL") and the southeast shore of Dunning Lake ("DL"). The residences on the lake shore are a mix of seasonal and year-round dwellings. These properties will not be buffered to the same extent as properties located in all other radial directions. The proposed rail track and the proposed realignment of CR 7 will cut between the two lakes with the rail spur extending in a northwesterly direction and the highway extending directly to the west, just north of the existing haul road now used for access by local residents. Construction of these two transportation elements will likely take place over a two year period interrupting the residents' normal daily activities. Thereafter, increased levels of construction traffic will be ongoing over several years as construction of Mesaba One and Mesaba Two reach peak levels.

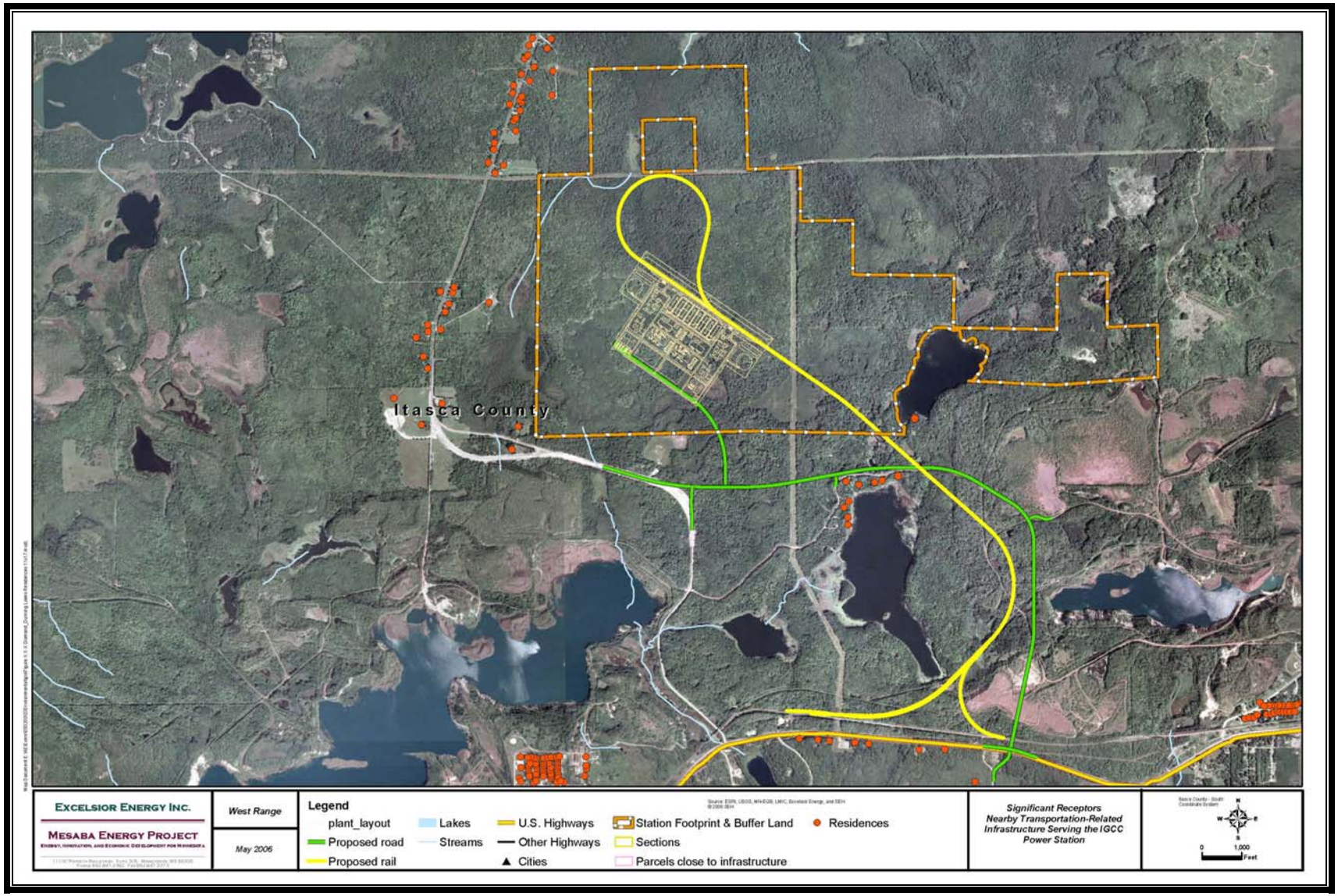
Figure 7.2-1 shows the residential properties on BDL and DL and their proximity to the proposed rail spur and the realignment of CR 7. The closest resident on the shore of BDL is about 500 feet from the track centerline and the single resident on DL is about 800 feet away. The closest resident on Big Diamond Lake to the rail alignment is also the closest to the realigned CR 7, approximately 200 feet distant from its centerline. One other property owner on BDL will be located about that same distance from the centerline of the highway. The properties located in all other radial directions will be far less exposed to construction and operational disturbances. Impacts on all receptors is addressed in the remaining sections of this Chapter 7.

The City of Taconite has both single-family and multi-family residential houses. The majority of these residences are occupied year-round. The closest residents of Taconite are located approximately 1.7 miles south-southeast of the IGCC Power Station Footprint.

Table 7.2-1
Receptors Located Nearby the IGCC Power Station Footprint

Location	Approximate Distance from the nearest edge of IGCC Power Station Footprint
R2 Residence, on Big Diamond Lake	3,850' to the southeast
R3 Residence, 31950 CR 7	3,800' to the west
R4 Residence, 32423 CR 7	4,400' to the west
R5 Residence, on Dunning Lake	4,175' to the east
R6 Lutheran Church	18,000' to the southeast
R7 Catholic Church	10,700' to the NNW

Figure 7.2-1 Residential Receptors Located Nearby the IGCC Power Station



7.2.2 Alternate HVTL Routes

The significant receptors within ½ mile of the Preferred and Alternate HVTL routes were identified from aerial photography and a helicopter overflight of the applicable HVTL routes. Table 7.2-2 summarizes the significant receptor inventory along each route

Table 7.2-2
Residences Along HVTL Routes

HVTL Route	Receptors	Distance from Centerline of Alignment (ft)					
		0-50	50-100	100-300	300-500	500-1,320	1,320-2,640
Preferred Route	66 residences	0	0	1	3	13	49
Plan B Phase II Alternate Route	214 residences	0	0	8	21	69	116
Alternative Route	62 residences	0	0	2	5	14	41

Only residential receptors are located within ½ mile of the centerline of each HVTL alignment. Of those receptors, all appear to be located at a distance from the centerline that exceeds 100 feet. Prior to construction, the Applicant will attempt to shift the HVTL alignment to avoid residences located too close to the centerline of the ROW.

7.2.3 Proposed Natural Gas Pipeline Route

The locations of significant receptors within ½ mile of the centerline of the Proposed Natural Gas Pipeline Route were identified from aerial photography. Table 7.2-3 provides a summary of the significant receptor inventory for this route. An analysis of the Other Considered Natural Gas Pipeline Routes is provided in the ES.

Table 7.2-3
Significant Receptors Located along the
Proposed Natural Gas Pipeline Route

Significant Receptors	Distance from Centerline of Alignment (ft)					
	0-50	50-100	100-300	300-500	500-1,320	1,320-2,640
153 residences	0	0	3	14	61	75
Trout Lake Cemetery	0	0			X	
Trout Lake Church				X		

All significant receptors located within ½ mile of the centerline of the Proposed Natural Gas Pipeline Route are located at a distance greater than 100 feet from its proposed centerline. The Trout Lake Church and Trout Lake Cemetery are about 470 feet and 720 feet away from the centerline of the Pipeline Route alignment and are shown above in Figure 2.5-2.

7.2.4 Process Water Supply Pipelines

The location of significant receptors within ½ mile of each of the Process Water Supply Pipeline Segments were identified by aerial photography. Table 7.2-4 below provides a summary of the significant receptor inventory.

Table 7.2-4
Significant Receptors along the Process Water Supply Pipeline

Significant Receptors	Number	Distance from Centerline of Alignment (ft)					
		0-50	50-100	100-300	300-500	500-1,320	1,320-2,640
Segment 1 (Lind Pit to Canisteo Pit)	15	0	0				15
Segment 2 (Canisteo Pit to West Range Site)	0	0	0	0	0	0	0
Segment 3 (Gross-Marble Pit to Canisteo Pit)	89			1	3	3	82

Only residential receptors are located within ½ mile of any of the process water supply pipeline segments, and only one is less than 100 feet from the centerline of the alignment.

7.2.5 Process Water Blowdown Pipelines

Significant receptors within ½ mile of each of the process water blowdown pipelines were identified from aerial photography. Table 7.2-5 below provides a summary of the significant receptor inventory.

Table 7.2-5
Significant Receptors along the Process Water Blowdown Pipelines

Process Water Blowdown Pipeline	Number	Distance from Centerline of Alignment (ft)					
		0-50	50-100	100-300	300-500	500-1,320	1,320-2,640
Pipeline 1	8	0	0	0	0	0	8
Pipeline 2	6	0	0	1	1	1	3

Only residential receptors are located within ½ mile of any of the process water blowdown pipelines, and all are greater than 100 feet from the centerline of the alignments.

7.2.6 Potable Water and Sewer Pipelines

Significant receptors within ½ mile of each of the Potable Water and Sewer Pipeline alignment were identified from aerial photography. Table 7.2-6 below provides a summary of the significant receptor inventory.

Table 7.2-6
Significant Receptors along the Potable Water and Sewer Pipeline Alignment

Potable Water and Sewer Pipelines	Number	Distance from Centerline of Alignment (ft)					
		0-50	50-100	100-300	300-500	500-1,320	1,320-2,640
Potable Water and Sewer Alignment	114	0	1	3	0	63	46

Only residential receptors are located within ½ mile of the potable water and sewer alignment, and all but one are greater than 100 feet from the centerline of the alignment centerline. The only exception is a home that is located approximately 90 feet from the centerline.

7.2.7 Railroad

Significant receptors within ½ mile of each of the railroad alignment alternatives were identified from aerial photography. Table 7.2-7 below provides a summary of the significant receptor inventory.

Table 7.2-7
Significant Receptors along the Alternative Railroad Alignments

Rail Line Alternative	Number	Distance from Centerline of Alignment (ft)					
		0-50	50-100	100-300	300-500	500-1,320	1,320-2,640
Rail Line Alternative 1A	16	0	0	0	0	10	6
Rail Line Alternative 1B	8	0	0	0	0	8	0

Only residential receptors are located within ½ mile of any of the railroad alternative alignments, and all are greater than 500 feet from the centerline of the alignments.

7.2.8 Roads

Significant receptors within ½ mile of each road alignment were identified from aerial photography. Table 7.2-8 provides a summary of the significant receptor inventory.

Table 7.2-8
Significant Receptors along Access Roads

Roads	Number	Distance from Centerline of Alignment (ft)					
		0-50	50-100	100-300	300-500	500-1,320	1,320-2,640
Access Roads 1 & 2	22	0	0	1	5	4	12

Only residential receptors are located within ½ mile of any of the road alignments, and all but one are located at a distance greater than 300 feet from the centerline of the alignments. The one exception is located approximately 200 ft from the centerline of the alignment.

7.2.9 Displacement

No resident or business will be displaced as a result of the construction or operation of Mesaba One and/or Mesaba Two.

7.3 AESTHETICS

A detailed evaluation of the areas from which the new Power Station and transmission lines will be visible is provided in Section 3 of the Environmental Supplement. This section of the Application provides an overview of the general visual impacts from the plant, HVTL, and pipelines.

The Mesaba Project will affect views in West Range Site area primarily in two ways. First, some of the IGCC Power Station buildings and exhaust stacks will be visible from nearby residential areas and roadways. Second, the new, taller, high-voltage transmission line structures will be visible along the selected transmission line corridors. In addition, along natural gas and water pipeline corridors (and along new roadways or railway) trees will be cleared in some areas and construction will require filling or relocation of wetlands. Permanently cleared right-of-way on these corridors will be visible where the routes follow or cross existing roadways.

7.3.1 IGCC Power Station

Near the West Range IGCC Power Station buildings and stacks will be screened but still be visible from nearby homes, businesses and the nearest public highway, CR 7. The highest buildings within the IGCC Power Station are the rod mill feed bins (150 feet) and generator buildings (90 feet). The tallest stack is on the tank vent boiler (210 feet); however, that stack is only six-feet in diameter and will not be highly visible. The stack on the generator building will be 150 feet tall. An artist's visualization of the Phase I and II Developments is provided above in Figure 3.2-2.

7.3.2 High-Voltage Transmission

The proposed double circuit 345-kV high-voltage transmission line for the West Range Site would be constructed primarily on steel single-pole structures to minimize the width of the right-

of-way needed and to minimize land use conflicts. While single steel poles cost more and are taller than wooden H-frame supports or other alternatives, they do allow for longer spans and require less right-of-way. Longer spans between poles require fewer poles than other structure types. For the proposed double -circuit 345-kV line, the structures would 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 right-of-way with an existing line near the Blackberry Substation. On that segment, the line would carry three circuits, including the existing circuit, on one set of structures. H-frame or other structure types may be necessary near waterfowl areas or interstate crossings. These single-pole structures would be visible to residents along the proposed route between the IGCC Power Station and the Blackberry Substation.

7.3.3 Pipelines and Roadways

Where the pipelines are constructed under a roadway or ATV trail-type surface, the surface condition will be maintained or improved. Since most of the proposed pipeline routes are currently covered with wooded areas, brush, or grassy vegetation, little visual change would result from construction or maintaining the proposed alignments. Where the routes follow the existing highway, clearing of trees and shrubs will be noticeable.

7.4 AIR QUALITY

The projected annual air emissions for Mesaba One and Mesaba Two are provided above in Section 3.4.1. In this section, we summarize the applicable regulatory requirements, emission controls evaluated, and the site-specific impacts of air emissions as modeled at receptors and the Federal Class One areas nearest the West Range Site. The engineering and operational design of the proposed IGCC Power Station, including air emission controls, is provided in Section 3. In addition, the Part 70 Air Permit Application filed with the MPCA provides details regarding all regulatory requirements, emission calculations, ambient air modeling assumptions, and modeling results.

7.4.1 BACT Requirements

Since the Project is subject to Prevention of Significant Deterioration (PSD) review, a Best Available Control Technology (BACT) analysis is required. The BACT analysis is independent of the location of the plant, so the results of the analysis are applicable to both the West and East Range Sites.

The BACT analysis was conducted for the following pollutants that exceed their respective PSD significance threshold: carbon monoxide, nitrogen oxides, sulfur dioxide, particulate matter, particulate matter less than ten microns in diameter (PM_{10}), ozone (volatile organic compounds are the surrogate pollutant for ozone), lead, and sulfuric acid mist.

The analysis was conducted in accordance with USEPA's "top-down" BACT methodology. The "top-down" process involves the identification of all applicable control technologies according to control effectiveness. The owner or operator then evaluates the "top," or most stringent, control alternative. If the most stringent alternative is shown to be technically or economically

infeasible, or if environmental impacts are severe enough to preclude its use, then the next most stringent control technology is similarly evaluated. This process continues until the BACT level under consideration cannot be eliminated by technical or economic considerations, energy impacts, or environmental impacts.

Potential control options were identified by researching the EPA database known as the RACT/BACT/LAER Clearinghouse (RBLC), drawing upon previous environmental permitting for similar units, engineering experience, discussions with equipment vendors, and researching available literature. Available controls were further evaluated based on an analysis of economic, environmental, and energy impacts. The permitted IGCC power stations in the United States that were used in this analysis are as follows:

- SG Solutions, Wabash River Generating Station, West Terre Haute, IN (operating)
- Tampa Electric Company, Polk Power Station, Mulberry, Florida (operating)
- We Energies, Elm Road Generating Station, Wisconsin (permitted)
- Global Energy, Inc.'s Kentucky Pioneer Energy LLC, Trapp, Kentucky (permitted)
- Global Energy, Inc.'s Lima Energy Company, Lima, Ohio (permitted)

A summary of the proposed BACT controls and associated emission rates for each emission unit is shown in Table 7.4-1. This analysis includes the syngas-fired CTGs, tank vent boilers, cooling towers, flare, emergency diesel generators, and diesel fire water pumps.

Table 7.4-1
Proposed BACT for the IGCC Power Station

Pollutant	Control	Emissions Limits
Syngas-Fired Combustion Turbines (emissions shown per CTG)		
NO_x	Diluent Injection	15 ppm NOx @ 15%O_2; 157 lb/hr per CTG on syngas fuel
		25 ppm NOx @ 15%O_2; 198 lb/hr per CTG on natural gas fuel
CO	Good Combustion Practice (GCP)	15 ppm @ actual O_2 (above 50% load) 95 lb/hr per CTG
PM/PM_{10}	GCP, gas cleanup, Gaseous Fuels only	25 lb/hr
SO_2	Gas cleanup/Use of Clean Syngas	76 lb/hr SO_2 per CTG; (approx. 50 ppmv sulfur, as H_2S, in undiluted syngas)
VOC	GCP	9 lb/hr per CTG
Lead	Gas cleanup/Use of Clean Syngas	0.087 tons/yr per CTG
H_2SO_4	Gas cleanup/Use of Clean Syngas	5.3 lb/hr, 23.2 tpy

Pollutant	Control	Emissions Limits
Cooling Towers		
PM_{10}	High Efficiency Drift Eliminators	0.001% drift
Tank Vent Boiler		
NO_x, SO_2, CO, VOC, PM_{10}	GCP, Gas cleanup/Use of Clean Syngas or Natural Gas	
Flare		
NO_x, SO_2, CO, VOC, PM_{10}	Good Flare Design, Flaring only treated Syngas	
Fire Pumps		
NO_x, SO_2, CO, VOC, PM_{10}	GCP, limited hours of operation, and use of low-sulfur diesel	Less than 100 hrs/yr operation; low sulfur diesel
Emergency Diesel Generators		
NO_x, SO_2, CO, VOC, PM_{10}	GCP, limited hours of operation, and use of low-sulfur diesel	Less than100 hrs/yr operation; low sulfur diesel

7.4.2 NAAQS and PSD Increment Impact Analysis

State and federal air quality rules prohibit emissions from a new facility that cause or contribute to an exceedance of State or National Ambient Air Quality Standards (NAAQS). In addition, emissions cannot exceed established Prevention of Significant Deterioration (PSD) increments. To demonstrate compliance with these requirements, the Applicant conducted the required air dispersion modeling analysis for the IGCC Power Station at the West Range Site. The AERMOD air dispersion model, which is MPCA's and USEPA's preferred model, was used for the analysis.

7.4.3 Significant Impact Analysis

Results of AERMOD modeling confirmed that facility emissions from Phases I and II would exceed Significant Impact Levels (SILs). Wherever modeled pollutant concentration increases exceed the SILs, further modeling is required under PSD rules to ensure that the Class II PSD increment for the area is not violated. This further evaluation must include all sources within 50 kilometers of the project's area of impact. The significant area of impact is determined by the farthest distance from the site that exceeded the SILs.

Table 7.4-2 below shows modeled impacts at normal operation, when the flares are operated, and during system startup. Because highest predicted impacts are above the SILs, PSD increment and NAAQS compliance modeling was necessary for SO_2, PM10, and 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, PM10, and NO_x, since normal operations (full load operation) represent the highest emission concentration scenario. A 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. 7.4-2
Highest Project Impacts (Phase I and II) and PSD SILs West Range IGCC Power Station

Pollutant and Averaging Time	Normal Operation	Flaring	Startup	SIL
	ug/m^3	ug/m^3	ug/m^3	ug/m^3
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
PM10				
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

7.4.4 PSD Increment

Increment analyses were completed for SO_2, PM10, 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, in conformance with good modeling practice. Of note, the major emission reduction plans recently announced by Minnesota Power for its Syl Laskin, Clay Boswell, and Taconite Harbor power generation facilities were not included in the modeling analysis.

The results of the increment analyses are shown in Table 7.4-3, along with a comparison to the allowable Class II PSD increments. The data in Table 7.4-3 demonstrate that the Mesaba Project, in combination with all other regional PSD sources, will be in full compliance with all state and federal increment limits.

Table 7.4-3
Results of Class II PSD Increment Analysis (µg/m^3)
West Range IGCC Power Station

Pollutant/Averaging Time	Highest*Concentration	PSD Increment
SO_2: 3-hour	76.4	512
24-hour	20.8	91
annual	1.56	20
PM10: 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 is shown. For annual average, the highest concentration for any of the five years is listed.

7.4.5 Class II NAAQS Evaluation

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

Inclusion of other regional sources utilized a two step procedure pursuant to recommendations of MPCA modeling staff. In the first step, the Mesaba Project was modeled with nearby sources whose 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, and included a much larger inventory of regional emission sources. The full regional inventory, referred to as First Approximation Run (FAR) data, was also provided by the MPCA. FAR data files were generated specifically for the Mesaba site location (again, not including the Minnesota Power emission reduction plan) with separate files provided for each pollutant and averaging time.

Application of the FAR data provided 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. In the case of Mesaba One and Two, the models clearly demonstrated that the highest predicted impacts in the analysis are far below applicable standards, and that there are very low impacts of regional sources within the Phase I and II IGCC Power Station's significant area of impact. Therefore, the FAR DATA methodology demonstrated compliance with all NAAQS limits.

Table 7.4-4 summarizes results of the NAAQS model analysis. For SO_2, PM10, and NO_x the table shows maximum impacts of 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. However, the data in Table 7.4-4 show CO concentrations from Mesaba One and Mesaba Two alone, and conservative total concentration estimates obtained by adding an urban background concentration to predicted Mesaba One and Mesaba Two impacts. All predicted concentrations are far below allowable levels and the results demonstrate compliance with all Minnesota and Federal ambient air quality standards.

Table 7.4-4
Results of Project Class II NAAQS Modeling West Range

Pollutant Averaging Time	Highest (1) Mesaba Alone	Highest(1) Mesaba & Nearby	Highest(1) All Sources	Back-ground	Total	NAAQS
	ug/m^3	ug/m^3	ug/m^3	ug/m^3	ug/m^3	ug/m^3
SO2						
1-hour	124.5	262.7	267.8	10	277.8	1300
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
PM10						
24-hour	11.0	11.7	15.4	20	35.4	150
Annual	1.86	2.16	3.38	10	13.4	50
NOx						
Annual	2.69	3.19	4.88	5	9.9	100
CO						
1-hour	2689.6	N/A	N/A	7000(2)	9690	40,000
8-hour	389.7	N/A	N/A	3000(2)	3390	10,000

(1) Listed Highest Concentrations are highest second-high for one to 24-hour averaging times except for PM10, 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.

7.4.6 Risks to Human Health and Ecology

The Applicant conducted an Air Emissions Risk Assessment ("AERA") to determine whether air emissions from the IGCC Power Station may pose an unacceptable health risk to people living or farming nearby, or from eating fish from nearby lakes. The maximum predicted emissions of all potentially toxic chemicals of potential concern ("COPC") are provided in Section 3.4, above. The detailed assumptions, inputs and results of the AERA are available in the air permit application submitted to the MPCA.

The AERA was completed using several methodologies. First, acute (short-term) and sub-chronic (one-month) exposure risks were estimated using MPCA's Risk Assessment Screening Spreadsheet ("RASS") and Equivalent Risk Emission Rate ("ERER") approaches. Second, chronic risks (long-term cancer risk) were estimated using the Industrial Risk Assessment Program ("IRAP") – Health View model. The IRAP model included the evaluation of the risk

associated with inhalation as well as other exposure pathways—such as eating fish indirectly contaminated by facility air emissions. In addition, the Applicant estimated whether mercury emissions from the facility would increase the amount of mercury in fish in nearby Big Diamond Lake as well as the associated health risk due to consumption of mercury-contaminated fish. The incremental health risk of mercury emissions was estimated using both the MPCA Draft Mercury Risk Estimation Method (MPCA 2005a) and a revised version of the MPCA method using results from the AERMOD air dispersion model.

7.4.6.1 Acceptable Health Risk

The MPCA benchmark for determining whether a facility's emissions present either an acute and/or sub-chronic (non-carcinogenic) health risk to nearby residents through inhalation is called a total "hazard index." The total hazard index accounts for the risk due to inhalation of all COPC by a maximally exposed person. The acceptable MPCA total hazard index for acute and sub-chronic exposures is 1.0 or less. For chemicals producing carcinogenic (chronic) effects, the acceptable MPCA regulatory benchmark is a total cancer risk of less than one in 100,000 (10^{-5}) for a maximally exposed person.

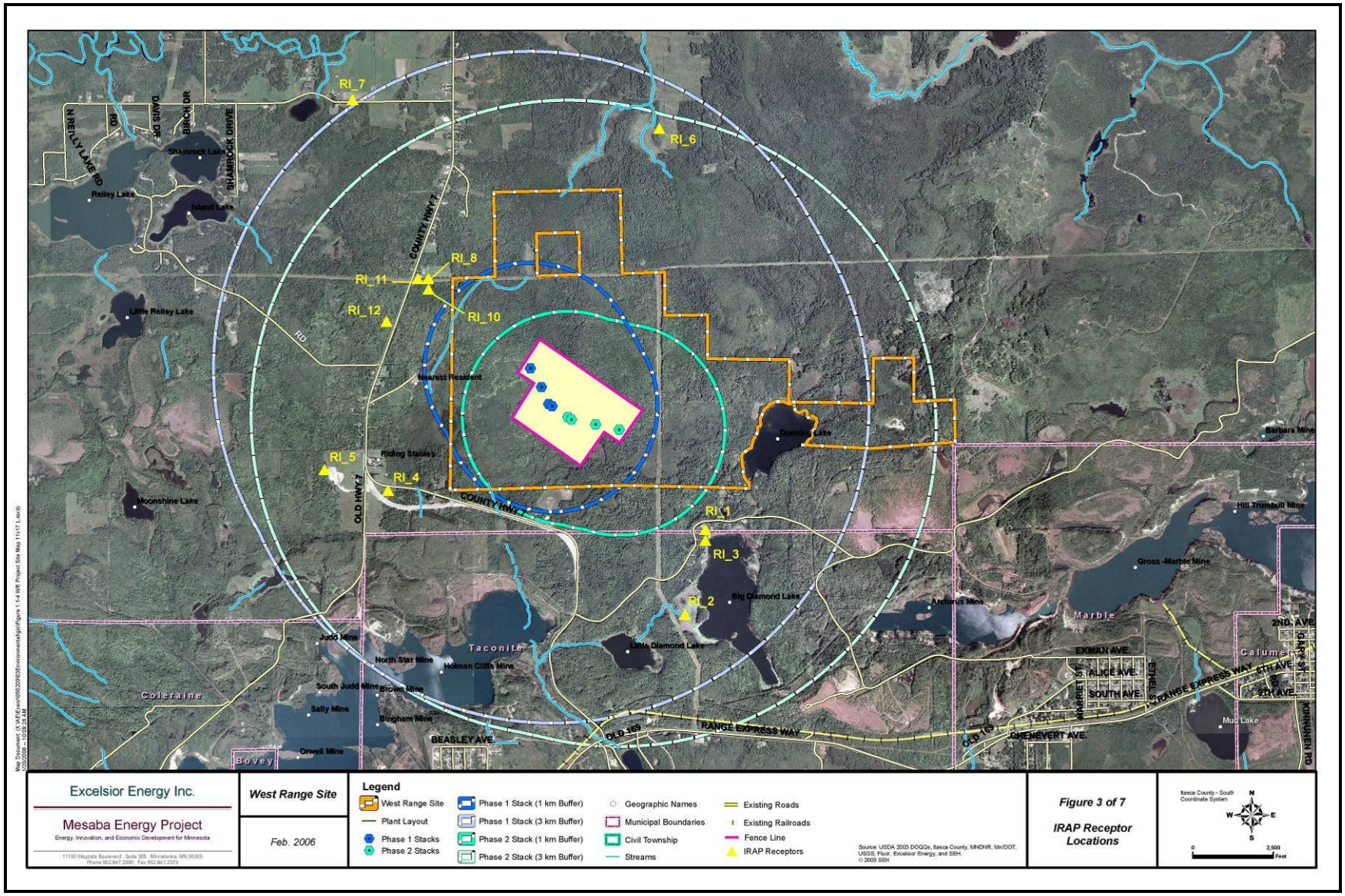
7.4.6.2 Nearby Receptors

Figure 7.4-1 shows the receptors located closest to the IGCC Power Station's point source stack emissions. The closest residence is located more than 1 kilometer away from the closest stack emission point.

7.4.6.3 RASS and ERER Results

The acute and sub-chronic potential "hazard index" was modeled at the receptor locations described above in Section 7.2. Using default, conservative RASS dispersion assumptions, the RASS spreadsheet results exceeded the MPCA hazard index of 1.0. However, the RASS spreadsheet is a "screening" tool with conservative emission dispersion and other assumptions. Therefore, a hazard index of 1.0 using the RASS does not necessarily mean that a project presents a health risk but only that additional detailed modeling must be performed to determine whether such a hazard is in fact likely.

Figure 7.4-1 Health Risk Assessment Residential Receptors



In this case, using the more refined ERER methodology (described in the AERA of the air permit application), the acute and sub-chronic health risks method are 0.52 and 0.13, respectively. Thus when using the ERER method, which is based on actual stack heights, dispersion parameters and receptor locations, both the acute and sub-chronic hazard indices are well within the acceptable MPCA total hazard index of 1.0. The ERER modeled acute and sub-chronic hazard indices are shown in Figure 7.4-2 and Figure 7.4-3, respectively.

7.4.6.4 IRAP Cancer Risk Assessment

The IRAP model was used to estimate the chronic (cancer) risk and non-cancer risks at eleven receptors representing rural residents, hobby and working farmers, and lakeshore residents. Again, using the emission rates provided in Section 3.4, above, the IRAP model predicts cancer risks ranging from 9.1×10^{-7} to $5.0 \times 10,^{-8}$ depending on receptor location. The IRAP predicted total non-cancer hazard index was 0.032 at the highest receptor. The modeled chronic and non-chronic risks indices are shown in Tables 7.4-5, 7.4-6 and 7.4-7.

Thus, the IRAP non-cancer hazard index is about 1/30 the applicable MPCA hazard index risk level for acute and sub-chronic health risks. The IRAP estimated cancer risk is less than 1/10 of the applicable chronic risk level.

Figure 7.4-2 Acute Hazard Indices From ERER Method

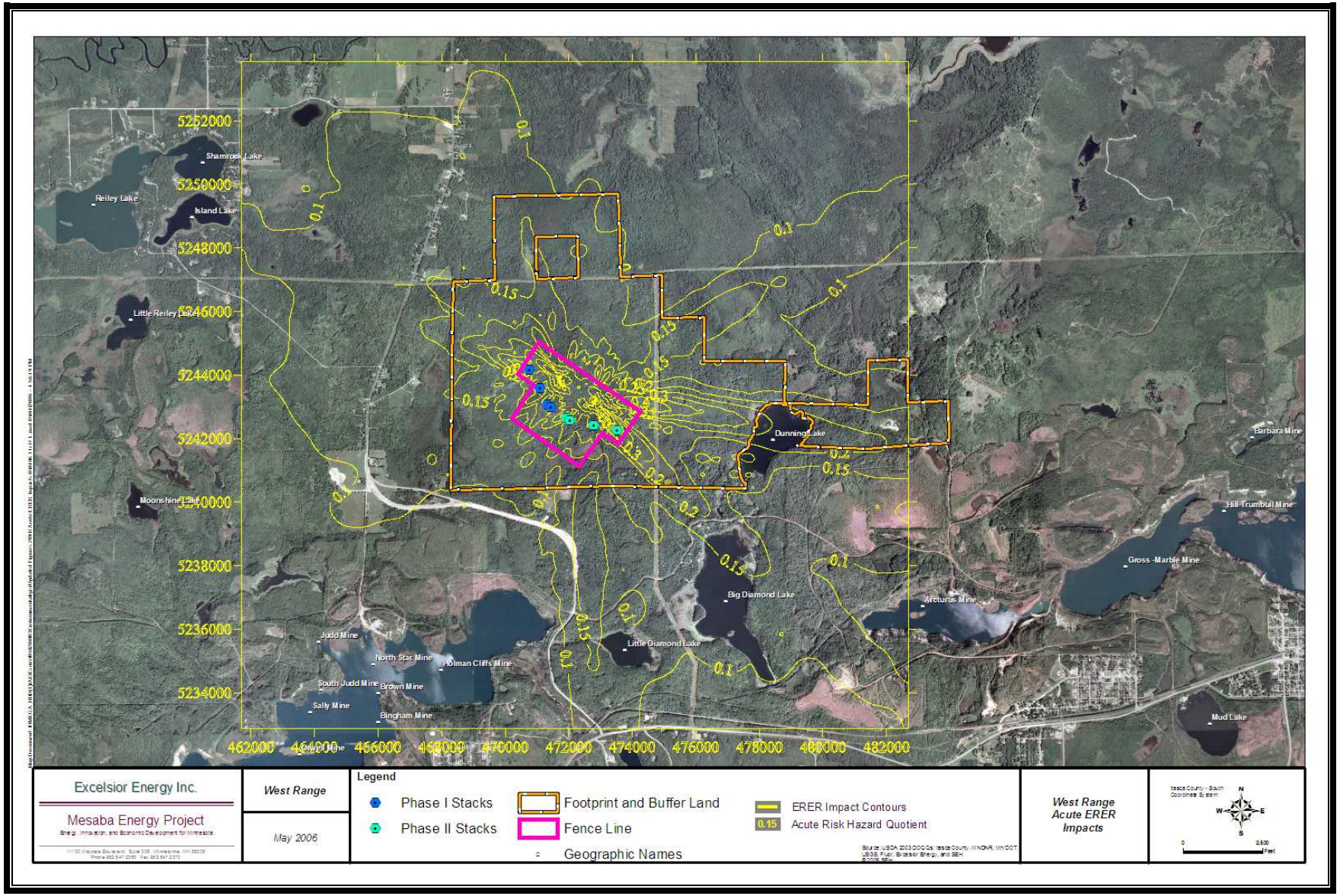


Figure 7.4-3 Subchronic Hazard Indices From ERER Method

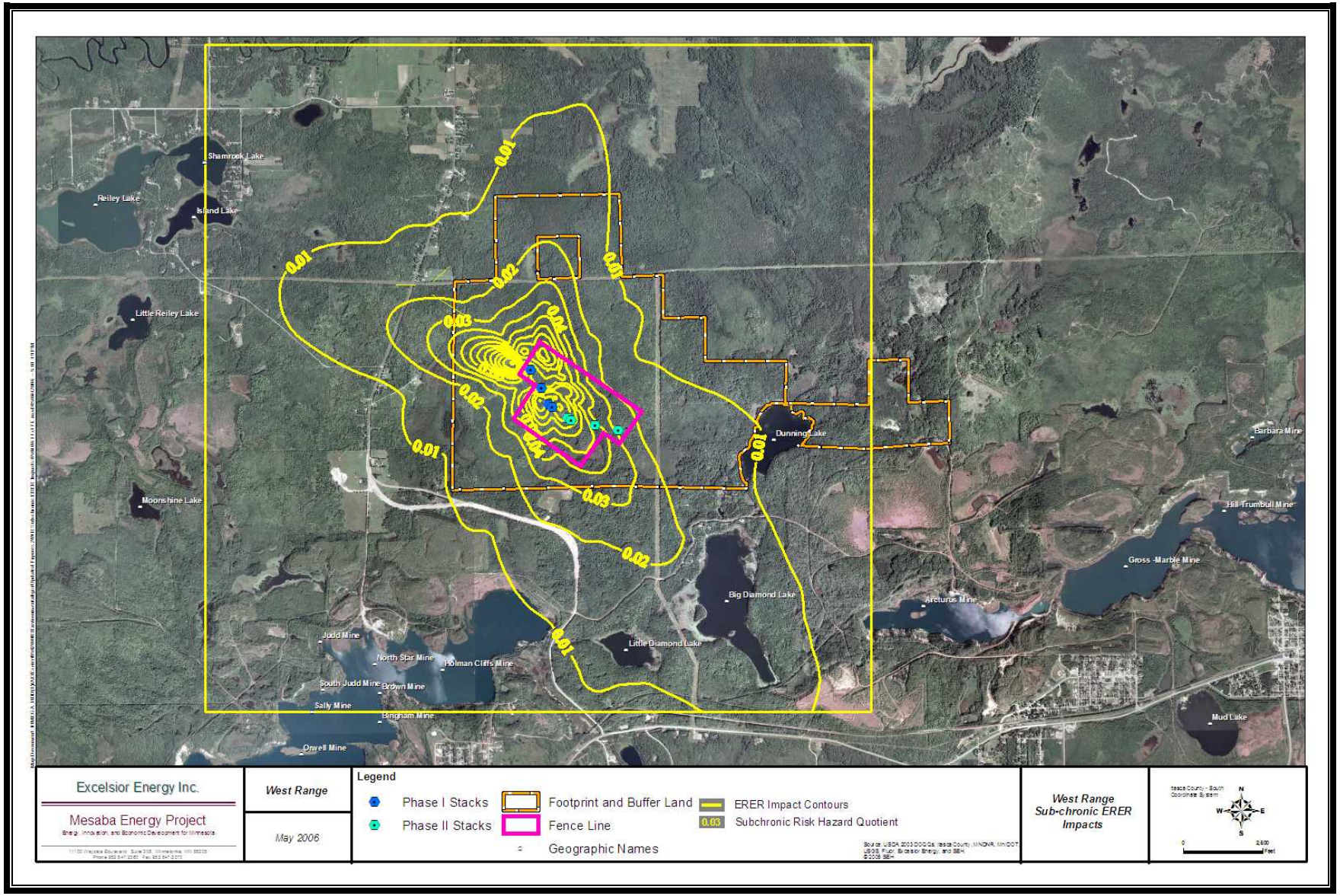


Table 7.4-5
IRAP Risk Summary by Exposure Scenarios

Location	Risk	Exposure Scenario Evaluated						
		Resident		Farmer		Fisher		Risk Acceptance Criteria Ca = 1E05 HQ = 1
		Adult	Child	Adult	Child	Adult	Child	
Rl_1 – Lake Resident	Cancer Risk	6.2E-07	2.5E-07	N/A	N/A	9.1E-07	2.9E-07	Passed
	Hazard Index	0.015	0.032	N/A	N/A	0.015	0.032	Passed
Rl_2 – Lake Resident	Cancer Risk	5.2E-07	2.1E-07	N/A	N/A	8.1E-07	2.4E-07	Passed
	Hazard Index	0.013	0.028	N/A	N/A	0.013	0.028	Passed
Rl_3 – Lake Resident	Cancer Risk	6.2E-07	2.5E-07	N/A	N/A	9.1E-07	2.9E-07	Passed
	Hazard Index	0.015	0.032	N/A	N/A	0.015	0.032	Passed
Rl_4 – Riding Stable	Cancer Risk	1.6E-07	6.5E-08	N/A	N/A	4.6E-07	1.0E-07	Passed
	Hazard Index	0.0036	0.0079	N/A	N/A	0.0037	0.0080	Passed
Rl_5 – Riding Stable	Cancer Risk	1.3E-07	5.0E-08	N/A	N/A	4.2E-07	8.8E-08	Passed
	Hazard Index	0.0028	0.0062	N/A	N/A	0.0029	0.0063	Passed
Rl_6 – NE Hobby Farm	Cancer Risk	2.6E-07	1.1E-07	N/A	N/A	5.6E-07	1.4E-07	Passed
	Hazard Index	0.0064	0.014	N/A	N/A	0.0065	0.014	Passed
Rl_7 – Working Farm	Cancer Risk	1.9E-07	7.4E-08	9.1E-07	2.3E-07	4.8E-07	1.1E-07	Passed
	Hazard Index	0.0047	0.010	0.0050	0.011	0.0048	0.010	Passed
Rl_8 – Rural Resident	Cancer Risk	4.0E-07	1.6E-07	N/A	N/A	6.9E-07	2.0E-07	Passed
	Hazard Index	0.0093	0.021	N/A	N/A	0.0095	0.021	Passed
Rl_10 – Rural Resident	Cancer Risk	4.0E-07	1.6E-07	N/A	N/A	6.9E-07	2.0E-07	Passed
	Hazard Index	0.0093	0.021	N/A	N/A	0.0094	0.021	Passed
Rl_11 – Rural Resident	Cancer Risk	3.7E-07	1.5E-07	N/A	N/A	6.7E-07	1.9E-07	Passed
	Hazard Index	0.0088	0.019	N/A	N/A	0.0089	0.020	Passed
Rl_12 – Rural Resident	Cancer Risk	3.2E-07	1.3E-07	N/A	N/A	6.2E-07	1.7E-07	Passed
	Hazard Index	0.0076	0.017	N/A	N/A	0.0077	0.017	Passed

Table 7.4-6
IRAP Cancer Risk Summary by Exposure Pathways (Page 1 of 3)

Location	Scenario	Pathway									Total Risk	Acceptance Criteria = 1E-5
		Inhalation	Produce	Beef	Poultry	Eggs	Fish	Milk	Pork	Soil		
Rl_1 – Lake Resident	Fisher Adult	2.7E-07	3.3E-07				2.9E-07			1.9E-08	9.1E-07	Passed
	Fisher Child	1.2E-07	9.2E-08				3.8E-08			3.5E-08	2.9E-07	Passed
	Resident Adult	2.7E-07	3.3E-07							1.9E-08	6.2E-07	Passed
	Resident Child	1.2E-07	9.2E-08							3.5E-08	2.5E-07	Passed
Rl_2 – Lake Resident	Fisher Adult	2.3E-07	2.7E-07				2.9E-07			1.5E-08	8.1E-07	Passed
	Fisher Child	1.0E-07	7.5E-08				3.8E-08			2.9E-08	2.4E-07	Passed
	Resident Adult	2.3E-07	2.7E-07							1.5E-08	5.2E-07	Passed
	Resident Child	1.0E-07	7.5E-08							2.9E-08	2.1E-07	Passed
Rl_3 – Lake Resident	Fisher Adult	2.7E-07	3.3E-07				2.9E-07			1.9E-08	9.1E-07	Passed
	Fisher Child	1.2E-07	9.2E-08				3.8E-08			3.5E-08	2.9E-07	Passed
	Resident Adult	2.7E-07	3.3E-07							1.9E-08	6.2E-07	Passed
	Resident Child	1.2E-07	9.2E-08							3.5E-08	2.5E-07	Passed
Rl_4 – Riding Stable	Fisher Adult	6.9E-08	9.0E-08				2.9E-07			5.1E-09	4.6E-07	Passed
	Fisher Child	3.1E-08	2.5E-08				3.8E-08			9.5E-09	1.0E-07	Passed
	Resident Adult	6.9E-08	9.0E-08							5.1E-09	1.6E-07	Passed
	Resident Child	3.1E-08	2.5E-08							9.5E-09	6.5E-08	Passed
Rl_5 – Riding Stable	Fisher Adult	5.3E-08	6.9E-08				2.9E-07			3.9E-09	4.2E-07	Passed
	Fisher Child	2.4E-08	1.9E-08				3.8E-08			7.3E-09	8.8E-08	Passed
	Resident Adult	5.3E-08	6.9E-08							3.9E-09	1.3E-07	Passed

Location	Scenario	Pathway									Total Risk	Acceptance Criteria = 1E-5
		Inhalation	Produce	Beef	Poultry	Eggs	Fish	Milk	Pork	Soil		
	Resident Child	2.4E-08	1.9E-08							7.3E-09	5.0E-08	Passed
Rl_6 – NE Hobby Farm	Fisher Adult	1.2E-07	1.4E-07				2.9E-07			8.0E-09	5.6E-07	Passed
	Fisher Child	5.1E-08	3.9E-08				3.8E-08			1.5E-08	1.4E-07	Passed
	Resident Adult	1.2E-07	1.4E-07							8.0E-09	2.6E-07	Passed
	Resident Child	5.1E-08	3.9E-08							1.5E-08	1.1E-07	Passed
Rl_7 – Working Farm	Farmer Adult	1.1E-07	5.2E-07	6.5E-08	8.7E-09	7.6E-10		2.0E-07	2.1E-09	7.3E-09	9.1E-07	Passed
	Farmer Child	3.7E-08	1.1E-07	4.3E-09	9.1E-10	8.1E-11		6.5E-08	2.4E-10	1.0E-08	2.3E-07	Passed
	Fisher Adult	8.4E-08	9.7E-08				2.9E-07			5.5E-09	4.8E-07	Passed
	Fisher Child	3.7E-08	2.7E-08				3.8E-08			1.0E-08	1.1E-07	Passed
	Resident Adult	8.4E-08	9.7E-08							5.5E-09	1.9E-07	Passed
	Resident Child	3.7E-08	2.7E-08							1.0E-08	7.4E-08	Passed
Rl_8 – Rural Resident	Fisher Adult	1.7E-07	2.1E-07				2.9E-07			1.2E-08	6.9E-07	Passed
	Fisher Child	7.7E-08	5.9E-08				3.8E-08			2.3E-08	2.0E-07	Passed
	Resident Adult	1.7E-07	2.1E-07							1.2E-08	4.0E-07	Passed
	Resident Child	7.7E-08	5.9E-08							2.3E-08	1.6E-07	Passed
Rl_10 – Rural Resident	Fisher Adult	1.7E-07	2.1E-07				2.9E-07			1.2E-08	6.9E-07	Passed
	Fisher Child	7.6E-08	5.9E-08				3.8E-08			2.3E-08	2.0E-07	Passed
	Resident Adult	1.7E-07	2.1E-07							1.2E-08	4.0E-07	Passed
	Resident Child	7.6E-08	5.9E-08							2.3E-08	1.6E-07	Passed
Rl_11 – Rural Resident	Fisher Adult	1.6E-07	2.0E-07				2.9E-07			1.1E-08	6.7E-07	Passed
	Fisher Child	7.2E-08	5.5E-08				3.8E-08			2.1E-08	1.9E-07	Passed
	Resident Adult	1.6E-07	2.0E-07							1.1E-08	3.7E-07	Passed

Location	Scenario	Pathway									Total Risk	Acceptance Criteria = 1E-5
		Inhalation	Produce	Beef	Poultry	Eggs	Fish	Milk	Pork	Soil		
	Resident Child	7.2E-08	5.5E-08							2.1E-08	1.5E-07	Passed
Rl_12 – Rural Resident	Fisher Adult	1.4E-07	1.8E-07				2.9E-07			1.0E-08	6.2E-07	Passed
	Fisher Child	6.0E-08	4.9E-08				3.8E-08			1.9E-08	1.7E-07	Passed
	Resident Adult	1.4E-07	1.8E-07							1.0E-08	3.2E-07	Passed
	Resident Child	6.0E-08	4.9E-08							1.9E-08	1.3E-07	Passed

Note: Blank cells indicate pathway was not evaluated for the scenario.

Table 7.4-7
IRAP Hazard Index Summary by Exposure Pathways (Page 1 of 2)

Location	Scenario	Pathway									HQ Total	Acceptance Criteria = 1
		Inhalation	Produce	Beef	Poultry	Eggs	Fish	Milk	Pork	Soil		
Rl_1 – Lake Resident	Fisher Adult	0.014	0.0003				0.0001			0.000005	0.015	Passed
	Fisher Child	0.032	0.0005				0.0001			0.000042	0.032	Passed
	Resident Adult	0.014	0.0003							0.000005	0.015	Passed
	Resident Child	0.032	0.0005							0.000042	0.032	Passed
Rl_2 – Lake Resident	Fisher Adult	0.012	0.0003				0.0001			0.000004	0.013	Passed
	Fisher Child	0.028	0.0004				0.0001			0.000033	0.028	Passed
	Resident Adult	0.012	0.0003							0.000004	0.013	Passed
	Resident Child	0.028	0.0004							0.000033	0.028	Passed
Rl_3 – Lake Resident	Fisher Adult	0.014	0.0003				0.0001			0.000004	0.015	Passed
	Fisher Child	0.032	0.0005				0.0001			0.000042	0.032	Passed
	Resident Adult	0.014	0.0003							0.000004	0.015	Passed
	Resident Child	0.032	0.0005							0.000042	0.032	Passed
Rl_4 – Riding Stable	Fisher Adult	0.004	0.0001				0.0001			0.000001	0.004	Passed
	Fisher Child	0.008	0.0001				0.0001			0.000011	0.008	Passed
	Resident Adult	0.004	0.0001							0.000001	0.004	Passed
	Resident Child	0.008	0.0001							0.000011	0.008	Passed
Rl_5 – Riding Stable	Fisher Adult	0.003	0.0001				0.0001			0.000001	0.003	Passed
	Fisher Child	0.006	0.0001				0.0001			0.000008	0.006	Passed
	Resident Adult	0.003	0.0001							0.000001	0.003	Passed
	Resident Child	0.006	0.0001							0.000008	0.006	Passed
Rl_6 – NE Hobby Farm	Fisher Adult	0.006	0.0001				0.0001			0.000002	0.006	Passed
	Fisher Child	0.014	0.0002				0.0001			0.000017	0.014	Passed
	Resident Adult	0.006	0.0001							0.000002	0.006	Passed
	Resident Child	0.014	0.0002							0.000017	0.014	Passed

Location	Scenario	Pathway									HQ Total	Acceptance Criteria = 1
		Inhalation	Produce	Beef	Poultry	Eggs	Fish	Milk	Pork	Soil		
Rl_7 – Working Farm	Farmer Adult	0.005	0.0004	0.00001	0.0000	0.0000		0.00001	0.0000	0.000001	0.005	Passed
	Farmer Child	0.010	0.0006	0.00001	0.0000	0.0000		0.00002	0.0000	0.000012	0.011	Passed
	Fisher Adult	0.005	0.0001				0.0001			0.000001	0.005	Passed
	Fisher Child	0.010	0.0002				0.0001			0.000012	0.010	Passed
	Resident Adult	0.005	0.0001							0.000001	0.005	Passed
	Resident Child	0.010	0.0002							0.000012	0.010	Passed
Rl_8 – Rural Resident	Fisher Adult	0.009	0.0002				0.0001			0.000003	0.009	Passed
	Fisher Child	0.020	0.0003				0.0001			0.000027	0.021	Passed
	Resident Adult	0.009	0.0002							0.000003	0.009	Passed
	Resident Child	0.020	0.0003							0.000027	0.021	Passed
Rl_10 – Rural Resident	Fisher Adult	0.009	0.0002				0.0001			0.000003	0.009	Passed
	Fisher Child	0.020	0.0003				0.0001			0.000027	0.021	Passed
	Resident Adult	0.009	0.0002							0.000003	0.009	Passed
	Resident Child	0.020	0.0003							0.000027	0.021	Passed
Rl_11 – Rural Resident	Fisher Adult	0.009	0.0002				0.0001			0.000003	0.009	Passed
	Fisher Child	0.019	0.0003				0.0001			0.000025	0.019	Passed
	Resident Adult	0.009	0.0002							0.000003	0.009	Passed
	Resident Child	0.019	0.0003							0.000025	0.019	Passed
Rl_12 – Rural Resident	Fisher Adult	0.007	0.0002				0.0001			0.000002	0.008	Passed
	Fisher Child	0.017	0.0003				0.0001			0.000021	0.017	Passed
	Resident Adult	0.007	0.0002							0.000002	0.008	Passed
	Resident Child	0.017	0.0003							0.000021	0.017	Passed

7.4.6.5 Mercury Fish Consumption Risk

Based on mercury data for lakes in the region, the 90th percentile northern pike in nearby Big Diamond Lake has a mercury contamination level of 0.56 ppm. As described below, using the MPCA Draft Mercury Risk Estimation Method for the Fish Consumption Pathway (MPCA 2006) it was estimated that emissions from the proposed project would increase the mercury concentration in the 90th percentile pike in Big Diamond Lake by 0.003 ppm.

This predicted mercury increase translates into an incremental increase in the hazard quotient of 0.01 for a subsistence fisher on Big Diamond Lake.

Based on the MPCA assumptions provided below, even if the proposed project is not constructed, the current estimated mercury risk to a subsistence fisher from eating fish from Big Diamond Lake equals a hazard quotient of 1.95 to 2.80, depending on the size of fish consumed (from an average of 21.8 inches to the 90th percentile of 27.8 inches).

In comparison to the existing hazard quotient for subsistence fishers eating fish from Big Diamond Lake, the incremental increase in hazard quotient predicted for inputs of mercury from Mesaba One and Mesaba Two is negligible.

7.4.6.5.1 Mercury Risk Assumptions

Based on the MPCA draft mercury risk assessment method, the Applicant used the following modeling assumptions:

- Background mercury deposition:
  - wet-plus-dry ambient deposition (flux) = 12.5 $\mu g/m^2$-yr – Minnesota default to lake surfaces and 33.6 $\mu g/m^2$-yr to rest of the watershed
  - 10 % watershed deposition transported to water body
  - Lake Finder database lake area for Big Diamond Lake = 122 acres (MNDR Lake Finder)
  - Watershed area for Big Diamond Lake determined using IRAP = 760 acres
- Mercury mass deposited to lake and watershed due to facility emissions
  - Determined by site-specific air dispersion modeling in AERMOD
  - Concentration over lake and watershed = 13 pg/m^3
  - Hg^0 Depositional Velocity = 0.01 cm/sec over the lake and 0.05 cm/sec over the rest of the watershed
  - All mercury emissions are assumed to be elemental mercury (Hg^0)
- Methylmercury estimation in fish fillet
  - Reference species of fish is Northern Pike
  - Database used to determine the current fish tissue concentration = "Allfish 04 NE lakes only" provided electronically as an Excel spreadsheet by MPCA
- Risk assumptions
  - Daily fish consumed = 0.142 kg/day
  - Adult body weight = 70 kg
  - Reference dose for methyl mercury = 1.0×10^{-4} mg/kg-day
- Fish Mercury Assumptions
  - N = Total fish in the modified database = 9,375 Northern Pike

- Minimum length = 6.7 inches
- Maximum length = 45.5 inches
- 90th percentile length fish = 27.8 inches
- Mean mercury concentration of 90th percentile 27.8 inch fish = 0.56 ppm (standard deviation = 0.40)
- Average length fish = 21.8 inches
- Number of fish of 21.8 inches = 105 fish
- Mean mercury concentration of all 21.8 inch fish = 0.39 ppm (standard deviation = 0.26)

7.4.6.5.2 MPCA Mercury Method Results

The MPCA draft local impact mercury assessment produced the following results:

- Mercury Loading Summary:
  - Mercury deposition to the lake from the facility = 0.08 g/yr
  - Background mercury deposition to the lake from rainfall and runoff = 16.51 g/yr
- Incremental increase in mercury in fish tissue from the project – 90th percentile fish size = 0.003 ppm
- Incremental increase in mercury in fish tissue from the project – average fish size = 0.002 ppm
- 90th percentile fish size
  - Ambient Subsistence Fisher Hazard Quotient = 2.80
  - Incremental Subsistence Fisher Hazard Quotient from the project = 0.01
- Average fish size
  - Ambient Subsistence Fisher Hazard Quotient = 1.95
  - Incremental Subsistence Fisher Hazard Quotient from the project = 0.01

7.4.6.5.3 Alternative Mercury Modeling Results

Tests on the Wabash River Coal Gasification Repowering Project showed that 100% of the mercury emitted from the facility was in the volatile, Hg^0, valence state (EPA 2002). Based on these Wabash test results, the limited solubility of elemental mercury in water (Perry and Green, 1984), and the low level emissions of mercury from the IGCC Power Station, the insignificance of the impacts predicted by the MPCA's Draft Mercury Risk Estimation Method for Fish Consumption are realistic. To confirm this, the Applicant also used AERMOD to calculate mercury deposition from the project to Big Diamond Lake and found the deposition rate to be 0.0021 micrograms per square meter per year ($\mu g/m^2$-yr).

The MPCA Hg-2003 evaluation conducted by the Applicant can be found in the application for a Part 70/New Source Review Construction Authorization Permit Mesaba One and Mesaba Two, dated June 2006 and attached as Appendix 5 to this Joint Application.

7.4.7 Class I Impacts and Increment Consumption

An air quality modeling analysis was conducted to estimate impacts of the Project on air quality in the following Class I areas: the Boundary Waters Canoe Area (BWCA), Voyageurs National Park (VNP), and the Rainbow Lakes Wilderness (RLW) located 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 and is located beyond the distance where long-range transport modeling has been shown to provide meaningful impact predictions.

The Class I analyses addressed PSD Class I increments for SO_2, and PM10. The dispersion modeling analysis used standard EPA long-range transport modeling methodologies, and followed the guidance presented in EPA's Guideline on Air Quality Models, the IWAQM Phase II report, and the FLAG Phase I report. The analyses also incorporated the 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 was modeled alone and the results compared with Class I PSD increments and SILs. Table 7.4-8 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, with no further analysis necessary. However, for short-term SO_2 concentrations, impacts are indicated to exceed the SIL in the BWCA and VNP. Because of the 3-hour and 24-hour SO_2 projected impacts, it was necessary to conduct a cumulative impact analysis, including other regional SO_2 increment sources, to quantify total PSD increment consumption.

Table 7.4-8
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)**
SO2 3-Hour	1.3804	1.4547	1.5505	25.0	1.00	1.5505
SO2 24-Hour	0.4554	0.3382	0.3589	5.0	0.20	0.4554
SO2 Annual	0.0147	0.0127	0.0095	2.0	0.10	0.0147
NOx Annual	0.0174	0.0152	0.0109	2.5	0.10	0.0174
PM10 24-Hour	0.0866	0.0617	0.0586	8.0	0.30	0.0866
PM10 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)
SO2 3-Hour	1.5911	1.0477	1.4836	25.0	1.00	1.5911
SO2 24-Hour	0.2506	0.2943	0.4492	5.0	0.20	0.4492
SO2 Annual	0.0128	0.0110	0.0113	2.0	0.10	0.0128
NOx Annual	0.0151	0.0125	0.0142	2.5	0.10	0.0151
PM10 24-Hour	0.0537	0.0500	0.0745	8.0	0.30	0.0745
PM10 Annual	0.0037	0.0032	0.0031	4.0	0.20	0.0037

Rainbow Lakes Pollutant/	Year Evaluated			Class I Inc	Class I SIL	Max
Averaging Period	1990	1992	1996	(ug/m3)	(ug/m3)	(ug/m3)
SO2 3-Hour	0.7088	0.7567	0.7012	25.0	1.00	0.7567
SO2 24-Hour	0.1806	0.1917	0.1711	5.0	0.20	0.1917
SO2 Annual	0.0075	0.0083	0.0065	2.0	0.10	0.0083
NOx Annual	0.0081	0.0071	0.0068	2.5	0.10	0.0081
PM10 24-Hour	0.0369	0.0462	0.0316	8.0	0.30	0.0462
PM10 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 emission and stack data for those northern Minnesota sources with a potential for Class I impacts (again, not including Minnesota Power's emission reduction plans).

The results of the cumulative SO_2 increment analysis are shown in Table 7.4-9. The maximum predicted increment consumption in each of the Class I areas was shown to be well within the PSD Class I limits with the conclusion being that the Mesaba Project will not cause or contribute to any violation of Class I PSD increments.

Table 7.4-9
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)**
SO2 3-Hour	6.1	7.0	5.8	25.0	7.0	NO
SO2 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)
SO2 3-Hour	5.2	4.6	5.5	25.0	5.5	NO
SO2 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)
SO2 3-Hour	4.5	4.3	4.7	25.0	4.7	NO
SO2 24-Hour	1.4	1.2	1.3	5.0	1.4	NO

7.4.8 Visibility

A visibility impact analysis was carried out for BWCA and VNP (visibility analysis is not required for Rainbow Lakes). Detailed modeling inputs, assumptions, and results are contained in the Applicant's MPCA air permit application. 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 Federal Land Managers (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 7.4-10 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 line-of-sight rather than extinction at a single receptor location.

Table 7.4-10
Mesaba CALPUFF Visibility Results

Speciated PM	**1990**	**1990**	**1990**	**1992**	**1992**	**1992**	**1996**	**1996**	**1996**
12/5/2005	**Method 2**	**Method 2**	**Method 2**	**Method 2**	**Method 2**	**Method 2**	**Method 2**	**Method 2**	**Method 2**
	> 5 %	> 10 %	Max %	> 5 %	> 10 %	Max %	> 5 %	> 10 %	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	**1990**	**1990**	**1990**	**1992**	**1992**	**1992**	**1996**	**1996**	**1996**
12/5/2005	**Method 6**	**Method 6**	**Method 6**	**Method 6**	**Method 6**	**Method 6**	**Method 6**	**Method 6**	**Method 6**
	> 5 %	> 10 %	Max %	> 5 %	> 10 %	Max %	> 5 %	> 10 %	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	**1990**	**1990**	**1990**	**1992**	**1992**	**1992**	**1996**	**1996**	**1996**
12/5/2005	**Method 7***	**Method 7**	**Method 7**	**Method 7**	**Method 7**	**Method 7**	**Method 7**	**Method 7**	**Method 7**
	> 5 %	> 10 %	Max %	> 5 %	> 10 %	Max %	> 5 %	> 10 %	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 7.4-10 indicate that calculated visibility impacts greater than 5% or 10% could occur at some times 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 real 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 and 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 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 which may affect visibility.

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 is reasonable to also utilize some 24-hour averaging in calculating the effect of natural visibility impairing events. As an example, 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 7.4-10 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 in the three year data period which exceed the 10% change in light extinction at the BWCA, and no predicted impacts at VNP.

In EPA's BART guidance for regional haze, an average of seven days per year or more exceeding a 5% increase indicates a significant impact. Using this criterion, the Method 7 results show no significant visibility impact of Mesaba One and Mesaba Two at either BWCA or Voyageurs National Park.

7.4.9 Vehicle Traffic Emissions

Emissions will be generated from vehicles operated during construction and operation of the IGCC Power Station and its Associated Facilities. These emissions will be by-products of combustion from vehicle engines and fugitive dust generated from traffic on the roadways near and on the IGCC Power Station Footprint and Buffer Land.

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, employees, on-site contractors, and visitors are expected to total between 125 and 175 persons. Estimated vehicular emissions from the East and West Range Sites are comparable.

When compared with emissions from the facility, vehicular emissions are small. Table 7.4-11 shows estimated peak daily emission rates from personal vehicles during construction. The estimated emission rate of carbon monoxide, the pollutant emitted at the greatest rate, is 22 pounds per day.

Table 7.4-11. 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
NOx	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 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 construction and operation of Mesaba One and Mesaba Two will be a small fraction of the AADT threshold, and further detailed air quality analysis is not appropriate or necessary.

7.4.10 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 entitled: *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 and ambient background concentrations. Most of the designated vegetation screening levels are equivalent to or exceed PSD standards. The 3-hour and 1-hour SO_2 sensitive vegetation screening levels are more stringent than comparable NAAQS and State Ambient Air Quality Standards. The Applicant's 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 7.4-12. The comparison includes ambient background concentrations in the impact levels. As shown in the table, maximum impacts for the 1-hour and 3-hour averaging periods are less than 20% of allowable concentrations.

Since dispersion modeling results at the East and West Range Sites are similar, impacts on vegetation at each site will be similar.

Table 7.4-12
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

7.5 GEOLOGY AND SOILS

This subsection summarizes the geology in the vicinity of the West Range Site, with a more detailed description provided in Section 2 of the ES. Mesaba One and Mesaba Two will not have a significant impact on geology or soils outside the IGCC Power Station Footprint, Buffer Land, and Interconnection Corridors. The impacts on farmland are described in Section 7.1.10.3.

The West Range Site is located within the Superior Upland Section of the Laurentian Upland of the Canadian Shield physiographic province (Leonards, 1962). The physical landscape of the region is typified by forests, lakes and bogs in glacial till over somewhat shallow bedrock. The landscape has been greatly affected by the glaciers that covered the land, the last of which left the area about 12,000 years ago. Physical relief is generally limited to a thousand feet or less

around the West Range Site. The maximum elevation range in the region is from elevation 600 feet msl at Lake Superior to elevation 2,301 feet msl at Eagle Mountain, the highest point in Minnesota.

The West Range Site is located in a regional area that generally consists of low glacial moraines and till plains. Physically, the local landscape is dotted with 300-to-400-foot deep mine pits, large mine-pit overburden spoil piles, and tailing basins, all of which are associated with former iron ore mining activity. The extent of the mining disturbance in the West Range Site area is shown in Figure 7.1-3.

The West Range Site straddles the border of Giants Range and the Chisholm-Embarrass physiographic area of Minnesota, as defined by Wright (Sims and Morey, 1972). The elevation atop the Giant's Range Batholith is about elevation 1,430 feet msl to 1,470 feet msl at the site. The Chisholm/Embarrass Till area exists north of the Giant's Range. The Chisholm/Embarrass Till Area is an area of low glacial moraines and outwash plains that extends north and south of the Giants Range in the vicinity of the project site. The till is typically on the order of 25 feet thick or less at the West Range Site, but extends to greater depths in the general area north and south of the site. Bedrock outcrops also exist in the area. Much of the till has been stripped and removed along the Iron Range as part of past mining operations. The elevation of the till plains to the north and south of the site are at about elevation 1,330 feet msl.

7.6 WATER RESOURCES AND WATER QUALITY

7.6.1 Surface Waters in the Vicinity of the West Range Site

The West Range Site lies within the northernmost region of the Upper Mississippi River Basin (UMRB) Watershed. The major surface waters in the vicinity of the Site are listed in Table 7.6-1.

Table 7.6-1
Surface Waterbodies

Surface Water	Watershed
Big Diamond Lake	Swan River
CMP	Swan River
Dunning Lake	Swan River
Greenway Mine Pit	Prairie River
Hill-Annex Mine Pit	Swan River
Holman Lake (Hill Lake)	Swan River
Lind Mine Pit	Prairie River
Little Diamond Lake	Swan River
Lower Panasa Lake	Swan River
Mississippi River	Mississippi River
Oxhide Creek	Swan River

Surface Water	Watershed
Oxhide Lake	Swan River
Prairie River	Mississippi River
Snowball Creek	Swan River
Sucker Brook	Prairie River
Swan River	Mississippi River
Trout Creek	Swan River
Trout Lake	Swan River
Twin Lakes	Swan River
Upper Panasa Lake	Swan River
West Hill Mine Pit	Prairie River

The Prairie River Watershed includes the northern portions of the project site. The CMP (CMP) Watershed is isolated from the other watersheds as the CMP does not have an outlet. The remaining surface waterbodies listed in Table 7.6-1 are all within the Swan River Watershed. The Prairie River and the Swan River both drain to the Mississippi River.

The Site consists of small surface depressions, wetlands, and several intermittent unnamed streams. The IGCC Power Station Footprint would be constructed over an existing drainage divide. The northern portion of the Station Footprint lies in the Sucker Brook watershed that drains into the Prairie River. The southern portion of the Station Footprint lies in a subwatershed that drains into the CMP.

Potential impacts to these waterbodies from stormwater discharges from the West Range Site during construction and operation will be minimized by appropriate stormwater management practices.

7.6.2 Historical Information

This Section describes the historical background of the resources the Applicant will use for its water supply. Water supply lines will originate in the CMP, HAMP Complex, LMP and the Prairie River. Process water discharge lines will terminate in the CMP and Holman Lake. The West Range Site process water infrastructure is discussed in Section 3.6.2.2. The Applicant's water management plan is discussed below in Section 7.6.3.

1.1.1.3 Stage/Storage Relationships

7.6.2.1.1 CMP Complex

The Canisteo Mine was one of 18 different properties operated over time by six different companies that made up a 4.5 mile long natural ore mining complex. In 1907, the Holman-Cliffs, Diamond, and Canisteo properties were the first to begin shipping ore. By 1985, mining across the entire length of the ore complex had ceased after having shipped more than 194,500,000 long tons of ore (MDNR, 2001).

During active mining it was necessary to pump water from the individual pits making up the mining complex to permit mining of the iron ore body. Once the pits were abandoned, dewatering operations ceased and they began to fill with water. Waters that had received pumped input, but no natural drainage, were cut off from this water supply, but runoff and ground water began to fill the formerly mined pits. Water in such pits rose dramatically in the first several years following abandonment but was not monitored.

Bathymetric data has been collected by the MDNR and was used to develop a stage-storage relationship for the pit. The MDNR has also collected stage (water elevation) data since 1989, but stage data was not collected on a daily basis until 1995. Because less detailed stage data exists for the period from 1989 to 1995, it was necessary to calculate long-term average inflows. Based on the available stage data and the stage-storage relationship for the pit, an average recharge of 3,160 gpm for the CMP was calculated over this period. Bathymetric mapping of the pit has been developed by the Applicant, based on electronic sampling of the mined surface through the water column.

Daily stage data from 1995 to present is available from the MDNR, although some data gaps exist. From 1995 to present, recharge rates range from 810 gpm to 4,190 gpm, with an average of 2,580 gpm. The water surface elevation in the mine pit on November 1, 2005 was 1,309 feet, with a surface area of 1,393 acres and a water volume of 149,500 acre-feet. Although groundwater movements are difficult to quantify, it appears that the amount of seepage out of the mine pit increases significantly when the water surface elevation is above the bedrock elevation (approximately 1300 feet msl).

When the data from years in which the stage was above 1300 feet msl (after year 2000) are not included, recharge rates ranged from 1,820 gpm to 4,190 gpm, with an average of 2,980 gpm.

The CMP does not currently discharge directly to surface waters. Water input to the pit results exclusively from surface water runoff and groundwater inflow. Water only leaves the pit through groundwater seepage and evaporation.

The west end of the mining complex, the Buckeye Mine Pit, filled with water and began being used for some recreational fishing after a boat launch was installed and the MDNR began to stock lake trout. As water continued to rise in each of the pits across the abandoned mining complex, the pits became interconnected, with the Buckeye Mine Pit becoming connected to the other pits in the early 1990's. The connected series of pits is locally referred to as the CMP and the pit now receives occasional recreational use by virtue of the Buckeye Mine Pit boat launch. For safety, security, and operational reasons, the Applicant proposes that this boat launch eventually be removed and access to the CMP be restricted.

Some stocking of lake trout in the west end of the conjoined pits (formerly the Buckeye Mine Pit) has occurred since 1999, and as a result lake trout have begun to populate waters in the eastern end of the CMP. Illegal stocking and/or unintended transport of other species may have also occurred.

According to the MDNR's sampling of the CMP, rainbow smelt are present in the pit. It is unknown if the effects of rainbow smelt on the fishery in this area are negative or positive.

The trophic state of the CMP is considered to be oligotrophic. As water that enters into the mine pit is mostly groundwater and there is relatively little surficial inflow to the pit, the quantity of nutrients and biota is resultingly low. This low amount of nutrients and biota results in a deficiency in the food chain within the pit with a resulting poor fishery and slow fish growth.

Some black crappie, bluegill, horneyhead chub, largemouth bass, pumpkinseed sunfish, painted turtle, rainbow trout, rock bass, snapping turtle, walleye, white sucker, and yellow perch have been found in the Canisteo and Buckeye Mine Pits by the MDNR. Bass appear to be in the pit, but they also grow slowly.

7.6.2.1.2 HAMP Complex

The HAMP Complex consists of four main mine pits: Arcturus, Gross-Marble, Hill-Trumbull, and Hill-Annex. Mining operations kept the pits completely dewatered until 1979. Following 1979, some dewatering took place and some of the pits began to fill with water. By 1981, all mining operations had ceased (Barr, 1987). Hill-Annex was established as a state park in 1988 by the Minnesota Legislature and is controlled by the MDNR Division of Parks and Recreation.

The Arcturus, Gross-Marble, and Hill-Trumbull/Hill-Annex were separated by large masses of rock during mining operations. Following the cessation of mining, water levels in the pits began to rise, and the Gross-Marble became connected to the Hill-Trumbull/Hill-Annex when the water surface elevation reached approximately 1,215 feet msl. The water surface in the Arcturus is higher than that of the other pits, and has not become connected by water to the other pits. Water currently overflows out of the Arcturus into the Gross-Marble. On November 1, 2005, the stage measured by the Applicant in the Gross-Marble, Hill-Trumbull/Hill-Annex Pit was 1,247 feet msl. At that same time, the stage measured in the Arcturus Pit was 1,269 feet msl.

Pumping records have been maintained by the MDNR since 1973, and the MDNR Hill-Annex staff continues to report dewatering volumes on a monthly basis.

Bathymetric data was collected by the Applicant in the fall of 2005, and a stage-storage relationship was developed for the Arcturus, Gross-Marble, and Hill-Trumbull/Hill-Annex pits from such data.

Stage data were collected by the MDNR from 1993 through 2002 for Hill-Annex, but because such data were not collected on a regular basis, it could not be used for a detailed yearly estimate of pit recharge. The stage in Gross-Marble, Hill-Trumbull/Hill-Annex was measured at 1,247 feet msl, and Arcturus was measured at 1,269 feet msl on November 1, 2005. The Applicant continues to measure stage at all of the pits within the HAMP Complex.

Actual recharge rates when the pits were dewatered from 1973-1979 were calculated based upon pumping records. Recharge rates during this period range from 3,230 gpm to 4,030 gpm.

Based on the stage-storage relationship, pumping records, and stage measurements, some long-term average recharge rates were calculated. Assuming that the pits were completely dewatered on January 1, 1979 and the Arcturus was completely full by 1999, an average recharge rate of 2,150 gpm was calculated using the stage-storage relationship, the stage measured on December 9, 1999, and historical pumping records.

A second long-term average recharge rate was calculated by adding the difference in volume in the pits between December 9, 1999 and November 1, 2005, and adding the volume of water pumped over this time period. The average recharge rate between the end of 1999 to 2005 was determined to be 1,590 gpm.

Uncertainties in the long-term average recharge rates calculated arise because of potentially missing data and pumping records, as well as the potential of highly variable groundwater head conditions. Recharge rates were calculated by the MDNR and independently by the Applicant's consultants. The HAMP Complex is not managed as a fishery and the MDNR has never stocked the pit. Sampling in 1990 failed to identify any game species in the mine pit, but some small species such as brook sticklebacks and common shiner were captured in minnow traps.

7.6.2.1.3 Lind Mine Pit

Very little historical water surface elevation and outflow data are available on the LMP. The pit has filled with water and has an outlet pipe that discharges to the Prairie River.

Bathymetric mapping of the pit has been developed by the Applicant based on electronic sampling of the mined surface through the water column.

Common shiner and black crappie were sampled by the MDNR in this pit. Black crappie appear to be naturally reproducing and the black crappie sampled appear to be near average with respect to growth rate. West Hill Mine Pit filled with water following the cessation of mining and currently discharges to the LMP through two 8 inch diameter HDPE pipes.

On November 2, 2005, the Applicant's consultants measured the pipe size, flow depth, and flow velocity at the LMP pipe outlet and determined the outflow from the pump at 1,800 gpm (4 cfs). A majority of the outflow appears to come from the West Hill Mine Pit. During the November 2, 2005 field trip, field personnel measured the pipe size, flow depth, and flow velocity at the West Hill Mine Pit pipe outlet and determined the outflow to be approximately 1,570 gpm (3.5 cfs). Follow-up flow measurements confirmed this flow rate.

7.6.2.1.4 Prairie River

The Applicant will also appropriate water from the Prairie River to supply and supplement the water resource needs of Mesaba One and Two. Applicant's consultants obtained river gauge data and conducted statistical analyses of appropriate data to assess the potential supply characteristics of the Prairie River. Average monthly flow rates are shown in Figure 7.6-2. MP reported an average flow of 27 cfs at the gauge station on August 29, 2005.

Gauge data have been collected intermittently at a USGS gauging station for a period of 16 years. The USGS gauge is located near the CR 7 crossing of the river, north of Taconite, Minnesota.

Gauge data have also been collected intermittently at the Prairie Lake Hydropower Dam, which is several miles downstream of the USGS gauge station. Flow data were collected from 1925 to 1957 on a monthly average basis while under the control and ownership of Blandin Paper Company. MP assumed control and ownership of the facility and collected flow data from 1997

to 2005 on a daily basis. Since the river flows are buffered by the lake and managed at the dam, the variability in the daily flow rates is not as extreme as at the USGS Prairie River gauge site.

Section 316(b) of the Clean Water Act ("CWA") contains criteria regarding Cooling Water Intake Structures (CWIS) that would apply to Prairie River appropriations. The rule specific to CWIS on fresh water rivers states that the maximum amount of water that can be taken is "5% of the mean annual flow or 25% of the 7Q10, whichever is the lesser."

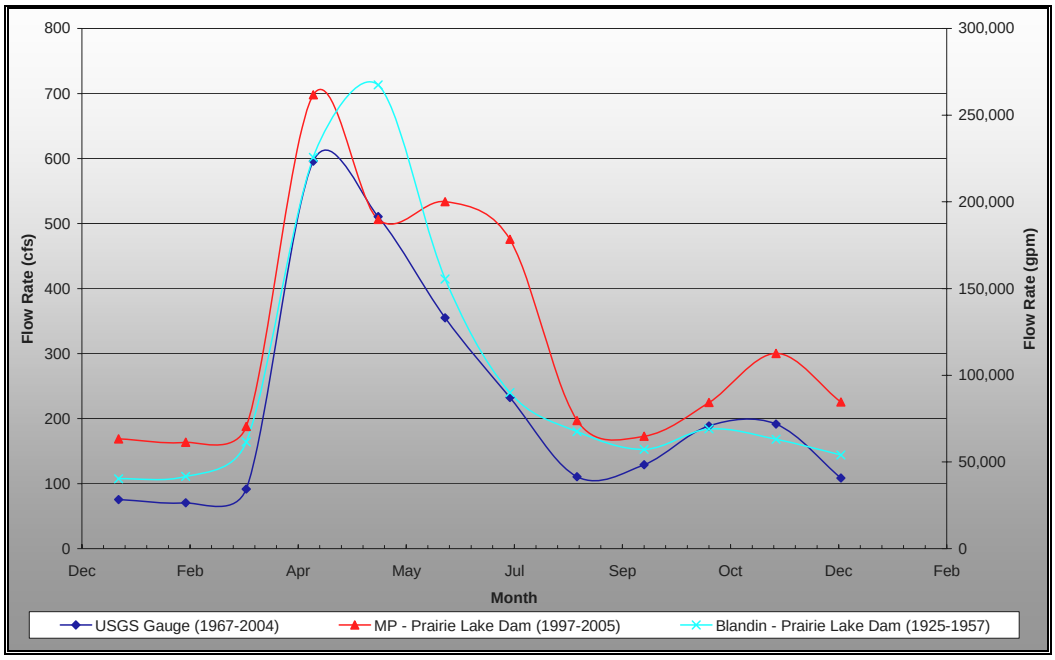
The 7Q10 is the seven day low flow average with a 10-year recurrence interval. The Weibull distribution[17] is the preferred statistical method used to determine the 7Q10, and requires that the top 80 percent of flow measurements be dropped as they are not considered to be true "low flows." The basis for the calculations used in determining the 7Q10 flow rate for the Prairie River is presented in Appendix F of the West Range IGCC Power Station Water Appropriation Permit Application filed with the MPCA and attached as Appendix 9. In general, river flows are plotted (on a log scale) against reoccurrence interval (on a normal scale) and an exponential regression is used to best fit a regression line to the data points. The point on the graph at which the best fit line intersects the 10-year recurrence interval is defined as the 7Q10.

To be conservative, only the data collected by Minnesota Power at the Prairie Lake Dam from 1998 to 2004 were utilized in the determination of the mean annual flow and the 7Q10 determination. Since full year records for 1997 and 2005 were not available, such data were eliminated from consideration. The Blandin data from 1925-1957 were recorded on a monthly average basis and could not be used to determine the 7Q10. Data from the USGS gauge were also not used because the point of taking is several miles downstream of the USGS gauging station and Prairie Lake.

The mean annual flow in the Prairie River is 319 cfs, and 5% of that flow is equal to 16 cfs. The 7Q10 in the Prairie River was determined to be 22 cfs, and 25% of that flow is equal to 5.5 cfs. Based upon Applicant's calculations and the data available for such calculations, with 25% of the 7Q10 being the smaller amount, the maximum rate at which water can be appropriated from the Prairie River at one time pursuant to Section 316(b) is 2,468 gpm (5.5 cfs). The Applicant will thus limit its Prairie River appropriations to this amount unless subsequent observations and determinations permit greater usage.

[17] Weibull, Wallodi, "A Statistical Distribution Function of Wide Applicability," Journal of Applied Mechanics, Vol. 18, pp. 293-297, 1951.

Figure 7.6-1 Average Monthly Flow Rates for Prairie River



7.6.3 West Range Water Management Plan: Modeled Water Level Impacts

The operation of water infrastructure for Mesaba One and Two and its impacts on water levels in the CMP have been modeled. The description of the model utilized is found in Section 4.3 of the Water Appropriation Permit Application filed with the MDNR. Modeling results indicate that water levels in the CMP could fluctuate up to two feet during a year with average rainfall. Under drought conditions, water levels in the CMP could fluctuate up to six feet. Figure 7.6-2 shows the average and drought-case scenario in the CMP during one years' operation with Mesaba One and Two in service. Figure 7.6-3 shows the impact of operating Mesaba One and Two on water levels in the CMP when drought conditions extend to five years. In this instance, CMP water levels are predicted to be lowered by up to 30 feet.

Based on the model runs conducted and other engineering considerations, the Applicant proposes to operate the CMP within a range of 1,260-1,290 feet msl, with a contingency plan range of 1,250-1,260 feet msl. The contingency plan range is proposed to accommodate the five-year drought scenario. The Applicant will operate within the 1,290-1,300 feet msl range during extremely wet periods. In the event water levels in the CMP cannot be controlled (that is, continue to rise) through water withdrawals required for operating Mesaba One and/or Mesaba One and Two, a cross-tie into the Holman Lake discharge pipe will allow excess CMP waters to be pumped to Holman Lake on an as needed basis. The cross-tie will contain sufficient protection to ensure that unwanted species are not inadvertently directed into Holman Lake. The Applicant and/or the MDNR through an approved mechanism derived during the permitting process will also have the capability to operate the existing pump in the Hill-Annex Mine Pit to manage water levels in that complex during overly wet periods.

Figure 7.6-2 Modeled Annual Variation in CMP Water Levels

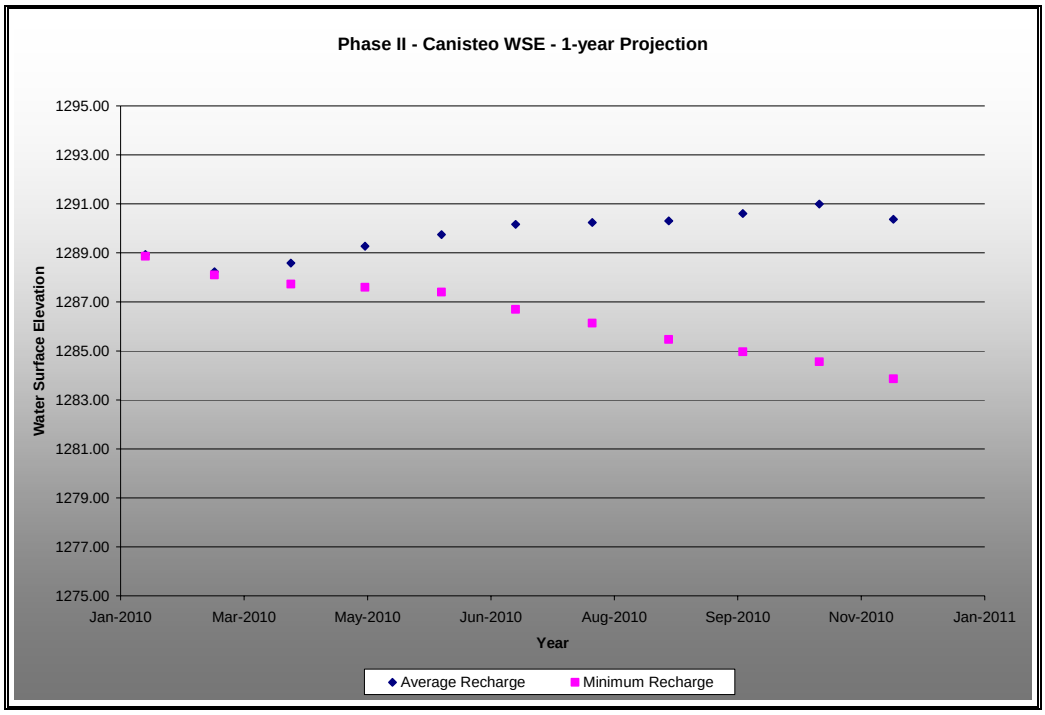
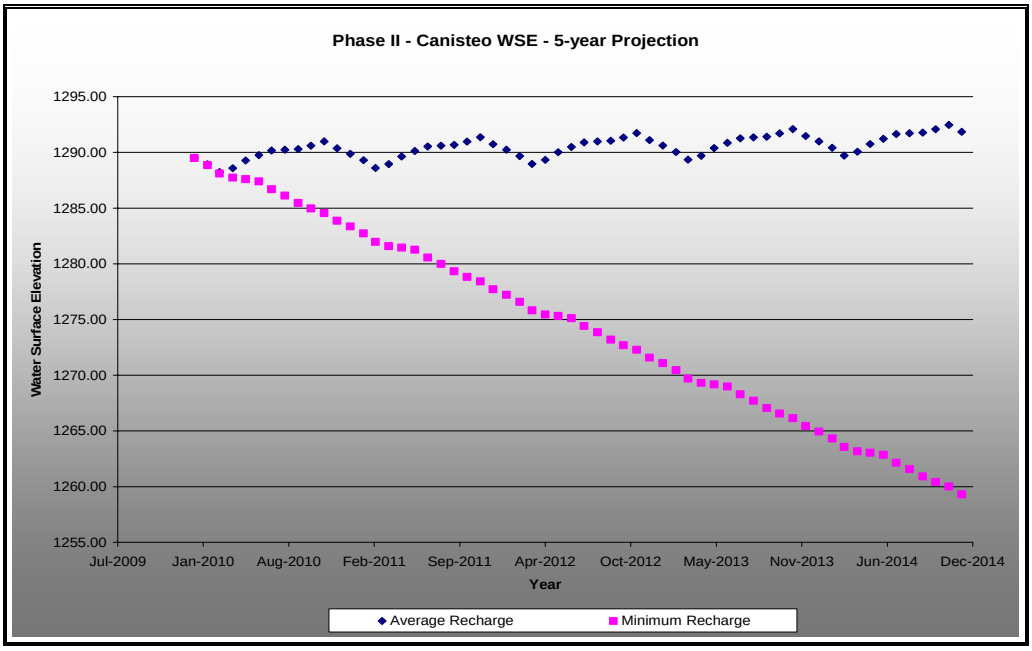


Figure 7.6-3 Modeled 5-Year Variation in CMP Water Levels



7.6.3.1 Water levels and Water Balance During Operation of Phase I and Phase II

The CMP contains some land bridges that are below a water surface elevation of approximately 1,260 feet msl. The intended operation of the CMP will be to maintain water levels above 1,260 feet msl, unless such other levels are otherwise necessary or required.

The pit water surface elevation will be 1,290 ± 2 feet msl during a typical year. Water from the other pits will augment water levels in the CMP, and should help to prevent significant water level changes.

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

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

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

7.6.4 Water Permits

7.6.4.1 Existing Permits

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 Applicant and the MDNR will be covered under the existing permits.

7.6.4.2 New Permits

7.6.4.2.1 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.

7.6.4.2.2 Minnesota DNR Public Waters Work Permits

A MDNR Public Waters Work Permit (FORM #NA-026620-03B) is required for temporary and permanent impacts to Public Waters.

The CMP and the Hill-Annex Mine Pit are Waters of the State, but are not classified by the MDNR as public waters. Since they are not public waters, a MDNR Public Waters Work Permit is not required for work that is done below the Ordinary High Water Level (OHWL) within these waterbodies.

A MDNR Public Waters Work Permit is required for work that takes place in identified public waters (see Table 2.5-1), and stream crossings must be reviewed and approved for any proposed hydraulic changes to the stream.

The following proposed activities will require coverage under a MDNR 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 the ES.

7.6.4.3 NPDES 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 (BMPs) 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.

7.6.4.4 Process Water Discharge Permit

Process water discharges of cooling tower blowdown are discussed in detail in the NPDES Permit Application and in Section 3.4.2 of this Application. Potential impacts resulting from the proposed four process water outfalls are summarized in this section. Figure 3.4-12 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.

7.6.4.4.1 Surface Water Quality Standards

The key water quality constituents associated with Outfall 001 and 002 discharges will be mercury, total dissolved solids (TDS), and hardness. Mercury will be addressed by operating the IGCC Power Station such that the concentration of mercury in its effluent discharges will not exceed the water quality standard of 6.9 ng/L. TDS and hardness discharge concentrations will be acceptable with the use of an approved mixing zone.

7.6.4.4.2 Impaired Waters

Holman Lake, Panasa Lake, the CMP and the HAMP Complex are not impaired waters. However, the water from those waterbodies, either now or in the future, will ultimately discharge into the Swan River, which is impaired for mercury. The Clean Water Act requires states to publish every two years an updated list of streams and lakes that are not meeting their designated uses because of excess pollutants. The list, known as the 303(d) list, is based on violations of water quality standards and is organized by river basin. The most recent draft of Minnesota's list of impaired waters was placed on the MPCA's web site on December 19, 2005 (MPCA, 2005b). The draft list indicates that the entire length of the Swan River from Swan Lake to the Mississippi River is impaired for dissolved oxygen ("DO") and mercury. See http://www.pca.state.mn.us/water/tmdl/index.html.

The Swan River flows into a reach of the Mississippi River between Swan River and Sandy River, which reach is also impaired for mercury. Other reaches further downstream on the Mississippi are impaired for:

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

Project waste streams consist of cooling tower blowdown, HRSG blowdown, boiler feedwater demineralizers and other minor sources. All other contact process water will be managed in the

ZLD System. The Applicant is proposing to eliminate discharges of nutrients and fecal coliform to the Swan River (a water impaired for DO and a tributary to a water impaired for PCBs) by discharging its domestic wastewater to the Coleraine-Bovey-Taconite municipal wastewater treatment facility.

Concerns over the environmental effects of PCBs led to a North American ban in 1977 on their manufacture, importation and most non-electrical uses, and also to restrictions on their use in existing electrical and mechanical equipment (Health Canada, 1998[18]). Effluents from Mesaba One and Mesaba Two will not contain PCBs.

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

As noted in Section 3.4.2.2.2, the Applicant has taken steps to eliminate the Station's use of phosphorus-containing chemicals that might otherwise cause the discharge of blowdown to cause or contribute to a violation of water quality standards in waters impaired for DO. As well, the Applicant will avoid discharges of turbidity through use of a contained conveyance to Holman Lake and a well designed discharge structure. Both of these design features will avoid the possibility of scouring sediment from wetlands known to have been receiving waters for direct discharges of domestic wastewaters and/or natural swales.

The proposed operation of the IGCC Power Station will result in no increase in the mass of mercury or phosphorus over that currently permitted from the HAMP Complex under NPDES Discharge Permit MN0030198. The MDNR also holds a water use permit, No. 510144 for appropriating water from the Hill-Annex Mine Pit. General permit information is summarized in Table 7.6-2. The MDNR has been pumping water out of the Hill-Annex Mine Pit since 1989 to control water levels in the pit and has discharged the water into Panasa Lake and ultimately to the Swan River.[19] Prior to 1989, the HAMP Complex was pumped to allow mining activities.

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[18] Health Canada 1998. The Health and Environment Handbook for Health Professionals. http://www.hcsc.gc.ca/ehp/ehd/catalogue/bch_pubs/98ehd211/98ehd211.htm

[19] Discharges of Canisteo Mine Pit water to the Swan River watershed have also occurred during past mining operations. NPDES permits for those discharges are available in MPCA files but detailed records of actual pumping activities are limited.

Table 7.6-2
Summary of Hill-Annex Mine Pit NPDES and Appropriations Permits

Permit Number	Date Issued	Expiration Date	Permit Holder	Average Discharge Rate (MGD/ gpm)	Maximum Discharge Rate (MGD/ gpm)	Annual Average Discharge Volume (acre-feet)	Receiving Water Body
NPDES Permit							
0030198	June 3, 2003	May 31, 2008	MDNR	4.5/3,125	9.0/6,250	--	Panasa Lake
Appropriations Permit							
510144	Not available	NA	MDNR	10.08/7,000	--.	10,485	--

Based on the permitted average discharge rate from the existing NPDES permit, and an assumed mine pit water concentration based on the analytical results from the HAMP Complex, the mass of a constituent permitted to be discharged to the Swan River watershed under the existing HAMP Complex pumping permit was estimated. The estimated mass of mercury and phosphorus permitted annually is shown in Table 7.6-3.

Table 7.6-3
Estimated Annual Mass Permitted to the Swan River Watershed From the Hill-Annex Mine Pit

Constituent	Estimated Concentration	Permitted Average Annual Discharge Rate	Permitted Annual Mass Discharge
Mercury	0.9 ng/L	3,125 gpm	5.6 g
Phosphorus	0.1 mg/L		621 kg

The Applicant will operate Mesaba One and Mesaba One and Two such that the actual mass of mercury and phosphorus discharged to the Swan River will be equal to or less than that currently allowed under the existing NPDES permit. The mass discharged will be the sum of each constituent associated with:

1. Water discharged into Holman Lake at Outfall 002 from the IGCC Power Station or the CMP (The mercury and phosphorus contained in the minor volume water streams that ultimately flow to the ZLD system are expected to be small and need not be considered in water discharge mass balance calculations. Similarly, mercury volatization in the cooling towers and elsewhere in the process is expected to be negligible and need not be considered in this calculation.).

2. Water pumped to Panasa Lake from the Hill-Annex Complex Mine Pits for water level control permitted under existing NPDES Permit MN0030198.

Mass balance calculations, based on expected source water quality, expected IGCC Power Station operation, and assumed HAMP Complex water level management pumping rates show that mercury and phosphorus discharged from Outfall 002 and the existing Panasa Lake outfall will be maintained at annual quantities less than that allowed under the current permit. The mass balance model and the results of its use associated with Mesaba One and Two are reported in Appendix D of the Applicant's NPDES Permit Application for the West Range IGCC Power Station attached as Appendix 6.

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

See Section 3.6.2.1.1 for a discussion of rules applicable to Mesaba One and Mesaba Two.

7.6.5 Domestic Wastewater Discharge

The proposed approach for treating domestic wastewaters is to connect to the Coleraine-Bovey-Taconite wastewater collection and treatment system because it avoids discharging nutrients to Holman Lake, a tributary to the Swan River (which in turn is a tributary to the Mississippi River), a receiving water that is impaired for DO.

7.6.5.1 Construction Period

About 1,500 construction personnel are expected to be on site during the periods of peak construction activity associated with Mesaba One and Mesaba Two. Assuming each worker generates an average of 20 gallons of wastewater per day, the estimated peak wastewater flows from the West Range Site during construction would be about 30,000 gallons per day (gpd). Construction activities associated with Mesaba One are projected to take approximately 44 months.

Construction of Mesaba Two would overlap activities associated with construction of Mesaba One. Mesaba Two is expected to be complete about 24 months after Mesaba One begins commercial operation. Peak construction periods associated with each phase are expected to be staggered in such a way that peak construction activities for Mesaba One would not overlap with those for Mesaba Two.

7.6.5.2 Operation

At the conclusion of construction, the number of permanent personnel at the Phase I IGCC Power Station would number about 110 people. The volume of wastewater generated by each person during operation versus that during construction is expected to be higher due to the use of showers and locker room facilities. During normal plant operation, each person will generate about 30 gallons of wastewater per day and the amount of domestic wastewater generated per day would total about 3,300 gpd. This total does not reflect the likelihood that the number of people on site at any one time will be greater than the operations staff due to the presence of equipment contractors, outage crews, and visitors.

The operational work force for Mesaba Two will number about 75 individuals (that is, somewhat fewer than that required for Mesaba One due to the overlap with Mesaba Two of managerial responsibilities, supervisory and administrative personnel responsibilities, and some

maintenance). The overall operational work force for Mesaba One and Two is expected to total about 185 people. Using the 30 gpd wastewater generation rate identified above, the expected amount of wastewater from Mesaba One and Two would total 5,600 gpd.

To accommodate the additional flows as a result of the added number of people on site during tours, special maintenance/construction activities, and outages, the capacity of the system has been conservatively set at 7,500 gpd. This capacity provides the capability to accommodate about 140 additional individuals on-site during operation of Mesaba One and about 80 individuals during operation of Mesaba One and Two. This flow is based on Mesaba One and Two having restrooms, locker rooms, showers, and break room facilities.

7.6.5.3 Adequacy of Taconite-Bovey-Coleraine WWTF

The cities of Taconite, Bovey and Coleraine have a joint wastewater commission that manages the wastewater treatment facility (WWTF) located in Coleraine, approximately 4 miles southwest of the West Range Site. The WWTF receives wastewater from the three cities and discharges treated effluent to the Swan River. The WWTF has a design capacity of 499,000 gpd and received an average flow of 334,000 gpd during the period from January 1 through May 31, 2005. During the wettest 30-day period, the WWTF received an average of 444,000 gpd with a peak day of 969,000 gpd.

An issue relating to Taconite's collection system is the amount of inflow and infiltration (I/I) entering the system during periods of rainfall or high groundwater. At such times, excess flow can exceed the capacity of the main wastewater pump station in Taconite, creating a need to bypass untreated wastewater into a natural pond system. Larger pumps could be installed in the pump station to remedy this problem or the City's collection system could be rehabilitated to prevent extraneous water from entering the sewers.

7.6.6 Water Crossings

Lakes and streams in the vicinity of the West Range Site are described in Section 7.6.1 above. Utility crossings over, under, or through waterbodies listed as protected waters or wetlands on the MDNR Protected Waters Inventory ("PWI") will require Licenses for Utility Crossings of Public Lands and Waters under Minn. Stat. § 84.415 and Minnesota Rules Chapter 6135. The MDNR Division of Land and Minerals is the administrative agency issuing such licenses, which may be renewed at the end of the licensing period. Protected waters or wetlands that will be crossed by HVTLs, gas pipelines, and process water blowdown pipelines and which require licenses for such crossings, are identified in the following subsections.

Water crossings associated with the development of Mesaba One and Mesaba Two are limited to the corridors associated with the HVTLs, gas pipeline, and one process water blowdown pipeline. There are no water crossings associated with siting, placement, or construction on the IGCC Power Station Footprint or on Buffer Land, the railroad alternatives, sewer and water lines, and roads. The following subsections describe the water crossings within the HVTLs, gas pipelines, water supply, and process water discharge lines.

7.6.6.1 Preferred HVTL Route

7.6.6.1.1 Preferred Double Circuit Corridor

There are a total of two river or stream crossings associated with this route. These crossings are over the Swan River (perennial) and a perennial stream between Big and Little Diamond Lakes. The perennial stream between Big and Little Diamond Lakes was the only water crossing along this alternative that was field surveyed during the 2005 field season due to access limitations. The Swan River is identified as a protected water by the MDNR Protected Waters Inventory (PWI) and requires a license to cross this waterbody for this HVTL.

Wetland habitat associated with the water crossings is based on NWI classification and mapping. In areas where 2005 field surveys were conducted, the classification given is based on observations made during the field surveys. The wetland habitat for the Swan River crossing is mapped by NWI as Type 6 (PSS/EM5C) scrub-shrub habitat. The perennial stream between Big and Little Diamond Lake was mapped during the 2005 field surveys and included Type 3 (PEMC) shallow marsh habitat. Total length of water crossings for this alternative is estimated at 123 linear feet. The location and wetland types associated with the water crossings for the preferred HVTL are summarized in the following Table 7.6-4.

Table 7.6-4
Water Crossings for the Preferred West Range HVTL

Stream Crossing Location	MDNR PWI?	Milepost (mile + linear feet)	Length of Waterbody Crossing	Adjacent Wetland Types	
				Cowardin	Circular 39
Perennial stream between Big & Little Diamond Lakes (Basin E1)*	Yes	0+3980	3 linear feet	PEMC	Type 3
Swan River (perennial)	No	3+1630	120 linear feet	PSS/EM5C	Type 6
Total: 123 linear feet					

* = This information has been field verified.

7.6.6.2 Alternate HVTL Route

As described Sections 2 and 4, an alternative route for the Preferred 345kV Double Circuit HVTL Route serving both Phases I and II was proposed for consideration. For this route, there are a total of six river or stream crossings. Five of these crossings are over the Swan River (perennial) and one crossing is over a perennial stream between Big and Little Diamond Lakes. The perennial stream between Big and Little Diamond Lakes was the only water crossing in this alternative that was field surveyed during the 2005 field season due to access limitations. The Swan River is identified as a protected water by the MDNR Protected Waters Inventory (PWI) and would require a license to cross this waterbody.

The water crossings and wetland impacts for this alternative is based on NWI classification and mapping. In areas where 2005 field surveys were conducted, the classification given is based on observations made during the field surveys. The wetland habitat for one of the Swan River crossings is mapped by NWI as Type 6 (PSS/EM5C) scrub-shrub habitat. The other Swan River crossings have no wetland habitats mapped by the NWI, and no classification is given for the streambed in these areas. The perennial stream between Big and Little Diamond Lake was mapped during the 2005 field surveys and included Type 3 (PEMC) shallow marsh habitat. Total length of water crossings for this alternative is estimated at 533 linear feet. The location and wetland types associated with the water crossings for HVTL Alternative are summarized in the following table. Table 7.6-5 details locations of water crossings associated with the HVTL alternatives.

Table 7.6-5
Water Crossings for West Range Preferred Alternate HVTL

Stream Crossing Location	MDNR PWI?	Milepost (mile + linear feet)	Length of Waterbody Crossing	Adjacent Wetland Types	
				Cowardin	Circular 39
Perennial stream between Big & Little Diamond Lakes (Basin E1)*	No	0+3980	3 linear feet	PEMC	Type 3
Swan River (perennial)	Yes	3+1700	60 linear feet	PSS/EM5C	Type 6
Swan River (perennial)	Yes	3+2960	60 linear feet	No classification given by NWI	No classification given by NWI
Swan River (perennial)	Yes	3+3575	50 linear feet	No classification given by NWI	No classification given by NWI
Swan River (perennial)	Yes	3+4400	270 linear feet	No classification given by NWI	No classification given by NWI
Swan River (perennial)	Yes	4+360	90 linear feet	No classification given by NWI	No classification given by NWI
Total: 533 linear feet					

* = This information has been field verified.

7.6.6.2.1 Plan B Phase II Alternative 345kV Route

This route alternative utilizes 18 miles of existing MP ROW. There are a total of five water crossings associated with this more easterly 18-mile Phase II alternative. Two crossings are under the Swan River (perennial) and one of its perennial tributaries. The other three crossings are associated with Snowball and Oxhide Creeks (both perennial), and Oxhide Lake. The Swan River and its tributary, Snowball Creek, and Oxhide Lake are identified as protected waters by the MDNR Protected Water Inventory (PWI), and would require a license to cross these waterbodies for the HVTL at this location. Lakes and wetlands designated as MDNR Protected

Waters or Wetlands receive a unique identification number, but streams and rivers do not. In this case, the PWI identification number for Oxhide Lake is 106P.

Wetland habitat associated with the water crossings for this HVTL is based on NWI classification and mapping. The wetland habitat for the Swan River crossing is mapped by NWI as Type 3 (PEM5C) shallow marsh habitat. The tributary of the Swan River tributary, which is the outlet of Lower Panasa Lake, and Oxhide Creek have no wetland habitats mapped by the NWI, and no classification is given for the streambed in this area. Snowball Creek is mapped by NWI as Type 2 (PEM5B) wet meadow habitat. Oxhide Lake is identified as Type 5 (L1UBH) deep water habitat and Type 6 (PSS1/EM5C) scrub-shrub habitat. Total length of water crossings for this alternative is estimated at 283 linear feet. The location and wetland types associated with the water crossings for this alternative Plan B Phase II route are summarized in the following table.

Table 7.6-6
Water Crossings for West Range Alternative 345kV HVTL (East Corridor)

Stream Crossing Location	MDNR PWI?	Milepost (mile + linear feet)	Length of Waterbody Crossing	Adjacent Wetland Types	
				Cowardin	Circular 39
Swan River (perennial)	Yes	14+0	190 linear feet	PEM5C	Type 3
Tributary of Swan River, outlet of Lower Panasa Lake (perennial)	Yes	12+4640	3 linear feet	No classification given by NWI	No classification given by NWI
Snowball Creek (perennial)	Yes	11	10 linear feet	PEM5B	Type 2
Oxhide Lake	Yes (PWI 106P)	8+2220	70 linear feet	L1UBH, PSS1/EM5C	Type 5, Type 6
Oxhide Creek (perennial)	Yes	9+2880	10 linear feet	No classification given by NWI	No classification given by NWI
Total: 283 linear feet					

7.6.6.3 Proposed Natural Gas Pipeline Route

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

MDNR Protected Waters Inventory (PWI), and therefore would require a License to cross this waterbody for Gas Pipeline 1.

Wetland habitat associated with the water crossings for Natural Gas Pipeline Alternative 1 is based on NWI classification and mapping. In areas where 2005 field surveys were conducted, the classification given is based on observations made during the field surveys. The wetland habitat for the two Swan River crossings is mapped by NWI as Type 1 (PFO1A) seasonally flooded and Type 6 (PSS/EM5C) scrub-shrub habitats. The wetland habitat at the tributary to the Swan River is mapped by NWI as Type 2 (PEM5Bd) wet meadow habitat. The perennial stream between Big and Little Diamond Lake was mapped during the 2005 field surveys and included Type 3 (PEMC) shallow marsh habitat. Total length of water crossings for this alternative is estimated at 133 linear feet. The location and wetland types associated with the water crossings for Natural Gas Pipeline Alternative 1 are summarized in Table 7.6-7.

Table 7.6-7
Water Crossings for West Range Gas Pipeline

Stream Crossing Location	MDNR PWI?	Milepost (mile + linear feet)	Length of Waterbody Crossing	Adjacent Wetland Types	
				Cowardin	Circular 39
Swan River (perennial)	Yes	4+2170	60 linear feet	PFO1A	Type 1
Tributary of Swan River (perennial)	No	5+1460	10 linear feet	PEM5Bd	Type 2
Swan River (perennial)	Yes	9+4560	60 linear feet	PSS/EM5C	Type 6
Perennial stream between Big and Little Diamond Lakes (Basin E1)*	No	12+2000	3 linear feet	PEMC	Type 3
Total: 51 linear feet					

* = This information has been field verified.

7.6.6.4 Process Water Supply Pipeline

7.6.6.4.1 Segment 1 – Lind Pit to Canisteo Pit

There are no water crossings associated with Process Water Supply Pipeline Segment l.

7.6.6.4.2 Segment 2 – Canisteo Pit to IGCC Power Station

There are no water crossings associated with Process Water Supply Pipeline Segment 2.

7.6.6.4.3 Segment 3 – Gross-Marble Pit to Canisteo Pit

There are no water crossings associated with Process Water Supply Pipeline 3 alternative.

7.6.6.5 Process Water Blowdown Pipelines

7.6.6.5.1 Process Water Blowdown Pipeline 1 (West Range Site to Holman Lake)

There are two stream crossings associated with the Process Water Blowdown Pipeline 1. Both crossings are under perennial streams, one which drains from Little Diamond Lake, and the other draining to Holman Lake. Neither stream was field surveyed during the 2005 field season due to access limitations. The National Wetlands Inventory is the basis for evaluating wetlands associated with the stream crossings.

The perennial stream draining from Little Diamond Lake has no wetland habitats mapped by the NWI, and no classification is given for the streambed. The perennial stream draining to Holman Lake is mapped by NWI as Type 3 (PEM/UBF) shallow marsh and Type 6 (PSS1/EM5C) scrub-shrub habitat. Both crossings are approximately three feet in length. The location and wetland types associated with the stream crossings for Blowdown Pipeline 1 are summarized in the following table. Table 7.6-8 details locations of water crossings associated with the water process line.

Table 7.6-8
Water Crossings for West Range Process Water Blowdown Pipeline 1

Stream Crossing Location	MDNR PWI?	Milepost	Length of Waterbody Crossing	Adjacent Wetland Types	
				Cowardin	Circular 39
Perennial stream from Little Diamond Lake	Yes	1+3990	3 linear feet	No classification given by NWI	No classification given by NWI
Perennial stream, drains to Holman Lake	Yes	2+2280	3 linear feet	PEM/UBF, PSS1/EM5C	Type 3, Type 6
Total: 48 linear feet					

* = This information has been field verified.

7.6.6.6 Process Water Blowdown Pipeline 2 (West Range Site to Canisteo Pit)

There are no water crossings associated with the Process Water Blowdown Pipeline 2 (West Range Site to Canisteo Pit).

7.7 WETLANDS

A detailed summary of wetlands in the project site and associated utility corridors is provided in the ES (Sections 2 and 3). This section summarizes wetland impacts for the site and each

alternate utility corridor associated with the West Range Site. Table 7.7-1 below summarizes the expected acres of wetlands impacted.

7.7.1 Overview of Impacts and Contact with Agencies

The following subsections describe effects on wetlands due to construction and operation activities, particularly where impacts may be 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 Minnesota Board of Water and Soil Resources (BWSR) and the U.S. Army Corps of Engineers (USACE) – St. Paul District, wetland impacts are generally evaluated on a per acre basis, without regard to wetland type being affected when the Minnesota Wetland Conservation Act (WCA) *de minimis* thresholds have been exceeded (Minn. Stat. § 103G.2241, subd. 9). An exception to this rule is for wetlands that may have particular ecological uniqueness or protection status (for example, calcareous fens) or are otherwise legally protected under other state and/or federal law (for example, 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 levels than impacts to a disturbed, urbanized wetland).

Table 7.7-1
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 Facility	n/a [1]	30.95
HVTL Preferred	n/a [1]	0.01 [2]
HVTL Alternative	n/a [1]	0.01 [2]
HVTL Plan B Alternative	n/a [1]	0.03 [2]
Gas Pipeline 1	24.69	17.47
Process Water Blowdown Pipeline 1 (IGCC Facility to Holman Lake)	5.86	4.07
Process Water Blowdown Pipeline 2 (IGCC Facility to Canisteo Pit)	20.38	13.60
Process Water Supply Pipeline Segment 1 (Lind Pit to Canisteo Pit)	0	0
Process Water Supply Pipeline Segment 2 (Canisteo Pit to West Range Site)	5.48	3.73

Project Alternative	Total Wetland Impacts (Acres)	
	Temporary ROW	Permanent ROW
Process Water Supply Pipeline 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
Access Road 1	9.72	5.67
Subtotal[4]	**103.2**	**158.2**
Total Permanent Impacts (including Railroad construction limit impacts)	**n/a**	**172.4 acres**

[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 West Range Proposed Natural Gas Pipeline Route, Railroad Alternative 1A and Center Loop. The Applicant will seek to avoid wetland impacts within the railroad center loop, however, including it here represents a worst case analysis.

Special or protected wetlands are not known to occur within the IGCC Power Station Footprint, Buffer Land, Associated Facilities or their Interconnection Corridors. However, to some extent, areas of tamarack and spruce bogs are located within each of these areas on the Site. No wetland type is anticipated to 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. Summaries of wetland impacts by wetland types are provided in detail in Section 3.1 of the ES for the West Range IGCC Power Station Footprint, Buffer Land, Associated Facilities and their Interconnection Corridors.

7.7.2 IGCC Power Station Footprint and Buffer Land

Minimization of wetland impacts has been addressed by adjusting the IGCC Power Station Footprint to straddle the two large wetland complexes (A1 and A4) located within the property on which the Applicant has obtained an option. However, the mitigation of wetland impacts will of necessity result in more permanent impacts to forest land and disturbances related to blasting. Some movement of the Station Footprint is to be expected as the FEED moves forward into a final design evaluation and negotiations regarding wetland impacts are undertaken between the Applicant and the agencies having jurisdiction over the particular wetlands affected.

Siting the Station Footprint was largely driven by establishing an acceptable grade for and length of the railroad trackage (that is, grades that will accommodate unit coal train deliveries, allow for automatic unloading via a rotary dumper system, and a length that will avoid interferences with other railroad traffic occurring on the main line) and avoid extensive cut/fill activity.

Permanent wetland impacts are estimated at 30.95 acres for the IGCC Power Station Footprint with wetland impacts for Mesaba One and Mesaba Two estimated at 17.33 acres and 13.62 acres, respectively. These wetlands are primarily Type 3/7 or Type 7 basins, many of which appear to be isolated and/or ephemeral type basins. Figure 7.7-1 shows the occurrence of wetlands on the IGCC Power Station Footprint.

The greatest amount of impacts from the IGCC Power Station Footprint and Buffer Land would be to Wetlands A1 (Type 3/6/8) and A4 (Type 7), which are larger wetland complexes that extend beyond the Station Footprint and Buffer Land. Figure 7.7-2 shows the occurrence of wetlands on the IGCC Power Station Footprint.

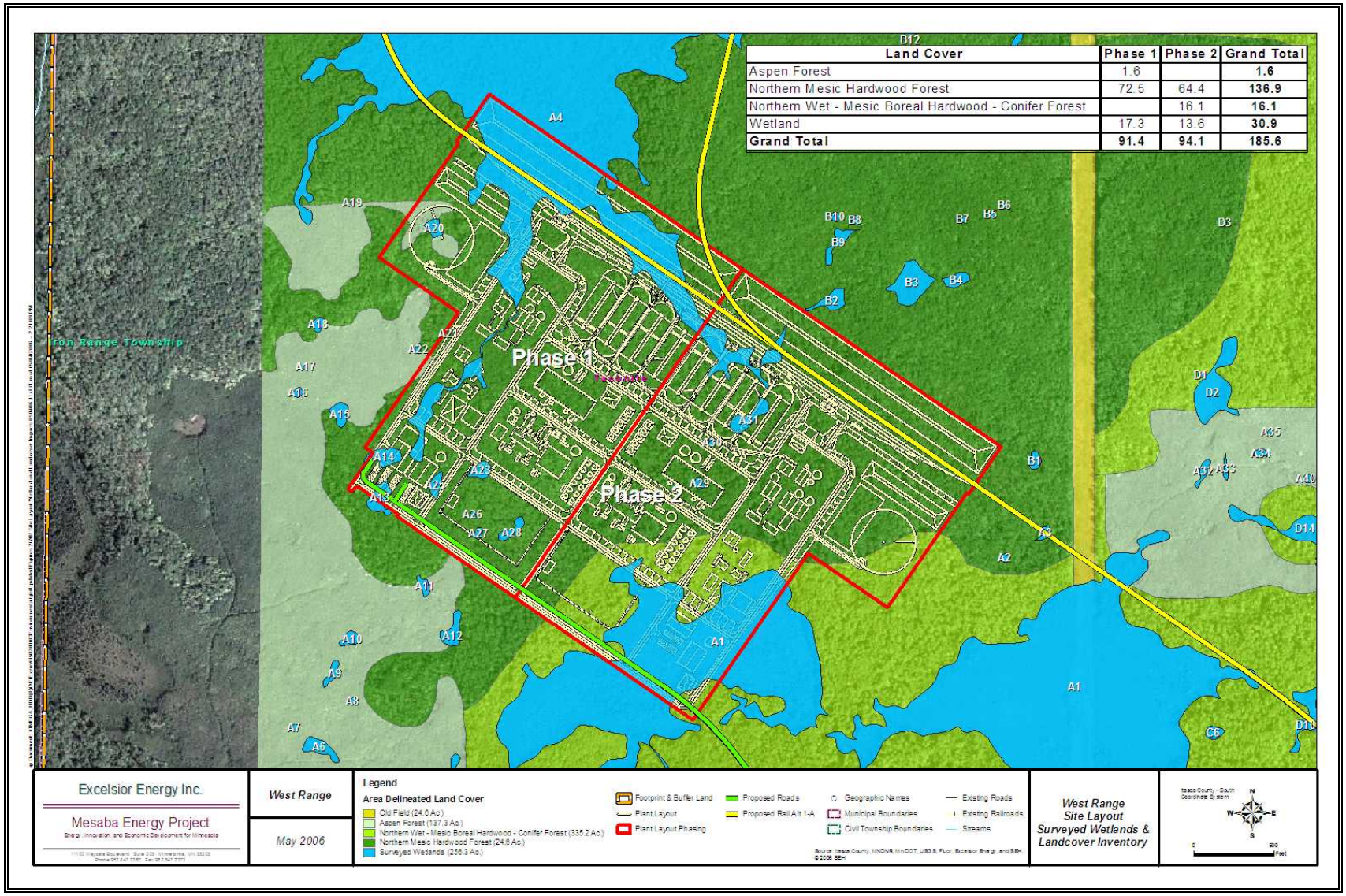
Type 7 wetlands are the most abundant wetland type present within the Station Footprint and Buffer Land and have the most impacts for both phases of the IGCC Facility, most of which being affected by the rail loop. Phase I will cause the majority of wetland impacts for the facility, most of which are Type 7 wetlands. Phase II involves less wetland impact, but includes impacts to Type 3 and Type 3/6/8 wetlands, including bog habitats, which are not impacted by Phase I.

7.7.3 Preferred HVTL Route

For purposes of comparing permanent wetland impacts, the Applicant estimated only the area actually needed for the required structure foundations and not the entire area in the right-of-way. This methodology is deemed to be a reasonable and proper approach for such analysis. Using this criteria, permanent impacts in the Preferred HVTL Route will be limited to about 0.01 acres of wetlands where new HVTL towers will be placed within wetland habitat. To the extent practicable, wetlands will be avoided when installing new towers and construction activities will be undertaken during winter months when wetlands are frozen and more resistant to equipment-related impacts.

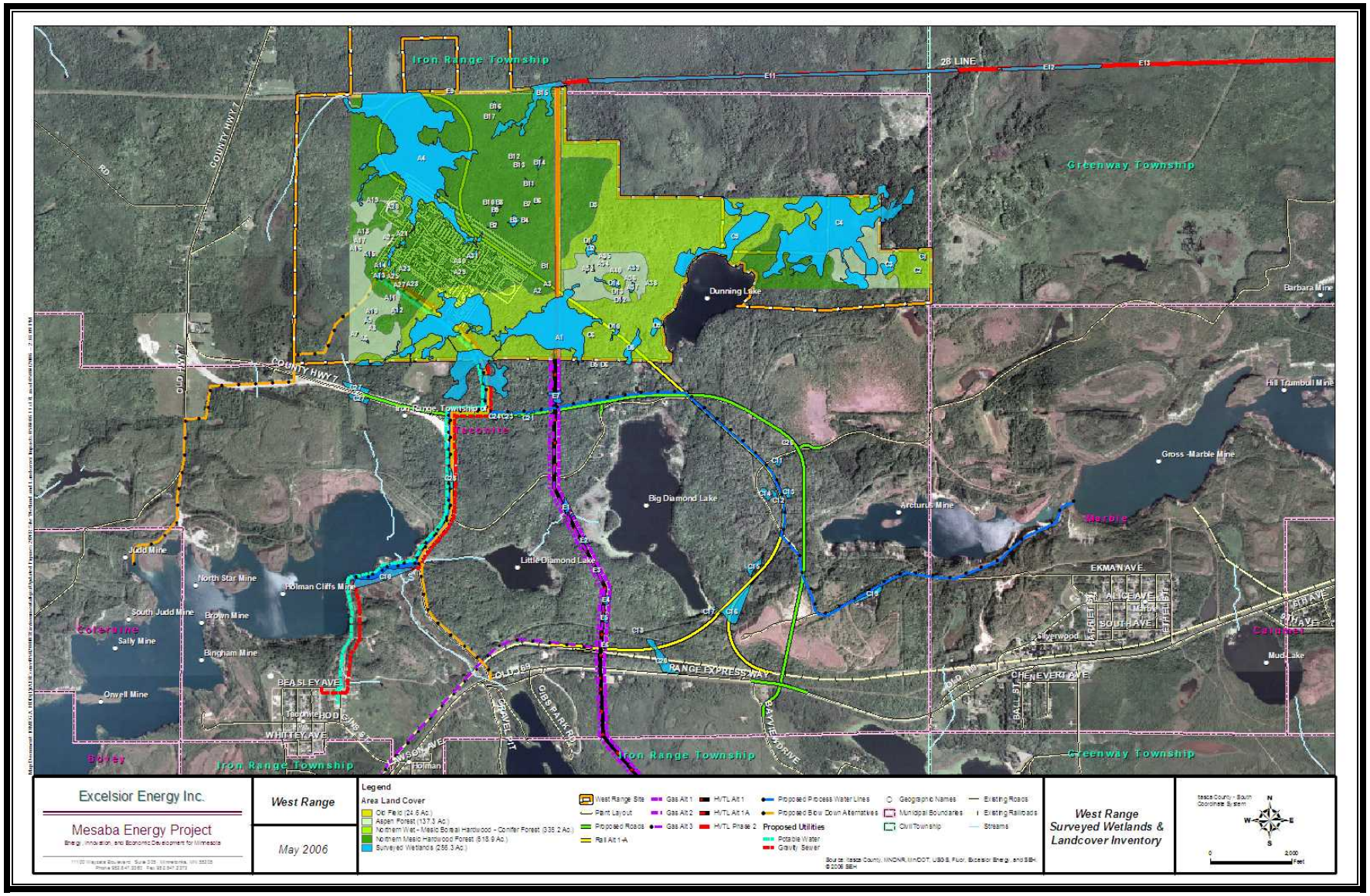
Tree and shrub clearing in wetlands will be initiated along new areas of ROW of the Preferred HVTL Route. A total of 30.21 acres of trees and shrubs is estimated to be cleared in Type 6, 7, and 8 wetlands. No vegetation clearing is anticipated in Type 1-5 wetlands (i.e., herbaceous dominated vegetation in seasonal basins, wet meadow, shallow marsh, or open water wetlands). Direct wetland impacts are 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. To comply with the federal Migratory Bird Treaty Act, tree clearing activities will be completed during the winter months to avoid the bird nesting period. Work during the winter months when the wetlands are frozen will further reduce equipment-related impacts. Future maintenance of the ROW will likely include the clearing of trees and shrubs that re-establish in wetlands and will be completed during the winter months to avoid equipment-related impacts and disturbances to nesting birds.

Figure 7.7-1 IGCC Power Station Footprint Impacts on Vegetation and Wetlands



Land Cover	Phase 1	Phase 2	Grand Total
Aspen Forest	1.6		1.6
Northern Mesic Hardwood Forest	72.5	64.4	136.9
Northern Wet - Mesic Boreal Hardwood - Conifer Forest		16.1	16.1
Wetland	17.3	13.6	30.9
Grand Total	91.4	94.1	185.6

Figure 7.7-2 Wetland and Land Use Impacts on the IGCC Power Station Footprint and Buffer Land



7.7.4 Alternate HVTL Route

Tree and shrub clearing in wetlands will be initiated along new ROW. A total of 24.53 acres is estimated to be cleared in Type 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 are 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);but direct loss of wetlands is not anticipated. Tree clearing will be completed during the winter months to avoid equipment-related impacts and, in compliance with the federal Migratory Bird Treaty Act, avoiding the bird nesting period. Future maintenance of the Alternate HVTL Route ROW will likely include clearing of trees and shrubs that re-establish in wetlands and will be completed during the winter months to avoid equipment-related impacts and disturbances to nesting birds.

Although wetlands will be impacted during construction, only 0.01 acres of wetlands will be permanently impacted by placement of new HVTL towers. To the extent practicable, wetlands will be avoided when installing the new towers and construction activities will be undertaken during the winter months to minimize direct wetland impacts.

7.7.5 Plan B Phase II Alternate HVTL Route Route

An estimated 0.03 acres of wetland will be permanently impacted by placement of new HVTL towers on the Plan B Phase II Alternate Route. To the extent practicable, wetlands will be avoided when towers are installed and construction activities will be planned during the winter months when wetlands are frozen.

No tree and shrub clearing in wetlands is anticipated as this alternative is proposed along an existing utility corridor maintained by MP. Future maintenance of the ROW will include clearing of trees and shrubs that re-establish in wetlands and will be completed during the winter months to avoid equipment-related wetland impacts and disturbances to nesting birds.

7.7.6 West Range Proposed Natural Gas Pipeline Route

A total of 24.69 acres of wetland habitat is located in the proposed temporary ROW. For permanent ROW, these wetland impacts will be reduced to 17.47 acres. Temporary impacts will result from construction activities and will be mitigated by restoring the area after construction is completed. Temporary wetland impacts will include tree and shrub clearing for construction staging areas paralleling the pipeline corridor.

To minimize wetland impacts at water crossings, the natural gas pipeline will be directionally drilled under the water body starting at approximately 100 feet from the edge of each bank. In this instance, wetland impacts associated with water crossings will include 1.34 acres in the temporary ROW and 0.94 acres in the permanent ROW. The remainder of the gas pipeline will be placed within the West Range Proposed Natural Gas Pipeline Route using open trench installation techniques. Soils and vegetation that become compacted as a result of construction will be restored by loosening such soils and reseeding the area with grasses and broad-leafed herbaceous plants native to the region.

7.7.7 Process Water Supply Pipeline

7.7.7.1 Segment 1 - Lind Pit to Canisteo Pit

According to the National Wetlands Inventory, no wetlands are present on the route Process Water Supply Pipeline Segment 1. However, field investigations will be performed prior to construction activities to determine if any wetlands are within the ROW and to determine if any impacts will occur.

7.7.7.2 Segment 2 – Canisteo Pit to West Range Site

Wetland impacts were minimized 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 Segment 2 corridor include a total of 5.48 acres in the 150-foot temporary ROW, but these impacts would be reduced to 3.73 acres for the 100-foot permanent ROW. The largest impact for the Process Water Supply Pipeline Segment 2 is within Wetland A1, the 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 water process line corridor. Where soils and vegetation may become disturbed in the construction areas, such areas will be restored by loosening the soils from compaction and reseeding with grasses and forbs native to the region.

7.7.7.3 Segment 3 – Gross-Marble Pit to Canisteo Pit

Wetland impacts were minimized by routing the process water lines along existing and proposed roadways, railroads, and utility rights-of-way. Process Water Supply Pipeline Segment 3 will include a total of 6.17 acres of wetland impacts in the 150-foot temporary ROW, with these impacts 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 water process line corridor. Where soils and vegetation may become disturbed in the construction areas, such areas will be restored by loosening the soils from compaction and reseeding with grasses and forbs native to the region.

7.7.8 Process Water Blowdown Pipeline Alternative 1 (Facility to Holman Lake)

Wetland impacts were minimized 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, and is 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.

There are two water crossings associated with the process water blowdown line. Wetland impacts include the total length of the crossing through waterbodies 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 will include tree and shrub clearing for construction staging areas paralleling the water process line corridor. Where soils and vegetation become disturbed in the construction areas, such areas will be restored by loosening the soils from compaction and reseeding with grasses and forbs native to the region.

7.7.9 Blowdown Process Water Alternative 2 (Facility to Canisteo Pit)

Wetland impacts were minimized 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, but will 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. There are no water crossings associated with Alternative 2 process water blowdown pipeline.

Temporary wetland impacts will include tree and shrub clearing for construction staging areas paralleling the water process line corridor. Where soils and vegetation become disturbed in the construction areas, such areas will be restored by loosening the soils from compaction and reseeding with grasses and forbs native to the region.

7.7.10 West Range Potable Water and Sewer Pipelines

Wetland impacts were minimized 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 and 1.79 acres for the 40-foot permanent ROW. The largest impact for the sewer and water pipeline 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.

7.7.11 West Range Rail Line Alternative 1A

Siting the location of the railroad alternatives first considered avoidance of both Dunning and Big Diamond Lakes. Preliminary alignments for the railroad included some designs that would have required filling as much as ¼ of Big Diamond Lake and were removed from further consideration. 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 its surrounding aquatic habitat.

Because the railroads must be designed for the straightest possible alignment, some unavoidable wetland impacts will occur. The railroad alternatives are the only utility or transportation corridors that have precisely 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 will be an established 100-foot ROW, and 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 to the necessary grading required for the railroad bed. Permanent wetland impacts within the construction limits (temporary ROW) include 26.45 acres. Permanent wetland impacts within the permanent ROW (the railroad bed itself) total 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.

7.7.12 West Range Rail Line Alternative 1B

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, and includes the ROW width needed for the center loop.

Permanent wetland impacts within the construction limits (temporary ROW) total 18.11 acres. Permanent wetland impacts within the permanent ROW (the railroad bed itself) totals 12.00 acres. The center loop of the rail spur for Alternative 1A has 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.

7.7.13 West Range Roads

Appropriate road corridors were identified by assessing grading requirements, existing topography, accessible properties, and the presence of wetlands in providing necessary access to 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 than attempt to grade 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 will 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 access roads.

7.8 ECOLOGICAL RESOURCES: PLANTS, ANIMALS, AND ENDANGERED SPECIES

This section describes the ecological conditions and biological communities that are present on the West Range Site, including an analysis of flora and fauna and occurrences of habitat for state and federally rare, special concern, threatened, or endangered species.

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 its involvement are discussed in detail in Section 3.6 of this report.

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

Timber harvesting is the primary upland use that has impacted the West Range Station Footprint and Buffer Land, and that has influenced the composition and dynamics of the forest cover. Both clear cutting and selective harvesting of timber have occurred on different tracts of land within the upland Buffer Land, resulting in a patchwork like pattern of cleared recently cut (10-20 years) areas and stands of forest cover of varying ages and compositions in the uplands.

Biological communities and habitats for and occurrences of flora and fauna were assessed in conjunction with the field reconnaissance for wetland habitat. Review of MDNR Natural Heritage Information System (NHIS) data for known records of protected habitats or species within or near the project area provided information for potential target habitats to assess. Habitats were first identified through off-site methods including review of aerial and satellite imagery. This was followed by a field reconnaissance by field biologists during June 6-10, 2005. The terrestrial (upland) habitats described below are based on observations collected during the June 2005 field reconnaissance. Supplemental information describing terrestrial habitats was provided by wetland scientists during a June-August, 2005 wetlands survey.

7.8.1 Terrestrial Flora

The list of vegetative communities found in the vicinity of the West Range Site is derived from the *Field Guide to the Native Plant Communities of Minnesota: The Laurentian Mixed Forest Province* (MDNR 2003), a vegetation classification system for north central and northeastern Minnesota. The following discussion describes terrestrial habitats present on the IGCC Station

Footprint and Buffer Land. State and federally protected flora species in the vicinity of the West Range Site are addressed in Section 7.8.3 below. The general land use impacts on trees and other plants and aquatic areas from the power station and associated utility corridors are described in Section 7.1 above. Detailed estimates of the amount of trees and brush required to be cleared within each area or right-of-way are presented in Section 3.9 of the ES.

Within the Station Footprint there was no old growth or mature conifer forest observed during field reconnaissance. White pines were observed infrequently and red pine (*Pinus resinosa*) was not observed. All of these upland terrestrial communities onsite have been impacted by timber activities at some point in time. Some areas appear to have been logged for several consecutive decades. The western half of the Station Footprint and Buffer Land also had evidence of logging activities in the past 10-20 years, with dense quaking aspen regrowth.

Table 7.8-1 below provides a summary of impacts by habitat type for the Station Footprint and Buffer Land. A summary of total land use impacts for the associated facilities, transmission lines, and pipelines is provided above in Section 7.1.

Table 7.8-1
Summary of Biological Communities within Station Footprint and Buffer Land

Vegetation Cover Type	Acres within Buffer	Phase I Impacts (acres)	Phase II Impacts (acres)	Total Impacts Acres
Aspen Forest	137.30	1.64	0	1.64
Northern Wet-Mesic Boreal Hardwood-Conifer Forest	335.2	0	16.1	16.1
Northern Mesic Hardwood Forest	518.9	72.47	64.42	136.9
Old Field	24.64	0	0	0
Wetland	177	17.3	13.6	30.95
Total Acres	**1193**	**88**	**111**	**179**

Given that the Station Footprint and Buffer Land is located within a timber production area 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 vegetative communities, all of which are abundant throughout the region.

7.8.2 Fauna

Fauna (animals) in the vicinity of the West Range Site include species that are typical to northern Minnesota (State and federally protected fauna are addressed in Section 7.8.3.). The most abundant habitat found on the Station Footprint and Buffer Land is northern mesic hardwood forest (red oak-sugar maple-basswood-(bluebead lily) forest). Bird diversity is highest within this community compared to other habitats, and includes nesting and foraging habitats for songbirds and raptors.

The list of potential mammals that utilize land within the boundary of the Buffer Land includes predators, bears, and large ungulates such as moose and deer. Many deer were observed within this forest type, and evidence of deer browse was commonly observed. Suitable forage for moose occurs in the wetlands and uplands areas within the boundaries of the Buffer Land, and a moose skeleton was observed within the Station Footprint and Buffer Land. Beaver also utilize this site for forage and beaver activity was prevalent, especially within the eastern half of the Station Footprint and Buffer Land. During the June 2005 field reconnaissance, field biologists saw a lone timber wolf (*Canis lupus* – federally threatened) preying on a deer fawn.

The northern wet-mesic boreal hardwood-conifer forest is patchy and discontinuous within the Station Footprint and Buffer Land. The fauna found are common to second growth forests and the varying upland habitats found in northern Minnesota.

Wetland habitats for fauna are relatively diverse and common throughout the vicinity of the West Range Site. The Type 8 bog habitat is the most unique and is potential habitat for rare species of fauna, primarily birds and small mammals. All other types of wetlands (Types 3-7) within the Station Footprint and Buffer Land, but not connected to lakes, are the most important for amphibians. The wetlands that provide optimum amphibian breeding habitats are ones lacking fish (predators) populations. Adult Anurans (frogs) were observed during the field reconnaissance and included American toad (*Bufo americanus*), grey treefrog (*Hyla versicolor*), Northern leopard frog (*Rana pipiens*), and wood frog (*Rana sylvatica*). Potential habitats were also observed for the spring peeper (*Psuedacris crucifer*), Western chorus frog (*Psuedacris triserata*), green frog (*Rana clamitans*), and mink frog (*Rana septentrionalis*), all species common to the area. The mink frog is common to lakes and lake fringe wetlands. Wetlands also provide potential habitat for the Eastern newt (*Notopthalmus viredescens*) and the blue-spotted salamander.

No breeding concentrations of migratory birds are present within the Station Footprint and Buffer Land. These include nesting swallow colonies, waterbird colonies, heron and egret nests, or other colonial nesting species. The entire area contains breeding bird habitats as evidenced by the songbirds engaging in territorial behaviors and calls during the June and July 2005 field surveys. These were thought to be from nesting birds. Raptor nesting was assumed to occur throughout the site as well. Two adult unidentifiable Accipiters and a barred owl (*Strix varia*) were observed. Of the three potential Accipiters found in this area, the Northern goshawk (*Accipiter gentiles*) is the only Accipiter considered rare and is a designated sensitive species in Minnesota by the U.S. Forest Service. Goshawk habitat was relatively absent from the site as this animal prefers old growth and undisturbed conifers. Ruffed grouse (*Bonasa umbellus*) were commonly observed in the second growth aspen forest, further indicating the widespread occurrence of timber harvesting activities within the Station Footprint and Buffer Land.

Habitat quality varies and the overall habitat quality within the Station Footprint and Buffer Land. Wetlands are the highest quality habitats within the Station Footprint and Buffer Land. Habitat fragmentation and loss of habitat connectivity is most prevalent southwest of the Station Footprint and Buffer Land due to the impacts of past mining. The existing roads and transmission lines in and around the area have also resulted in permanent conversions and represent a habitat fragmenting vector for some species. Land uses and habitats are similar in lands surrounding and extending outward from the West Range Site.

7.8.3 Rare and Unique Natural Resources

The West Range Site 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 previously noted, a wolf was observed within the Station Footprint and Buffer Land during the 2005 field reconnaissance and wolf habitat and prey items widely occur throughout the vicinity of the West Range Site. 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 Station Footprint and Buffer Land.

There are no federally protected plant species identified by the USFWS within the Station Footprint and Buffer Land or any of the proposed utility or transportation corridors and, therefore no adverse effects are anticipated on any federally protected plant species.

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 the vicinity of 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 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 in the vicinity of 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 Station Footprint and Buffer Land, nor within a 0.5-mile radius of the project boundary.

Additional field survey during winter 2005-2006 by U.S. Fish and Wildlife Service to determine the potential effects on habitat for the Canada lynx and grey wolf is ongoing. The significance of effects to these species will be determined through the Section 7 consultation process. Similarly, effects on bald eagles should also be determined by the U.S. Fish and Wildlife Service through the Section 7 consultation process.

7.8.3.1 Minnesota Endangered Species Act

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 (Minn. Stat. § 84.0895). The MDNR was contacted to request a review of the NHIS for occurrences within the Station Footprint and Buffer Land and its associated utility and transportation corridors, which includes the Nashwauk, Taconite, and Bovey areas. 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.

7.8.3.2 West Range IGCC Power Station Footprint and Buffer Land

No MDNR NHIS species occurrences within the Station Footprint and Buffer Land are documented within the 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. Of these occurrences, only three species are within a one-mile radius of the Station Footprint and Buffer Land. 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 7.8-2 below.

Most of the 17 NHIS occurrences in the vicinity of 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 Station Footprint and Buffer Land. 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 mine spoil areas. Typical habitat for this species is within fringe wetland habitats such as wet meadow habitats dominated by native graminoids and sedges. Similar habitat is present within the Buffer Land. Consideration must be given to the potential presence of the species in designing the final layout of the IGCC power station.

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 Buffer Land that may provide potential habitat for this species. However, Dunning Lake and its associated aquatic habitats will be avoided for construction of the IGCC Power Station and associated facilities.

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 by the construction of the IGCC Power Station and its associated facilities. However, species of special concern are not protected by the Minnesota Endangered Species Statute (Minn. Stat. § 84.0895). Nonetheless, the Applicant will coordinate with the MDNR to determine whether there could be any significant effects on this species.

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. Again, even though species of

special concern are not protected by the Minnesota Endangered Species Statute (Minn. Stat. § 84.0895), the Applicant will coordinate with the MDNR to determine whether there could be any significant effects on this species.

For the records of state-listed species within the vicinity of the West Range Site 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 7.8-2
MDNR NHIS Plant Species Occurrences in Vicinity of West Range Site

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	Non-status	Grassy opening, near mine area
#24653, #28537	*Liparis lilifolia*	Lilia-leaved twayblade	Non-status	Tailings basin
#27799	*Myriophyllum tenellum*	Leafless water milfoil	Non-status	Lake shoreline
#24655, #28510	*Platanthera flava var. herbiola*	Tubercled rein-orchid	END	Tailings basin
#30846	*Spiranthes casei*	Case's ladies'-tresses	Non-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

7.8.4 West Range Preferred HVTL Route

Seven (7) known occurrences of state-listed species are documented within one mile of the West Range Preferred HVTL Route, as detailed in Table 7.8-3. 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 the West Range Preferred HVTL Route 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 West Range Preferred HVTL Route.

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 West Range Preferred HVTL Route.

The remaining records of state-listed species within one mile of the West Range Preferred HVTL Route 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 the West Range Preferred HVTL Route. Although impacts to these species or their habitats are not regulated, coordination with MDNR will be completed to determine the potential effects on these species or their habitats within or near this HVTL route, particularly for state-listed endangered *Platanthera flava var. herbiola*.

Table 7.8-3
MDNR NHIS Occurrences within One Mile of HVTL Preferred Route

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

7.8.5 West Range Alternate HVTL Route

Seven (7) known occurrences of state-listed species are documented within one mile of the West Range Alternate HVTL Route, as detailed in Table 7.8-4. 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 the West Range Alternate HVTL Route are within mine spoil areas, and there are no mine spoil areas that are within the West Range Alternate HVTL Route.

As with the West Range Preffered HVTL Route, because of the rarity of *Platanthera flava var. herbiola* in the state, the probability is low for encountering this species in wet meadow habitat.

The remaining records of state-listed species within one mile of the West Range Alternate HVTL Route 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 the West Range Alternate HVTL Route. Although impacts to these species or their habitats are not regulated, coordination with MDNR will be completed to determine the potential effects on these species or their habitats within or near the West Range Alternate HVTL Route, particularly for state-listed endangered *Platanthera flava var. herbiola*.

Table 7.8-4
MDNR NHIS Occurrences within One Mile of the West Range Alternate HVTL Route

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

7.8.6 Plan B Phase II Alternate HVTL Route Route

The Plan B Phase II Alternate HVTL Route is an existing HVTL corridor that would be utilized as an alternate Phase II route if the Proponent's Plan A Preferred 345kV option is not approved. Twelve (12) known occurrences of state-listed species are documented within one mile of the Plan B Phase II Alternate HVTL Route, as detailed in Table 7.8-5. 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 the Plan B Phase II Alternate HVTL Route is within a mine spoil area and there are no mine spoil areas within the Plan B Phase II Alternate HVTL Route.

The remaining records of state-listed species within one mile of this corridor are listed as species of special concern or non-status. Although impacts to these species or their habitats are not regulated, coordination with MDNR will be completed to determine the potential effects on these species or their habitats within the corridor, particularly for state-listed endangered *Platanthera flava var. herbiola*.

Table 7.8-5
MDNR NHIS Occurrences within One Mile of Plan B Alternative Route

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

7.8.7 West Range Natural Gas Pipeline Alternative

Nine (9) known occurrences of state-listed species are documented within one mile of the Natural Gas Pipeline Alternative 1, as detailed in Table 7.8-6. 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 the Natural Gas Pipeline

Alternative 1 are within mine spoil areas, and there are no mine spoil areas within the alignment for the Natural Gas Pipeline Alternative.

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 Natural Gas Pipeline Alternative.

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. Although impacts to these species or their habitats are not regulated, coordination with MDNR will be completed to determine the potential effects on these species or their habitats within Natural Gas Pipeline Alternative 1, particularly for state-listed endangered *Platanthera flava var. herbiola*.

Table 7.8-6
MDNR NHIS Occurrences within One Mile of Gas Pipeline Route

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

7.8.8 West Range Process Water Supply Pipeline

7.8.8.1 Segment 1 (Lind Pit to Canisteo Pit)

Four (4) known occurrences of state-listed species are documented within one mile of Process Water Supply Pipeline Segment 1 (Lind Pit to Canisteo Pit), as detailed in Table 7.8-7. 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. 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 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 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.

Although impacts to species of special concern or non-status species or their habitats are not regulated, coordination with MDNR will be completed as soon as possible to determine the potential effects on these species or their habitats within or near Process Water Supply Pipeline Segment 1, particularly for state-listed endangered *Botrychium pallidum*.

Table 7.8-7
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

7.8.8.2 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 impacts to these resources or their habitats are not anticipated for this alternative.

7.8.8.3 West Range Process Water Supply Pipeline Segment 3 (Gross-Marble Pit to Canisteo Pit)

One (1) known occurrence of a state-listed species is documented within one mile of Process Water Supply Pipeline Segment 3 (Gross-Marble Pit to Canisteo Pit), as detailed in Table 7.8-8. 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 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 7.8-8
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

7.8.9 Process Water Blowdown Pipeline 1 (IGCC Facility 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 Facility to Holman Lake), and impacts to these resources or their habitats are not anticipated for this alternative.

7.8.10 Process Water Blowdown Pipeline 2 (IGCC Facility 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 Facility to Canisteo Pit), and impacts to these resources or their habitats are not anticipated for this alternative.

7.8.11 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 impacts to these resources or their habitats are not anticipated for this alternative.

7.8.12 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 impacts to these resources or their habitats are not anticipated for this alternative.

7.8.13 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 impacts to these resources or their habitats are not anticipated for this alternative.

7.8.14 West Range Roads

There are no known occurrences of state-listed protected or otherwise rare species within one mile of the road alignments, and impacts to these resources or their habitats are not anticipated for this alternative.

7.9 NOISE

The Applicant estimated the amount of noise that Mesaba One and Mesaba Two would create at nearby residences and other receptors during construction and operation. Noise will be generated by the IGCC Power Station as well as by associated rail and roadway traffic. Overall, noise mitigation methods are available such that noise from the IGCC Power station will be not be audible at nearby residences (less than 3dBA increase) and will not exceed MPCA noise standards at any surrounding receptors. While the State noise standards are not applicable to Itasca County's proposed realignment of CR 7, traffic noise levels are projected to exceed MPCA standards at some nearby receptors during both construction and CR7 operation. Mitigation of the roadway traffic noise is economically infeasible.

7.9.1 Noise Standards

The Minnesota Pollution Control Agency (MPCA) has set noise standards for both residential and industrial zones. These standards, measured in dBA, are stipulated in the form of L_{10} and L_{50}. L_{10} means that the measured sound pressure level ("SPL") (in dBA) must not exceed a certain threshold more than 10% of the time (for a one hour survey), and L_{50}, being a level that must not

be exceeded more than 50% of the time (for a one hour survey). These thresholds are listed as SPL (dBA) maximums by the MPCA, as shown in Table 7.9-1. The Noise Area Classification (NAC) has 4 classes. NAC-1 includes household units, including farmhouses, as well as religious activities. NAC – 2 applies to more commercial development, such as retail, businesses, government services, and parks. NAC-3 and 4 (not considered here) are less stringent, and are composed primarily of industrial uses. Applicable limits for NAC-1 areas where there is no overnight lodging are daytime values only.

Table 7.9-1 Minn. R. 7030.0050 Noise Area Classification (NAC)

	NAC - 1		NAC - 2	
	L_{50}	L_{10}	L_{50}	L_{10}
Daytime	60dBA	65dBA	65dBA	70dBA
Nighttime (10:00 p.m.-7:00 a.m.)	50dBA	55dBA	65dBA	70dBA

7.9.2 Site Setting and Receptors

The West Range Site and its HVTL and natural gas pipeline routes are rural, generally forested areas, and sparsely populated with residences. A total of 11 noise receptor stations were positioned nearby the IGCC Power Station Footprint and Buffer Land. Four receptors were positioned on the boundary of the Buffer Land and seven others at more distant locations. These receptor locations are summarized in Table 7.9-2 below.

Table 7.9-2 West Range Site 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
3. Residence, along CR 7	3,800' to the west	Ambient Monitoring; Plant Operations Modeling; Construction Impacts; Rail Operations Impacts
4. 32423 CR 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

7.9.3 Existing Noise Levels

Noise monitoring was completed at five locations throughout the West Range Site. All monitoring was completed using a Type II, ANSI approved noise level meter with calibration performed before and after each monitoring cycle.

A windscreen was used to counter any wind effects and no monitoring was performed during times when winds greater than 15 mph were measured, or when precipitation was occurring. Monitoring at each location was performed for no less than one hour and during both times specified as "night" and "day" by MPCA classification.

Table 7.9-3 and Table 7.9-4 summarize ambient noise conditions for the time frames measured in and around the West Range Site, and for daytime and nighttime conditions, respectively.

Table 7.9-3 Monitored levels at all Receptors, Daytime

Daytime Receptors	L_{10}	L_{50}	L_{10} dB over State Compliance	L_{50} dB over State Compliance
Receptor 1, 1700' West, Day (9:15AM-10: 15AM)	53dBA	52dBA	0dB	0dB
Receptor 2, 3900' SE, Day (3:15PM-4: 15PM)	54dBA	53dBA	0dB	0dB
Receptor 3, 3900' West, Day (1:03PM-2: 04PM)	59dBA	55dBA	0dB	0dB
Receptor 4, 4400' West, Day (2:30PM-3:30PM)	59dBA	52dBA	0dB	0dB
Receptor 4, 4100' SE, Day (4:00PM-5:00PM)	51dBA	50dBA	0dB	0dB

Table 7.9-4 Monitored Levels at all Receptors, Nighttime

Nighttime Receptors	L_{10}	L_{50}	L_{10} dB over State Compliance	L_{50} dB over State Compliance
Receptor 1, 1700' West, Night (10:04PM-11:04PM)	51dBA	49dBA	0dB	0dB
Receptor 2, 3900' SE, Night (11:15PM-12: 16AM)	50dBA	49dBA	0dB	0dB
Receptor 3, 3900' West, Night (10:23PM-11:23PM)	59dBA	55dBA	4dB	0dB
Receptor 4, 4400' West, Night (11:45PM-12:45PM)	56dBA	53dBA	1dB	3dB
Receptor 5, 4100' SE, Night (from Receptor 2)	50dBA	49dBA	0dB	0dB

All locations, with the exception of Receptors 3 and 4, experience ambient noise conditions at or below state and federal standards during the most critical nighttime hours (10PM-7AM). Receptors 3 and 4 experience ambient noise levels above state standards during nighttime conditions, likely due to their proximity to CR 7.

Noise levels at all locations are typical for townships and locales of this size, and below those of typical urban environments in close proximity to major transportation corridors. Detailed descriptions of the monitoring locations and conditions are provided in Section 2.11 of the ES.

7.9.4 Construction Noise Impacts

The construction process for the IGCC Power Station and Associated Facilities 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, scrapers, 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 and equipment components. The Applicant assumed that there will be no driven piles during the construction process, although the necessity for such construction activity has not been finally determined.

Noise associated with the construction of the Project will be attenuated in a variety of ways. The most significant is the divergence of the sound waves with distance (attenuation by divergence). In general, this mechanism results in a 6 dBA decrease in the sound level with every doubling of distance from the source. For example, the 84 dBA average sound level (at 50 feet) associated with clearing and grading will be attenuated to 78 dBA at 100 feet, 72 dBA at 200 feet, and to 66 dBA at 400 feet. Noise attenuation from dampening due to ground effects was not included in the construction noise analysis to allow for some conservatism.

During final construction, a method used for testing and cleaning steam piping called "steam blows" creates substantial noise. A steam blow results when high-pressure steam is allowed to escape into the atmosphere when cleaning the steam piping. A series of short steam blows, lasting two or three minutes each, will be performed several times daily over a period of two or three weeks. Steam blows can produce noise as loud as 130 dBA at a distance of 100 feet. Under such circumstances, the resultant sound level at the nearby receptors would range from 86 to 103 dBA. 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. Detailed information regarding methods to mitigate noise can be found in Section 2.11 of the ES.

Although nighttime construction is not currently anticipated, if construction activities took place during the nighttime hours (after 10:00 p.m.), noise would be expected to exceed the MPCA residential nighttime noise limit of 50 dBA (L_{50}) at receptor locations R2 and R3, and could cause a significant impact.

Although construction noise would be below daytime state standards, because of its transitory nature and common fluctuations in the background noise level, construction activity will occasionally be discernable at the nearest receptors. Given ideal atmospheric conditions for noise propagation, construction noise could be discernable at the receptors located furthest from the IGCC Power Station Footprint and Buffer Land.

Rail line construction will 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. Blasting of rock will be required for some of the cuts needed to establish an acceptable grade for the rail track and will affect local residents. Because of the temporary nature of the linear construction activities, rail construction noise will result in short-term temporary noise impacts. However, these impacts would be diminished once the construction operation moves away from Receptors R2 and R5.

7.9.5 Operating Noise Impacts

7.9.5.1 Methodology

A proprietary computerized noise prediction program was used to simulate and model the operation of IGCC Power Station equipment. The modeling program uses industry-accepted propagation algorithms based on ANSI and ISO standards (ISO 9613, ISO 1913 (Part 1), ANSI 126, or ISO 3891). 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, ground effects, and barriers/shielding.

Calculations were performed using octave band sound power levels (abbreviated PWL or Lw) 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 Lp) 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.

The IGCC Power Station was assumed to operate 24 hours per day at its design capacity, meaning that its noise output would be constant, regardless of time-of-day (and, thus, the statistical sound levels would all be the same – that is, L100=L90=L50=L10). 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 the coal piles were not included in the provision for shielding benefits.

A total of 11 receptor locations – four along the boundary of the Buffer Land and seven at locations outside of the Buffer Land – were used for the predictive analyses to assess future noise conditions due to the proposed equipment. The modeled off-site receptor locations were the same as the ambient measurement locations used by the Applicant and reported in Section 2.11 of the ES. See Section 2.11 of the ES for further details.

7.9.5.2 Results

The noise model was run for the base case plant configuration for both Phase I only and for the combined Phase I and Phase II operations. 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, Power Block and ASU cooling towers, and several large water-handling pumps.

Because noise standards were exceeded under the base case assumptions, the Applicant evaluated ways to further reduce noise from plant operations. Specifically, the Applicant's noise consultant, ACC, evaluated a mix of low-noise designs for some equipment items, using available noise control technologies (such as stack silencers), and applying external treatments such as enclosures or noise control panels on selected building walls. The ACC-suggested noise mitigation for the IGCC Power Station is summarized in Table 7.9-5. With the proposed mitigation, the facility is predicted to meet state standards (both L_{50} and L_{10}) at all receptors that currently meet these standards (L_{10} noise levels at Receptors 3 and 4 are already above the

MPCA nighttime limits due to roadway traffic on CR 7, and the noise from the IGCC Power Station would not increase noise at these sites.). With the proposed mitigation, noise levels would not increase at any nearby residence by more than one decibel, which is an imperceptible increase.

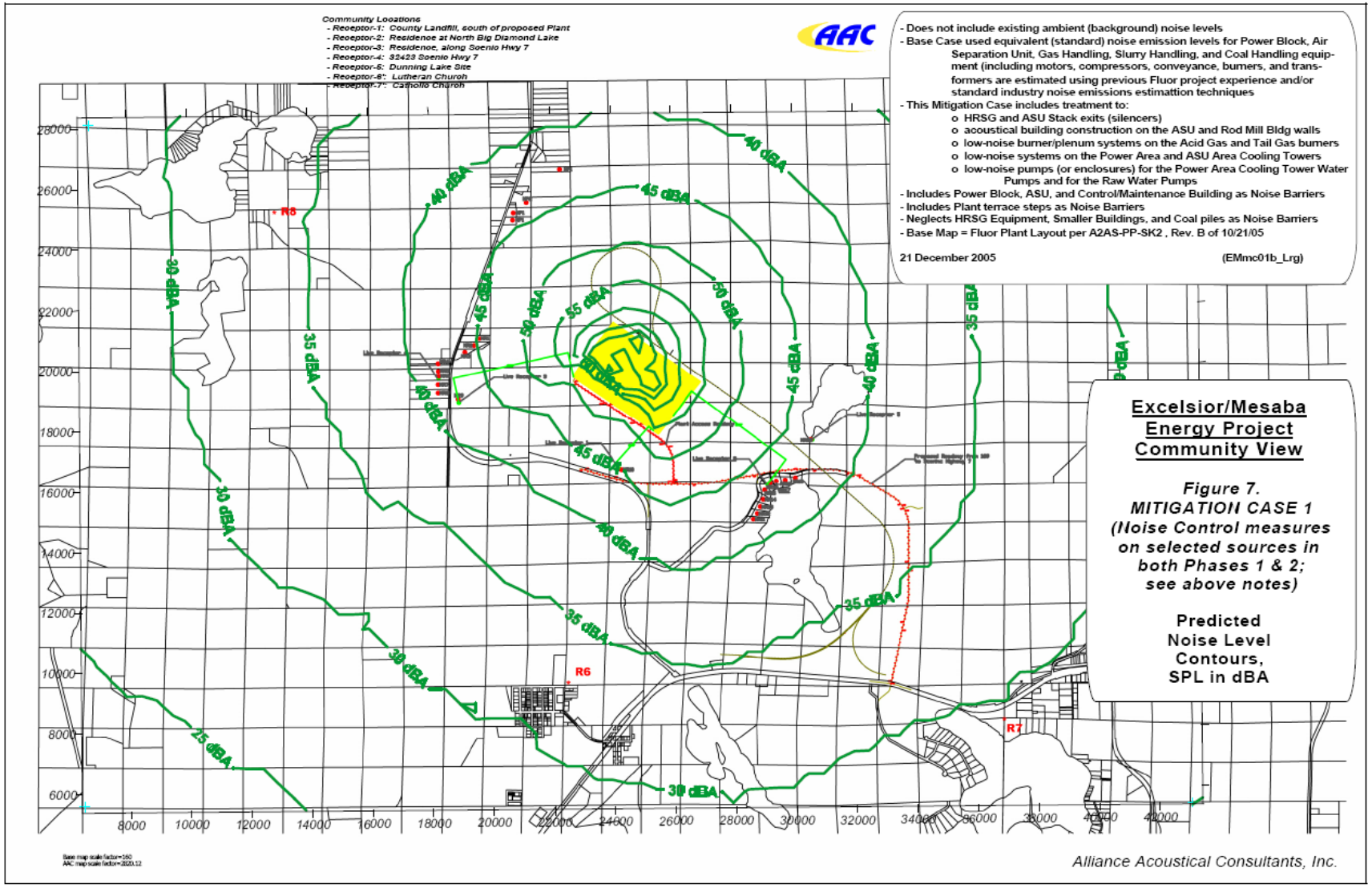
The predicted noise contours around the IGCC Power Station, with the suggested noise mitigation, are shown in Figure 7.9-6 below. While the ACC-recommended noise mitigation is listed below, the actual noise mitigation to be used for the IGCC Power Station to meet the applicable noise limits will be determined during final design. Details of the noise mitigation measures and the levels resulting from the modeling can be found in Section 2.11 of the ES.

Table 7.9-5
Summary of Noise Mitigation Project Design Features

Noise Source (Original Noise Emissions Rating)	Conceptual Noise Mitigation Feature(s)
Power Block Cooling Tower (60 dBA at 400' from tower edge)	Reduced 6 dB to 54 dBA at 400' from tower edge. Tower vendors can use a combination of slower-speed fans with special blade design, low-noise drive systems, splash control features, and/or tower baffling materials.
Gas Turbine, Steam Turbine, & HRSG 2-on-1 Power Island (70 dBA at 400' from island envelope)	(a) Include acoustical panel specifications for GTG and STG buildings walls in the detailed design such that interior space noise levels are adequately absorbed and encased within these building shells. (b) Specify GTG components that are outside buildings to be less than 90 dBA at 3 feet from the equipment surface envelope, as an aggregate.
HRSG Stack Exit (alone) (60 dBA at 400')	Reduced 10 dB to 50 dBA at 400' from stack base. Power Island vendor should use a stack silencer (either before or after the up-turn bend) to reduce HRSG stack noise.
Power Block Cooling Tower Pumps (94 dBA at 1')	Reduced 6 dB to ≤88 dBA at 1'. Can be accomplished via noise limit specification to equipment vendor (for a quiet design). As an alternative, install an acoustical enclosure around the pump and drive mechanics.
ASU System (varies)	(a) Include acoustical panel specifications for ASU building walls in the detailed design such that interior space noise levels are adequately absorbed and encased within the building shell. (b) Specify ASU components that are outside buildings to be less than 90 dBA at 3 feet from the equipment surface envelope, as an aggregate.
ASU Stack Exit (alone) (50 dBA at 400')	Reduced 10 dB to 40 dBA at 400' from stack base. ASU System vendor should use a stack silencer to reduce stack noise.

Noise Source (Original Noise Emissions Rating)	Conceptual Noise Mitigation Feature(s)
Rail Dumping Building (73 dBA at 50')	Assumes acoustical panel specifications for building walls in the detailed design such that interior space noise levels are adequately absorbed and encased within the building shell to meet the assumed emissions levels.
Slurry Feed and Slurry Prep Building (60 dBA at 50')	Same as immediately above.
Slag Handling Building (65 dBA at 50')	Same as immediately above.
Rod Mill Building (75 dBA at 50')	Reduced 10 dB to 65 dBA at 50' from any building facade. Specify acoustical panel specifications for Rod Mill building walls in the detailed design such that interior space noise levels are adequately absorbed and encased within the building shell to meet the reduced emissions levels.
SynGas and TailGas Burners (96 dBA at 3')	Reduced 10 dB to 86 dBA at 3' from the burner box. Specify low-noise burners to equipment vendors or use noise control enclosures/ plenums around burner systems.
Raw Water Pump Sets (91 dBA at 3')	Reduced 10 dB to 81 dBA at 3' from the pump set envelope. Noise limit specification to equipment vendor to supply either quiet-design pump sets or to utilize equipment enclosure.
All other Mechanical Equipment not specified above (various)	Noise limit specification to equipment vendor; no more than 85 dBA at 3'.
All building HVAC units and fans (various)	Noise limit specification to equipment vendor; no more than 85 dBA at 3'.

Figure 7.9-1 Noise Level Mitigation Modeling Results



7.9.6 Vehicular Traffic Noise Impacts

Traffic noise analysis was performed according to Federal Highway Administration (FHWA), Mn/DOT, and MPCA guidelines with regard to noise in and around proposed neighborhoods affected by 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 sites were used as a basis for modeled results and included in the modeled receptor sites. The measurement sites include areas of existing residential housing and common use areas regarded by Federal standards as Federal Activity Category B. For reference, FHWA Noise Abatement Criteria is listed in Table 7.9-6.

Table 7.9-6
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 C.F.R. 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 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. The remaining receptors were placed at other residential locations near the proposed roadway. All modeled results were judged using the L10 metric, as both federal and state guidelines specify only one metric be used when determining impacts, with the L10 standard being commonly utilized in both federal and state guidelines.

Due to the proximity of the proposed access roadway running between Big Diamond Lake and Dunning Lake, the following noise issues were identified by the model:

- The nighttime state L_{10} standard was exceeded at ten receptor sites during construction. This construction period noise impact would be temporary; that is, limited to the construction period.
- The "Daytime" L10 standard was exceeded during construction at one receptor, MR19, because it is 275 feet from the proposed roadway. This construction period noise impact would also be temporary. Nighttime state L10 standards were exceeded at five receptors during plant operation.

The modeled operating noise levels at the five receptors 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. Therefore, a mitigation analysis was performed to determine whether noise walls would be cost effective in accordance with Mn/DOT cost reasonableness criteria. "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. As described in detail in the ES, a 2,200-foot wall, placed between receptors MR15-MR19, which are homes located to the north of Big Diamond Lake, would cost about $660,000—or a price per total decibel reduction of $20,625.

Since the proposed access roadway would be constructed and owned by Itasca County (See Section 3.5.1.1.1), it would be designed to meet Minnesota State Aid standards for construction of roadways eligible for state funding. Under these standards, the criteria for a noise wall must meet MnDOT minimum of $3,250 per total decibel reduction. The hypothetical 20-foot noise wall would not meet the MnDOT minimum criteria and is therefore not considered feasible.

7.9.7 Railroad Noise and Vibration Impacts

Freight train noise levels would range from 38 to 58 dBA at the Receptor locations during a train pass-by. Typical daytime background noise levels were measured to be in the low 50's dBA (L_{50}). 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.

Vibrations generated by the Project's future rail operations were estimated by AAC for the surrounding 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. Vibrations at the nearest receptors were not predicted to be greater than FRA guidelines.

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 was also estimated by AAC. 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.

In summary, significant impacts from freight rail operations are expected to be limited to the audibility of train horns, which noise is unavoidable due to FRA regulations.

7.10 TRANSPORTATION AND TRAFFIC

7.10.1 Roads

The proposed 3.2-mile access roadway (Access Road 1) that will serve the IGCC Power Station will be constructed and owned by Itasca County. The new two-lane roadway starts at a new access point on State Highway 169, approximately 7,000 feet east of CR 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 CR 7, just southwest of the plant site. The section of existing CR 7 between the new connection and U.S. 169 will remain in place, and the only modifications required will be to orient the north end of CR 7 to meet the new connection perpendicularly. About 800' to 1000' of the existing curve between the east/west section and the north/south connection of CR 7 will then be abandoned and reclaimed.

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 above in Figure 2.1-3.

Access to the HVTL, natural gas pipeline, and other utility corridors will come from various existing roadways at points that they are crossed by the proposed utilities. As design and construction progress, there could be a need for temporary access roads to be constructed to facilitate utility construction.

One benefit of the proposed Access Road 1 is that it would give local residents north of the IGCC Power Station a new route alternative when traveling east on State Highway 169. It will also reduce traffic volumes on the southerly portion of County CR 7, an area that has experienced problems with slope stability. In addition, the new roadway will have a better

intersection with State Highway 169 than County CR 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, wetland, and other impacts on existing land use/land cover as a result of roadway construction are discussed in more detail in Section 7.9, Section 7.7, and Section 7.1, respectively.

7.10.2 Traffic Impacts

The predicted 2028 traffic forecast indicates that if Mesaba One and Mesaba Two are built at the West Range Site, traffic on State Highway 169 and C.H. 7 (north of Site) will only be slightly higher than that forecast under the 1.5% annual growth No-Build scenario. The proposed access roadway between State Highway 169 and the plant site will see its highest volumes (about 3,100 vehicles per day) during peak construction (2008), then will drop off to an estimated 1,550 vehicles per day. The section of existing County Highway 7 that lies between the IGCC Power Station and State Highway 169 will see its volume drop by more than 50% as traffic diverts to the proposed access roadway. The forecast traffic volumes are shown below. These traffic forecasts assume that Itasca County constructs Access Road 1 before plant construction begins. If not, a longer driveway off of C.H. 7 would serve the plant until the proposed access road is built. Under either scenario, the existing or proposed roadways are adequate to handle predicted traffic.

Table 7.10.2
Forecast Traffic Volumes West Range Site

Year	T.H. 169		C.H. 7		New C.H. 7	
	West of CSAH 7	East of CH 7	North of New C.H. 7	South of New C.H. 7	West of Entrance	East of 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
2008 Build	8,900	7,100	1,500	470	1250	3100
2028 Build	10,500	8,400	1,700	460	1250	3100

7.10.3 Railroad

The proposed railroad will be a single track using a 100 foot wide permanent right-of-way. As provided in Table 3.5-2, railroad tracks, especially tracks designed for unit coal trains, have limited parameters for curvature and grades. These criteria make it difficult to avoid impacts to the environment. Grading impacts, based on cut and fill sections, will vary from 60 feet to 760 feet wide. Except for the track bed, disturbed areas will be revegetated.

Current and expected train traffic on the BNSF and CN rail line that would serve the IGCC Power Station at the West Range Site is discussed in Section 3.5.2.2. About six trains per day currently travel on the BNSF line through Grand Rapids at speeds up to 25 miles per hour. Nine

grade crossings (a location where a public highway, road, street, or private roadway, including associated sidewalks and pathways, crosses one or more railroad tracks at grade) are located within the city limits of Grand Rapids and La Prairie. The track from Gunn to the West Range Site (about 12.5 miles in length) also operates at speeds of 25 miles per hour and has traditionally carried 4 to 10 trains per day. This track segment has another six public grade crossings.

Traveling at 25 miles per hour, a unit coal train would take about four minutes to clear a grade crossing. With both Phase I and Phase II operating at full load conditions using PRB coal, the IGCC Power Station is expected to require five unit coal train deliveries about every four days, or approximately nine full and empty unit train deliveries per week.

7.11 SOCIAL AND CULTURAL IMPACTS

7.11.1 Public Services

This section describes existing local government units located near the West Range Site that may be affected by the proposed project. It is divided into the following three subsections:

- Fire and Emergency Medical
- Police
- Utilities

7.11.1.1 Fire and Emergency Medical

Emergency services for the West Range Site would be primarily provided by the City of Taconite. Taconite has an Emergency Medical Technician (EMT) staff of seven volunteers that handle emergency medical services for the area. Taconite currently has a total of 14 volunteer fire department personnel. Ambulance service may be provided from Nashwauk or Grand Rapids, depending on exact location of the 911 caller. The nearest hospitals are the Itasca Memorial Center in Grand Rapids (13 miles) Hibbing (30 miles), and Bigfork (29 miles.) The City of Taconite also has a mutual aid agreement with nearby Cohasset and Grand Rapids. Itasca County provides additional emergency response as needed.

According to the City of Taconite, if the facility is built at the West Range Site, its volunteer fire department would likely have to be expanded from the current 14 up to perhaps a staff of 20, similar to the number of fire and emergency personnel available 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 would expect the Mesaba IGCC facility to train its own first responders and first aid specialists to respond until local emergency personnel arrive. In a large emergency, Itasca County, Grand Rapids, and Cohasset fire and EMT personnel would respond pursuant to existing mutual aid agreements with the City of Taconite.

7.11.1.2 Police

Itasca County provides police protection to the City of Taconite and the surrounding area. The Itasca County Sheriff's Office has 64 employees working as Jailers, Dispatchers, Clerical and Road Deputies. Itasca County employees have specialized training to work in the following areas: D.A.R.E. (Drug Abuse Resistance Education), pre-employment background investigation, Boat and Water Safety, Snowmobile Safety, Drug Task Force, Emergency Response Team, Dive Team, and special enforcement projects.

7.11.1.3 Utilities

The utilities in the rural areas are all on-site utilities including wells and septic systems. The City of Taconite uses wells to appropriate water and has a wastewater collection system that conveys wastewater to the joint Coleraine-Bovey-Taconite WWTF located in Coleraine. Potable water service and sanitary sewer collection system will be extended from the City of Taconite's existing utility systems to the IGCC facility site. The utility corridor will be approximately 12,400 feet in length and will affect about 17 acres.

There are also several private utilities that provide services to the area. QWest provides local telephone service. Natural gas and electricity are also provided by various utility companies and municipalities.

7.11.2 Archaeological and Historical Considerations

Section 106 of the National Historic Preservation Act requires consideration of impacts on historic, archaeological and cultural properties determined eligible for listing on the National Register of Historic Places (NRHP). The area of potential effects (APE) for archaeological resources is defined as all areas of potential effects from aspects of direct, physical impacts through the construction of the facility site itself, as well as its associated transportation systems (road and railroads), HVTL (high voltage transmission lines), gas pipelines and other associated utilities. The potential area of impact due to transmission line construction includes not only the area within the right-of-way but also nearby areas used during project construction. Specifically, the recommended APE for the architectural history resources extends to 0.25 miles from the centerline of proposed HVTL routes along existing or new proposed rights of way.

7.11.2.1 Archaeological Resource Model and Survey

During June and July 2005, an initial screening-level cultural resources assessment of the West Range Site and portions of associated corridors was conducted. The project study area for the West Range Site is approximately 1,344 acres (544 hectares), and 4,970 acres (2,011 hectares) for associated corridors. Thus, a total of 6,314 acres (2,555 hectares) were evaluated.

This evaluation consisted of three major steps: a review of SHPO file, the development of a GIS based sensitivity model, and a limited field survey to verify model predictions. Background research was first conducted using the SHPO site files for information on previously identified archaeological sites and cultural resource surveys within one mile (1.6 kilometer [km]) of the project area. The archaeological sensitivity model was developed to establish areas of archaeological sensitivity within the West Range Site and associated corridors. A 10-mile radius

around the West Range Site was used to determine the type of cultural affiliations and locations of archaeological sites that could be encountered within the project area. Previously recorded sites located within the study area were grouped according to the model.

The model established a general set of criteria that were based upon previous work throughout Minnesota and conversations with the Minnesota State Historic Preservation Office. The criteria included undisturbed portions of the following areas:

- Within 500 feet (ft.) (150 meters [m]) of an existing or former water source (lake, pond, river, stream).
- Elevated, comparatively well-drained areas within, or immediately adjacent to, a marsh or wetland of 10 acres (4.0 hectares) or greater in extent.
- Topographically prominent areas that command a wide view of the surrounding Landscape.
- Areas adjacent to a known or suspected portage or transportation route.
- Located within 300 feet (100 m) of a previously reported site.
- Located within 300 feet (100 m) of a former or existing historic structure or feature (such as a building foundation or cellar depression).

Areas of sensitivity were ranked in terms of the frequency in which previously recorded sites occurred. Areas were then categorized in terms of high, moderate and low potential for the location of archaeological sites.

Based on this sensitivity model, the Applicant conducted a limited archaeological survey covering 31 acres of within the Station Footprint and Buffer Land (6 acres identified as high-potential; 25 acres as moderate). No archaeological resources were encountered in either the high or moderate potential areas identified. The complete report of this investigation is included in an Appendix to the ES.

The Minnesota SHPO and appropriate federal agencies and tribes will be consulted to address the proposed 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.

7.11.2.2 Architectural Resources

A Phase I architectural history survey was conducted within the project boundaries to identify previous studies conducted in or near the project area, and to identify expected resource types. As described below, for the HVTL, rail and road corridors, the recommended APE for the architectural history resources extends to 0.25 miles from the centerline. For underground pipelines, the APE for is limited to the width of the corridor itself.

Several properties currently listed or eligible to be on the National Register of Historic Places (NRHP) are located in the vicinity of the area of potential effect (APE), but no such properties are located within the APE. In addition, eleven architectural history properties within the recommended APE have been previously recorded in SHPO records. Two properties, the Great Northern Railway Nashwauk-Gunn Line, and the Duluth, Missabe & Northern Railway Alborn Branch have been determined eligible for listing on the NRHP. Two previously recorded properties no longer exist. As to the gas pipeline corridors, since the area of potential impact of the pipeline is limited to the corridor itself, no historic buildings will be affected as no buildings are located within the corridor of the proposed pipeline route.

To date, the level of potential impact to NRHP registered or eligible archaeological sites, resources, or architectural resources has not been determined. Scoping studies to be conducted as part of the PPSA are expected to help identify areas of special concern that may warrant further investigation. At that time studies will be commissioned to address any identified concerns. 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.

7.11.2.3 Programmatic Agreement

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 become a signatory to a Programmatic Agreement. Initial consultation letters were sent in September 2005 from the Department of Energy to all federally recognized tribes that have expressed a cultural and historical interest in Minnesota. As of the date of this Application, one tribe has indicated an interest in participating in the review of the Project.

7.11.3 Population Trends and Demographics

This section summarizes demographic data for the area surrounding the West Range IGCC Power Station near the City of Taconite. Regional population trends, demographics, and racial justice issues are addressed in Section 6.1.

7.11.3.1 Taconite Population Trends

The population trends for the City of Taconite are shown below in Table 7.11-1. The data show that the population of Taconite has remained essentially constant since 1980.

Table 7.11.1
Population Trends Since 1980 for Taconite (West Range)

	1980	1990	2000	2004
Taconite	331	310	315	323

The regional area gets a large influx of temporary residents and visitors at lake cabins, resorts and campgrounds in the summer. These temporary residents are not counted in these population statistics, but they do impact the capacity of local government services to meet local needs.

7.11.3.2 Predicted Impacts

A new industrial facility of the magnitude of Mesaba One and Mesaba Two is expected to result in a positive impact on the area population. The most recent example of a baseload power plant's impact on rural Minnesota population trends comes from the Sherburne County Generating Plant's (Sherco) in the City of Becker, Minnesota. Prior to construction and operation of Sherco, Becker was a small rural community with few businesses. Now, after more than twenty years of operation of Sherco, the City has changed dramatically. Many businesses operate within the community and the City has become a magnet for commuters, increasing its population nearly four-fold since 1980. A similar, positive impact may occur from the construction and operation of Mesaba One and Two.

7.11.3.3 Demographics and Environmental Justice

The population of Taconite is over 95% white, with about 2.5% American Indian. To help determine whether the project could disproportionately impact minority or low-income residents, demographic data was evaluated for local site areas. A review of the demographics at the census block level also did not show any concentrations of minority or low income populations along the alternative transmission line route. The Applicant is not aware of any minority populations that are disproportionately affected in the area should the project be built at this site.

The racial demographics of the census tracts and block groups in the vicinity of the West Range Site and associated facilities (transmission lines, water lines, pipelines, etc.) were examined and compared with the demographics of Itasca County. The minority population in the census tract throughout the West Range Site, including the associated facility areas, ranges between 2.0% to 3.6%. 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 the surrounding area consist of minority population percentages that are slightly less than those found at the county or state levels. The percentage of population that earns above the poverty level is approximately the same in these block groups as in the rest of Itasca County and the Arrowhead Region. Based on this 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.

As described in Section 7.4 above and in the AERA Report attached as an appendix to the West Range IGCC Power Station Application for a Part 70 New Source Review Construction Authorization Permit (attached as Appendix 5), the Project's mercury emissions will not contribute appreciably to mercury concentrations in fish in nearby lakes. Therefore the IGCC Power Station will not disproportionately affect Native Americans or others in the area who may rely upon locally caught fish as a regular part of their diet.