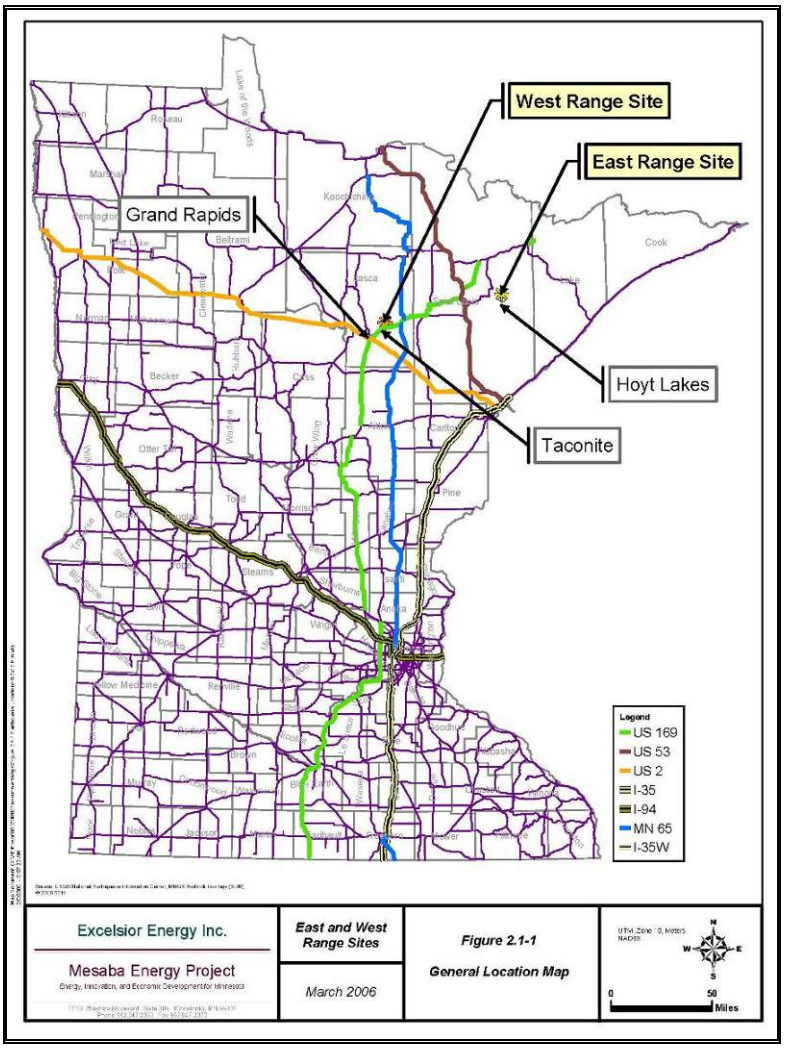
2. OVERVIEW OF LEPGP SITES AND HVTL/ PIPELINE ROUTES

2.1 LEPGP SITES

In compliance with the requirements of Minn. Stat. §§ 116C.51-.69 (known as the Minnesota Power Plant Siting Act, hereafter, the "PPSA") and Minn. R. 4400.1150, subp.1.C, the Applicant is proposing herein a preferred and alternate site for location of Mesaba One and Mesaba Two. The West Range Site, the Applicant's preferred location, is mostly located within the City limits of Taconite in Itasca County, Minnesota. The Applicant's alternate East Range Site is located mostly within the City limits of Hoyt Lakes in St. Louis County, Minnesota. Figure 2.1-1 illustrates the general project location, including both sites relative to one another, and provides a broad geographical context within which to place them. A complete description of the West Range and East Range Sites is provided in Section 2.5.1 and Section 2.6.1, respectively. Tables 2.7-1 through 2.7-3 compare the two Sites to one another in terms of their overall environmental impacts and construction/operating costs.

Figure 2.1-1 Minnesota Map Showing Location of West and East Range Sites



2.1.1 West Range Site

Figure 2.1-2 shows the West Range Site and the location of the IGCC Power Station Footprint, Buffer Land and Associated Facilities. Figure 2.1-3 provides a more detailed illustration of the infrastructure immediately surrounding the Station Footprint and Buffer Land. A description of each of these components on the West Range Site is provided in Section 2.5 along with the specific HVTL and natural gas pipeline routes for which the Applicant is seeking permits. A complete description of the existing environmental setting of the West Range Site and the environmental impact of constructing the IGCC Power Station and its Associated Facilities is provided in Section 7.

2.1.2 East Range Site

Figure 2.1-4 shows the East Range Site and the location of the IGCC Power Station Footprint, Buffer Land and Associated Facilities. Figure 2.1-5 provides a more detailed illustration of the infrastructure immediately surrounding the Station Footprint and Buffer Land. A description of each of these components on the East Range Site is provided in Section 2.6 along with the specific HVTL routes for which the Applicant is seeking a permit. A complete description of the existing environmental setting of the East Range Site and the environmental impact of constructing the IGCC Power Station and its Associated Facilities is provided in Section 8.

Figure 2.1-2 West Range Site Showing IGCC Power Station Footprint, Buffer Land, Associated Facilities and Additional Lands

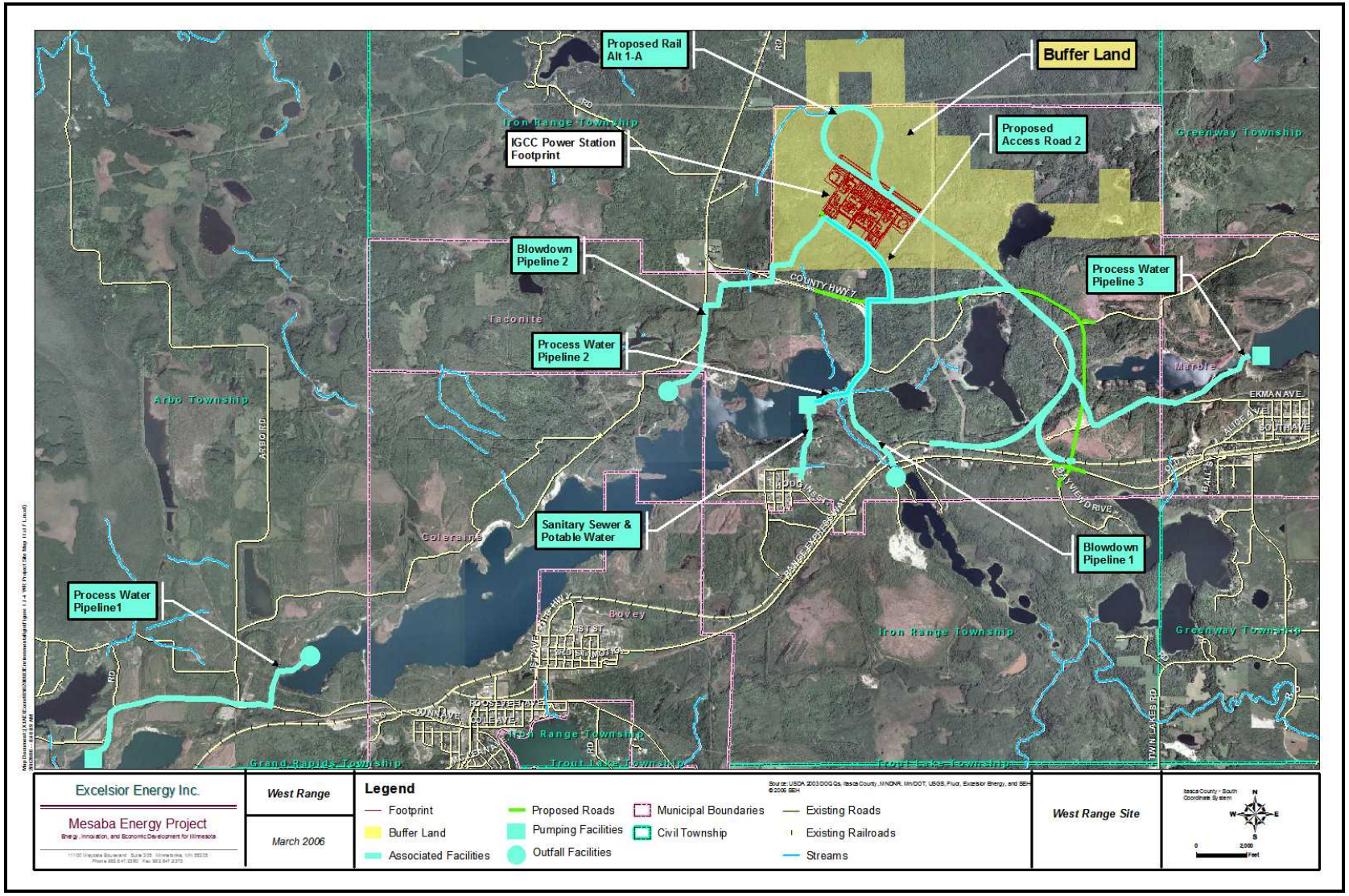


Figure 2.1-3 West Range Site Showing IGCC Power Station Footprint, Buffer Land and Details Behind Selected Associated Facilities

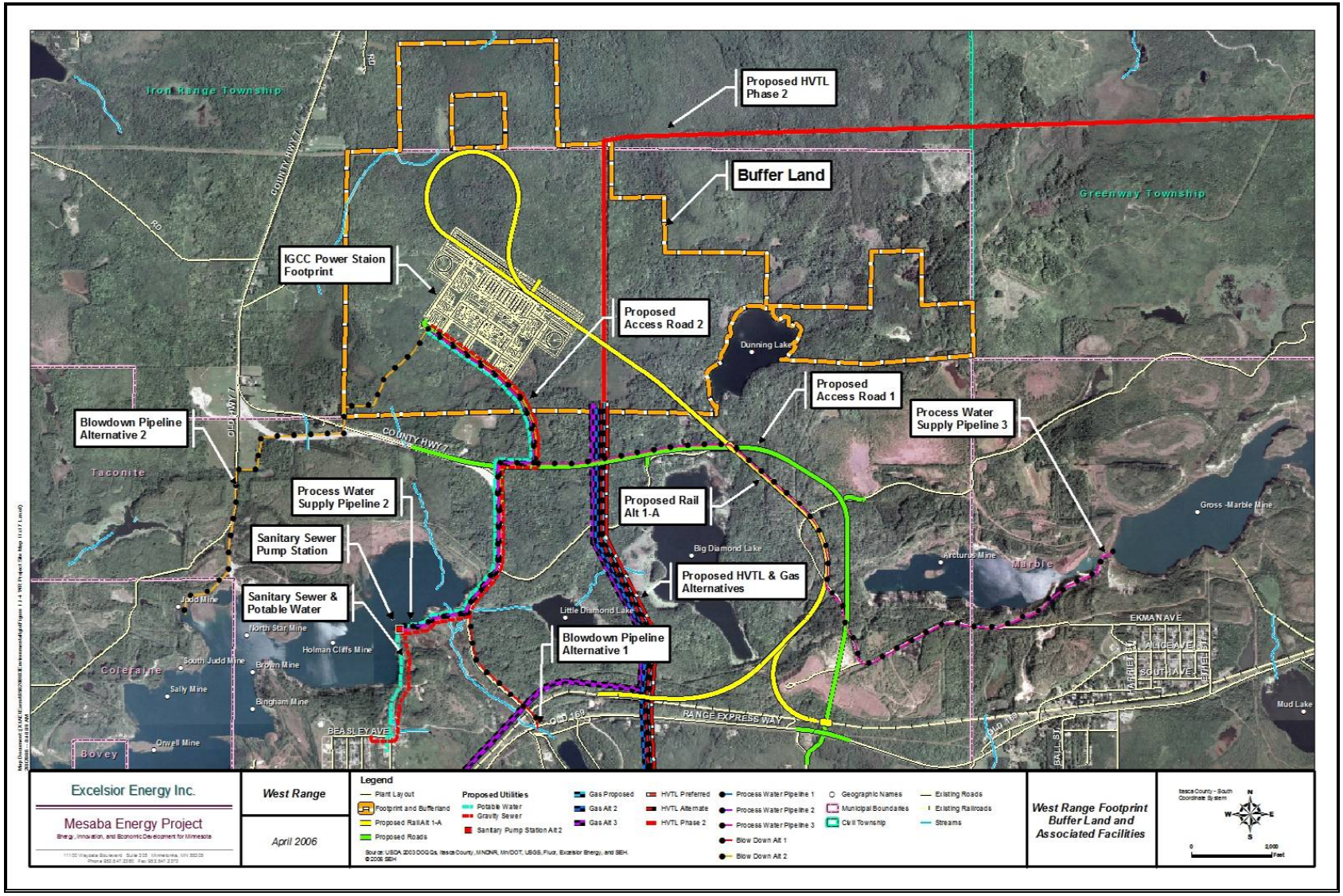


Figure 2.1-4 East Range Site Showing IGCC Power Station Footprint, Buffer Land, Associated Facilities, and Additional Lands

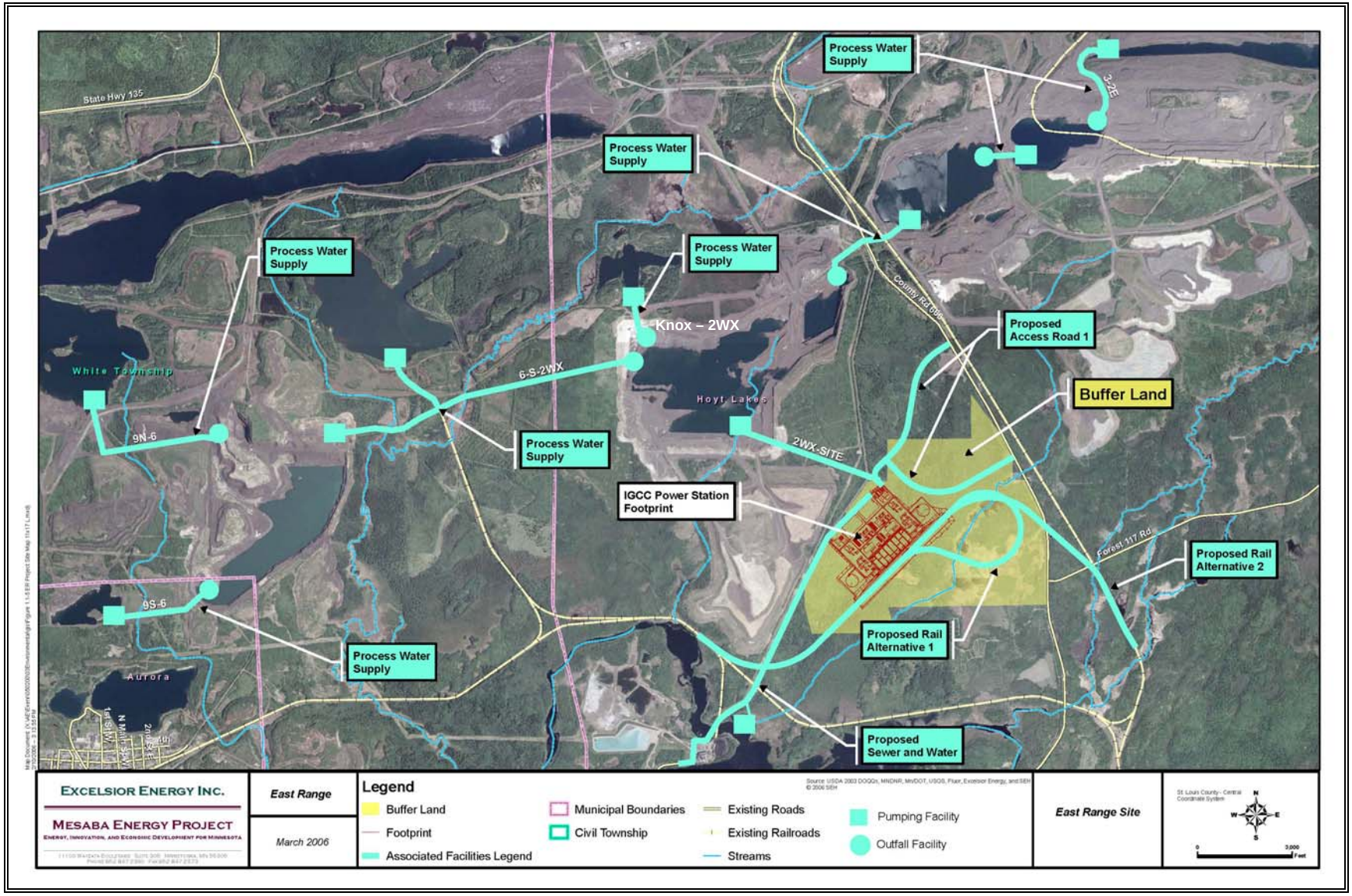
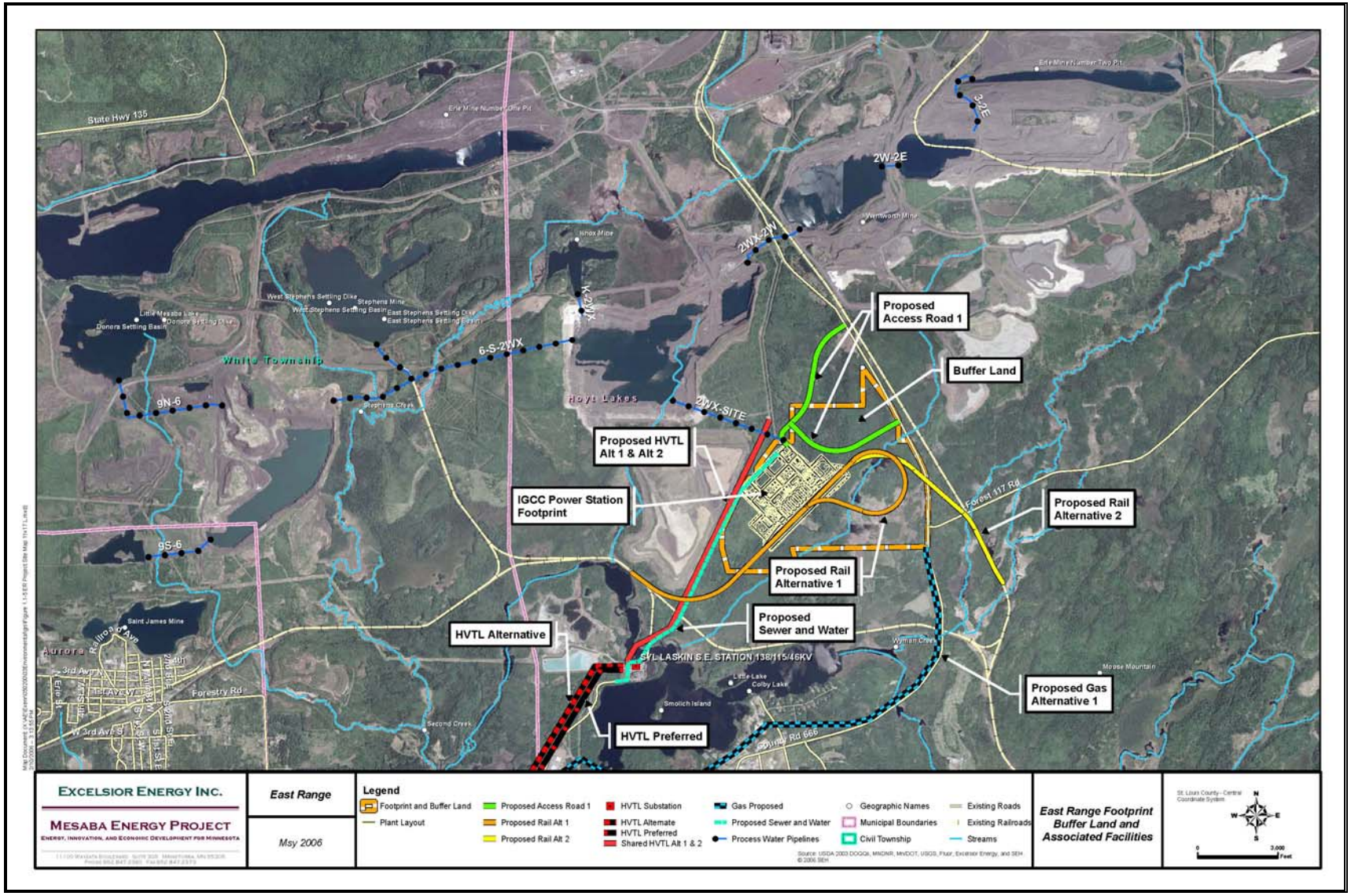


Figure 2.1-5 East Range Site Showing IGCC Power Station Footprint, Buffer Land and Details Behind Selected Associated Facilities



2.2 HVTL ROUTES

The PPSA requires the Applicant to identify at least two potential routes for its proposed HVTLs, identify which of the routes it prefers, and provide justification for its preference. The West Range and East Range Sites each have preferred and alternate HVTL routes (specifically described in Section 2.5.3 and Section 2.6.3 for the West and East Range Sites, respectively) which are referred to in this Joint Application by the names given to them in Tables 2.1-1 and 2.2-2. The proposed HVTL alignment for each of the routes named in these tables is shown in a milepost route map, the figure reference of which is provided in the tables.

The permitted HVTL "route" is defined in Minn. R. 4400.0200, subp. 16 as an area between two substation end points that "may have a variable width of up to 1.25 miles within which a right-of-way for a HVTL can be located." The Applicant hereby requests a narrower one-half mile wide route for each of the requested HVTLs. The requested one-half mile route would be one quarter-mile (1,320 feet) in width on each side of the proposed HVTL centerline alignments. The requested route width will be sufficient to minimize impacts and accommodate land owners' concerns during final route design. The Applicant will acquire a minimum 150-foot wide temporary right-of-way for construction of the HVTL and a minimum 100-foot wide permanent right-of-way.

2.2.1 Single Failure Criterion (n-1)

Most bulk power systems are designed according to the (n-1)-criterion, also called the single failure criterion, which requires that the power system withstand the loss of a single line, generator, transformer or bus bar without any severe disturbance of power supply. For example, a single transmission line interconnecting a plant with its POI will not meet the "single failure criteria" since loss of that one line due to a forced or scheduled maintenance outage would require plant operations to be curtailed and result in a complete loss of power to the grid.

For either the West Range Site or the East Range Site, two separate HVTL circuits are needed to reliably connect the IGCC Power Station to the substation POI. For Mesaba One alone, a minimum of two 230kV circuits (or two 345kV circuits) are required in order to provide the necessary transmission redundancy should one circuit fail. For Mesaba One and Two together, two 345kV circuits, or the combination of one double circuit 230kV line and one single circuit 230kV line, are needed to provide the necessary n-1 redundancy.

2.2.2 West Range

The Applicant is applying for one HVTL Route Permit for a combination of circuits and routes that will provide the necessary reliable interconnection of Mesaba One and Mesaba Two to the POI. Under the West Range Site preferred plan ("Plan A"), as described below, two 345kV HVTL circuits would be installed on the same structures on a single route (345kV double circuit). However, should the MISO deem this configuration incompatible with regional plans, the Applicant is also applying in the alternative for a HVTL Route Permit under a contingent plan ("Plan B"). Under Plan B, described below, one double circuit 230kV HVTL and one single circuit 230kV HVTL would be installed on separate transmission structures located on separate routes.

2.2.2.1 Transmission Plan A

Plan A involves interconnecting to the Blackberry Substation (the West Range POI) with two 345kV HVTLs mounted on single steel pole structures. This double circuit 345kV plan will accommodate the full 1,212 MW output of Mesaba One and Mesaba Two and meet the (n-1) single failure criterion (see Section 2.2.1 above). Each 345kV HVTL has sufficient transfer capacity to carry Mesaba One and Mesaba Two electrical output, with both lines would be installed with construction of Mesaba One. For Mesaba One, each of the two 345kV GO HVTLs will be operated at 230kV and either line will be capable of supporting the entire output of the Station in the event of a contingency forcing one line out of service. Before Mesaba Two comes on line, each of the 345kV HVTLs operating at 230kV would be upgraded to their rated 345kV capacity and thereafter be capable of conveying the entire output capacity of Mesaba One and Mesaba Two to the POI. The necessary upgrades would only apply to electrical substation equipment and involve no modification to the HVTL structures or conductors initially installed to serve Mesaba One.

The routes considered under Plan A are discussed in Sections 2.2.2.1.1 and 2.2.2.1.2 and shown on Figure 2.2-1. A detailed description of the Plan A routes and a series of maps showing each alignment superimposed on aerial photographs is contained in Section 2.5.3.

2.2.2.1.1 Plan A Preferred HVTL Route (WRA-1)

The preferred 345kV double circuit HVTL route ("Route WRA-1") would use the following two segments of existing ROW: i) about 1.6 miles of existing ROW between the southern boundary of the West Range Buffer Land and the retired Greenway Substation, located just south of US Highway 169 and ii) about one mile of existing ROW shared with MP's 230kV 83 Line and 115kV 20 Line HVTLs just before their interconnection with the Blackberry Substation (hereafter, all existing HVTLs will be identified by their number followed by the letter "L" for "Line," e.g., 83L).

Route WRA-1 would require acquisition of about six miles of new ROW between the Greenway Substation and point of intersection with MP's HVTLs. As the length of new ROW exceeds that exempted under Minn. R. 4400.1150, subp.2.C (see Section 2.5.3.1.2), an alternate route must be proposed.

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

The alternate HVTL route ("Route WRA-1A") follows the same alignment as the preferred route for the first 3.2 miles from the southern boundary of the Buffer Land. Route WRA-1A also shares about 0.9 miles of ROW in common with the 115kV 62L HVTL route just prior to its interconnection with the Blackberry Substation.

The major difference between Route WRA-1A and the preferred route is that Route WRA-1A runs east of and parallel to Twin Lakes Road (the preferred route runs west of and parallel to Twin Lakes Road) as shown in Figure 2.2-1. Route WRA-1A is located about 0.44 miles east of Twin Lakes Road to avoid residences located on the road. Route WRA-1A will require about the same length of new ROW (approximately 5.8 miles), but overall is about one-half mile shorter in length than Route WRA-1. In general, Route WRA-1 is preferred because it traverses

area that is less developed (that is more remote, has fewer water crossings, crosses fewer open fields, avoids gravel mining operations, and would generally be less visible). Both routes are similar in that they traverse areas that have a similar residential density profile and are the shortest and most direct routes to the POI.

2.2.2.2 Transmission Contingent "Plan B"

In the event MISO determines that the 345kV transmission infrastructure is incompatible with regional transmission planning initiatives or the Applicant determines that the timing for building 345kV transmission in the region is outside the reasonable timeframes it contemplated, then the Applicant would construct and install the 230kV transmission scheme as described in Plan B below.

Plan B would involve first interconnecting the West Range POI with two 230kV HVTLs on a single steel pole structure. This double circuit 230kV plan will accommodate the full 606 MW output of Mesaba One and meet the (n-1) single failure criterion.

Although the double circuit 230kV GO HVTLs installed to accommodate Mesaba One can accommodate the entire 1,212 MW output of Mesaba One and Mesaba Two, they do not meet the single failure criterion (that is, the 1,212 MW IGCC Power Station would be required to reduce its generating capacity should one of the 230kV HVTLs be taken or be forced out of service). Plan B therefore includes an additional HVTL with the construction of Mesaba Two.

The rating of the additional GO HVTL required to reliably convey the combined full-load output of Mesaba One and Mesaba Two will depend upon the route selected between the IGCC Power Station and its POI at the Blackberry Substation.

The routes considered under Plan B are discussed in Sections 2.2.2.2.1 and 2.2.2.2.2 and shown on Figures 2.2-2, 2.2-4 and 2.2-5. A detailed description of the Plan B route and a series of maps showing each alignment superimposed on aerial photographs is contained in Section 2.5.3.2

2.2.2.2.1 Plan B Phase I

2.2.2.2.1A Preferred Route (WRB-1)

The preferred route for the 230kV double circuit GO HVTLs for Plan B Phase I ("Route WRB-1") is the same as Plan A's Route WRA-1 (see Section 2.2.2.1.1), including the need to acquire about six miles of new ROW.

2.2.2.2.1B Alternate Route (WRB-1A)

The alternate route for the 230kV double circuit GO HVTLs for Plan B Phase I ("Route WRB-1A") is the same as Route WRA-1A (see Section 2.2.2.1.2 above).

2.2.2.2.2 Plan B Phase II

2.2.2.2.2A Preferred Route (WRB-2)

The Applicant's preferred HVTL route for Plan B Phase II ("Route WRB-2") is to use the route not selected for the 230kV double circuit HVTL for Plan B Phase I. That is, if the Applicant's

preference of Route WRB-1 is approved, the Applicant proposes Route WRB-1A to be considered the preferred route for the single circuit 230 kV Phase II development.

Because the total line length of WRB-2 is only one-half mile shorter in length than the length for WRB-1, the single circuit HVTL required for Plan B (to reliably accommodate the combined full-load output of Mesaba One and Mesaba Two) can be designed at 230kV.

Conversely, if the Applicant's preference of Route WRB-1 is not approved as the preferred route under Plan B Phase I, the Applicant will propose Route WRB-1 as the preferred route for Plan B Phase II.

2.2.2.2.2B Alternate Route (WRB-2A)

Because the length of new ROW associated with either of the routes proposed as the preferred route under Plan B Phase II is greater than five miles, an alternative route must be proposed.

The alternate route proposed for Plan B Phase II ("Route WRB-2A") combines segments from two existing HVTL corridors, one of which traverses the northern section of the West Range Buffer Land. The length of the HVTL required to reach the POI via Route WRB-2A is about 18 miles. The Applicant proposes to use HVTLs rated at 345kV on this route to avoid elaborate switching requirements that would be required if 230kV were utilized on this route.

Both of the existing corridors are presently occupied by 115kV HVTLs structures owned by MP. The Applicant is proposing to use delta configuration 345kV structures with an underbuild feature that will the carry the existing 115kV HVTLs below the arms holding the 345kV conductors.

2.2.2.3 Plan A and Plan B Summary Table

A summary of the Applicant's transmission plans for the West Range Site is presented in Table 2.2-1 below.

Table 2.2-1
Applicant's HVTL Plans for West Range Site (See Note)

	Phase I Development						Phase II Development					
	Preferred Route			Alternate Route			Preferred Route			Alternate Route		
	Capacity & Type	Route Name	Figures Showing Route	Capacity & Type	Route Name	Figures Showing Route	Capacity & Type	Route Name	Figures Showing Route	Capacity & Type	Route Name	Figures Showing Route
Plan A	345kV D/C	WRA-1	2.2-1	345kV D/C	WRA-1A	2.2-1	Additional Phase II Developments Not Needed					
Plan B	230kV D/C	WRB-1	2.2-2	230kV D/C	WRB-1A	2.2-2	230kV S/C	WRB-2	2.2-3 or 2.2-4	345 kV S/C	WRB-2A	2.2-3 or 2.2-4

D/C = Double circuit; S/C = Single circuit
Note: The first two letters of the route name identify the Site to which the route applies; the second letter refers to the plan; the number that follows the first three letters refers to the phase of development, and the letter "A" following the phase descriptor identifies whether the route is an alternate (the absence of the letter "A" implies the route is preferred).

Figure 2.2-1 West Range Plan A Preferred (WRA-1) and Alternate (WRA-1A) 345kV HVTL Routes

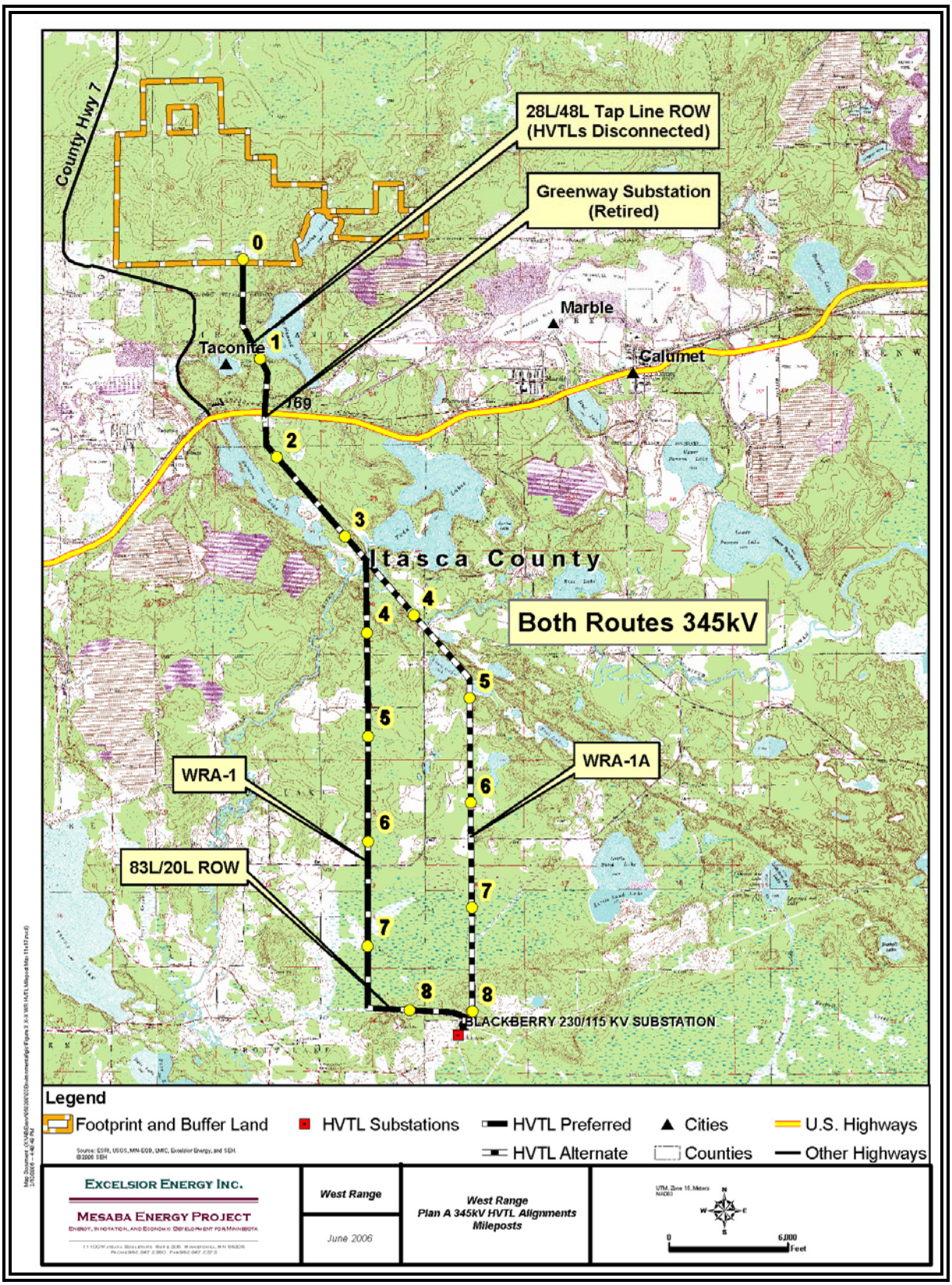


Figure 2.2-2 West Range Plan B Phase I Preferred (WRB-1) and Alternate (WRB-1A) Double Circuit 230kV HVTL Routes

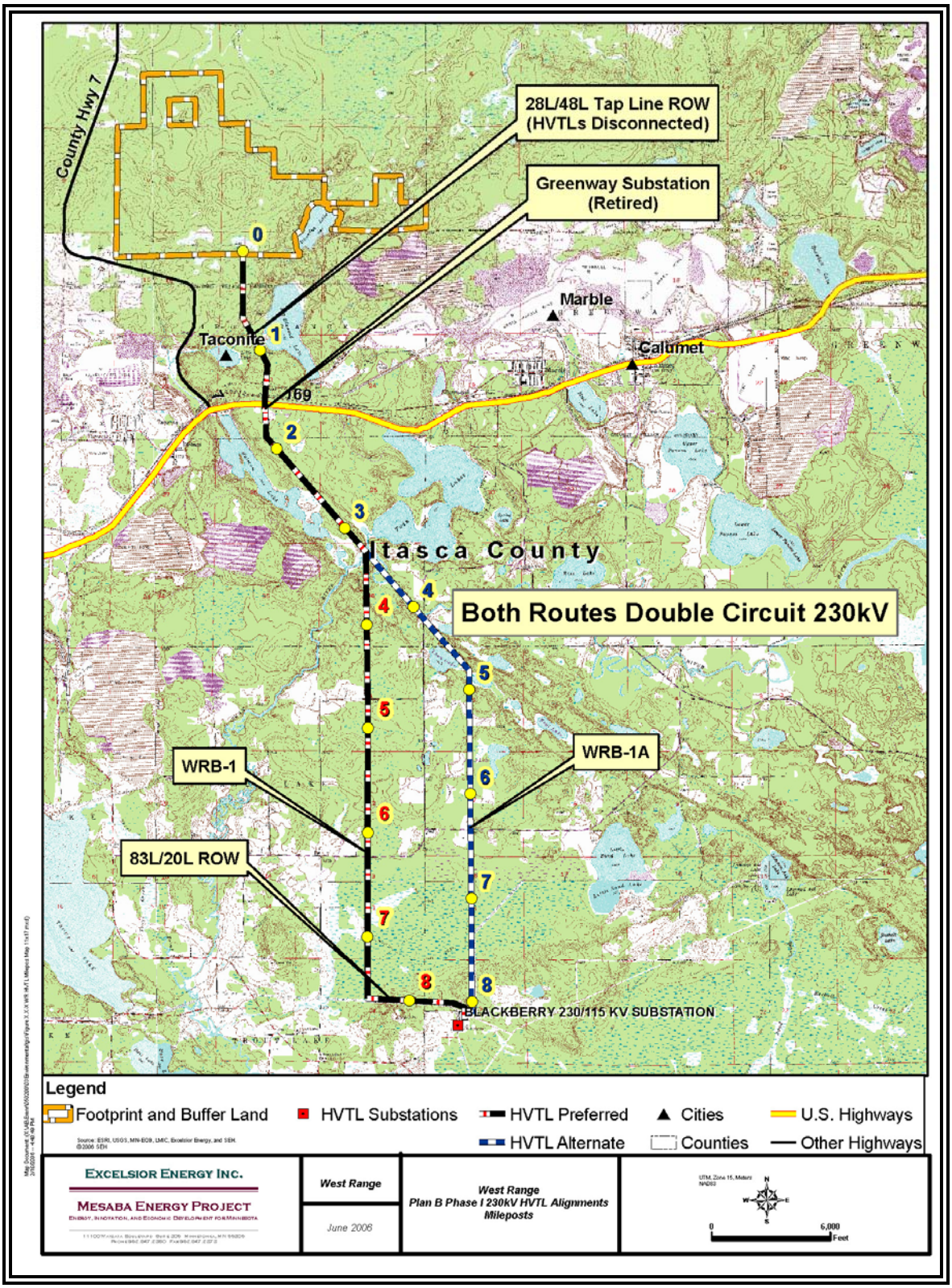


Figure 2.2-3 West Range Plan B Phase II Preferred (WRB-2) and Alternate (WRB-2A) HVTL Routes

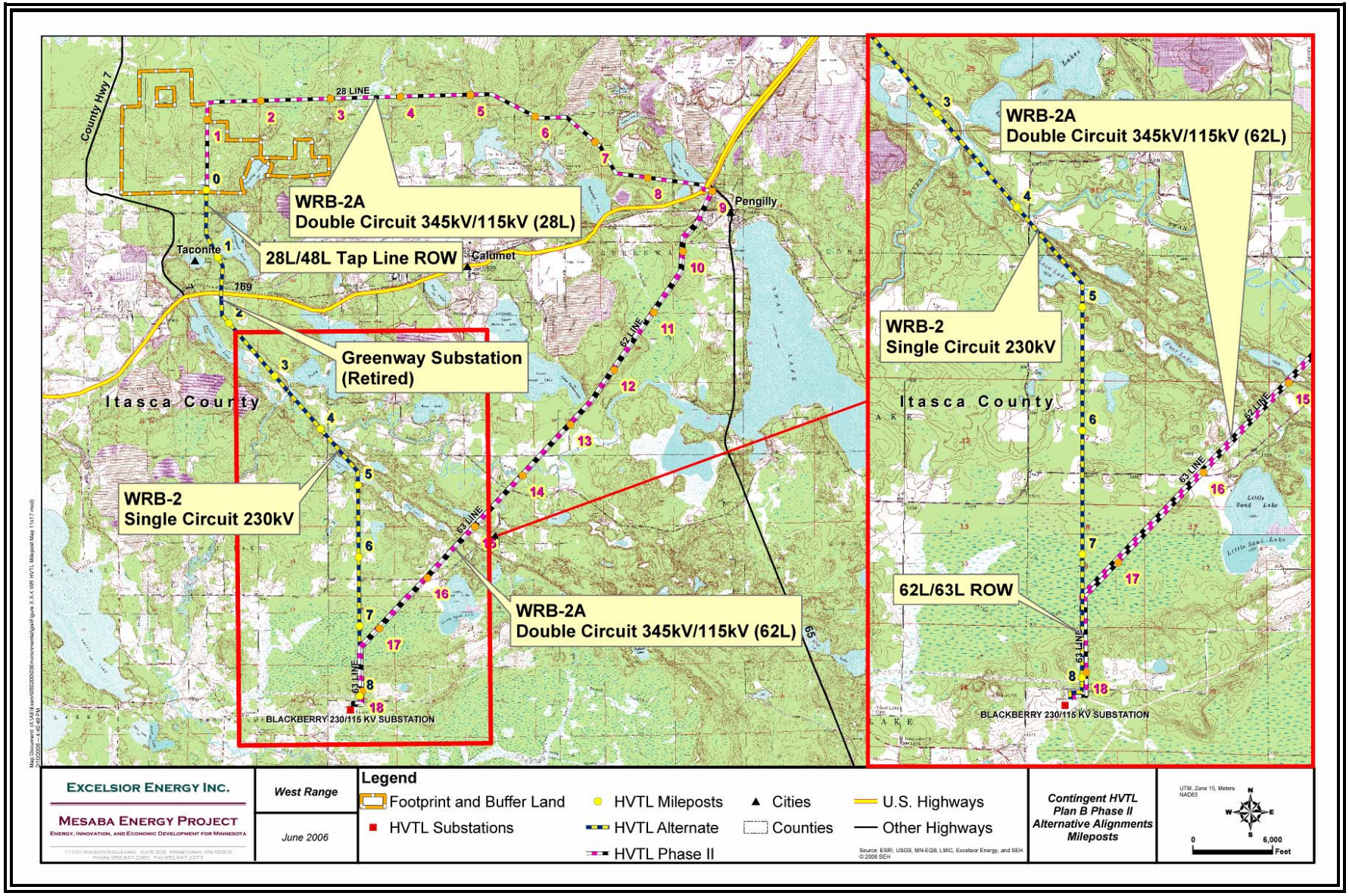
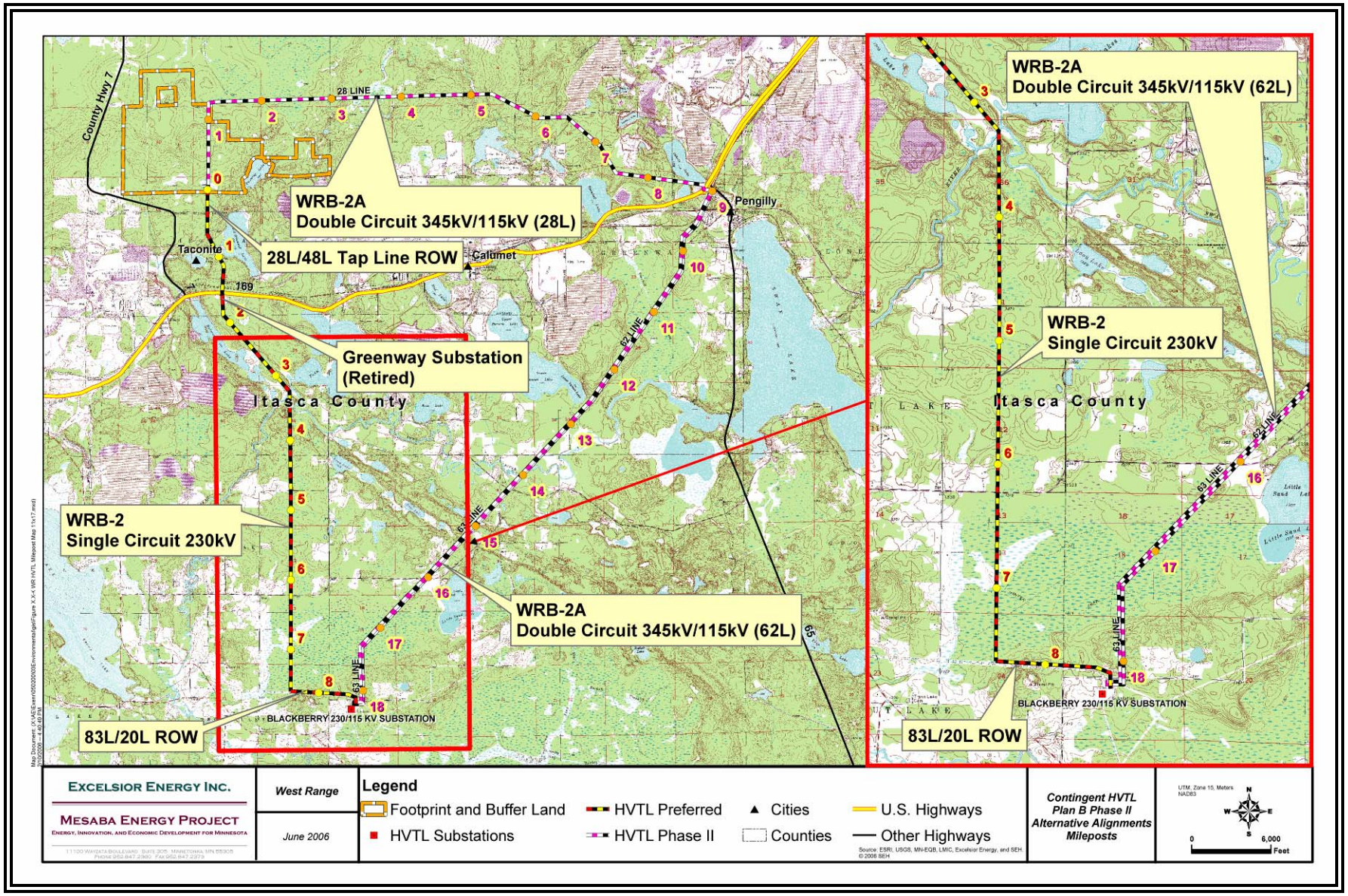


Figure 2.2-4 West Range Plan B Phase II Preferred (WRB-2)* and Alternate (WRB-2A) HVTL Routes



*The Preferred PlanB Phase II Route shown on this figure would be available only if it were not designated the Plan B Phase I Preferred Route.

2.2.3 East Range Site

The Applicant's preferred transmission plan for the East Range IGCC Power Station consists of two new 345kV HVTLs that will link the Station to the Forbes Substation POI. As noted in Section 2.2.1, even though one 345 kV HVTL is sufficient to accommodate the combined full load output of Mesaba One and Mesaba Two, both new lines must be constructed concurrently with installation of Mesaba One to address the single failure criterion requirement. Each line would follow existing corridors now occupied by 115 kV HVTLs owned by MP and that interconnect the Syl Laskin Generating Station ("Laskin") with the Forbes Substation.

The existing 115kV HVTLs connecting Laskin with the Forbes Substation are fully loaded year around and complicate the construction process. In order to avoid the conditions associated with "hot" construction methods (that is, working with HVTLs that are energized during the handling process), the Applicant is proposing to acquire an additional 30 feet of ROW along one of the routes between Laskin and Forbes in order to greatly minimize these concerns.

2.2.3.1 Constructability

In order to construct the initial double circuit 345kV/115kV vertical steel pole line on either of the existing 38L or 39L/37L ROW, an additional 30 feet of ROW is required to be added to the edge of the existing ROW. This proposed additional width will allow proper construction clearances and electrical clearance to the existing 115kV "H" frame structures and conductors under initial operation. As the vertical steel pole structures will be constructed adjacent to the existing "H" frame centerline approximately 31.5 feet off center, such construction requires the additional right-of-way.

The best option for widening 39L appears to be acquiring ROW on the south side of the existing ROW from the Syl Laskin Substation to Hwy 97, then moving to the north side from Hwy 97 to, and across, the Thunderbird Mine. The 39L has single-family residential conflicts in three potential locations and potentially one industrial site conflict. These narrow sections of ROW will necessitate either hot line construction or construction in short, scheduled outage windows on the existing line in affected ROWs.

The 37L is expandable on either side of the ROW since the only conflicts involve existing transmission lines, which may require outage windows for construction.

The proposed rerouting of 38L is anticipated to be on the north side of the existing structures. This route conflicts with three to four short sections of existing 38L where single family residences are located on the north side of the existing 115kV RW. The ROW in these locations is too narrow for a 30-foot expansion. Therefore, it is proposed to construct these sections during short, scheduled line outages, or under hot line construction, on the existing 115kV "H" frame centerline.

The construction staging and sequence scenario will be the same regardless of the circuit(s) chosen. The vertical double circuit construction will only be required on one of the chosen routes. The structure foundations will be installed first approximately 31.5 feet off centerline. While the foundation installation is under way in the winter months, ROW clearing would also be completed. Included in the ROW clearing would be the removal of dangerous trees

overhanging the expanded ROW. The erection of the steel pole structures will be scheduled in accordance with the completion of foundations with the 345kV cross-arms facing away from the existing 115kV MP circuit. The bundled 345kV-1272 kcmil ACSR "Pheasant" conductor will be installed while the existing 115kV "H" frame lines remain in service. Once the 345kV circuit is installed, the electric load from the existing 115kV HVTL will be transferred to the new 345kV HVTL and it will be temporarily operated at 115kV to replace the existing MP line in the same corridor. The existing "H" frame structures will then be removed from the ROW. The open side of the 345kV vertical structure would then be built with 115kV insulators, hardware and 954-kcmil ACSR "Rail" conductor, while the 345kV side of the HVTL remains energized at 115kV.

The new double circuit transmission line will temporarily be operated as 38L on one side and 39L on the other side. The new lines will be connected to the breakers for 38L and 39L by short temporary transmission lines. While 38L and 39L follow different routes, both lines begin and terminate at the same substations. The relaying and protection schemes would be temporally reset to provide line protection; and would provide sufficient failure contingencies to allow the remaining "H" frame line to be removed. A new 345kV delta line with 115kV under-build would be constructed along the existing centerline of the 115kV transmission line not used in the previous scenario. Once construction is complete, the 345kV/115kV HVTL operating temporarily as a double circuit 115kV would be converted to its intended 345kV voltage. MP would thereafter have two 115kV lines operating on separate routes, on the same structures, with the IGCC Power Station's 345kV HVTLs.

The 38L and 39L both have active substations on the lines which must remain in service during the line construction. The Peary Substation on 38L can be served from a short radial feed from 16L.

The Lakeland Substation on 39L requires a longer radial feed from the new line either to 37L or from the Syl Laskin Substation. The Lakeland Substation limits the rebuild of 39L to two sections divided at approximately the half way point of 39L. Since the Lakeland Substation will represent a single contingency during the construction, a switch could be installed at the intersection of 38L and 39L to increase the reliability at Lakeland Substation.

The construction sequence is summarized in the following steps:

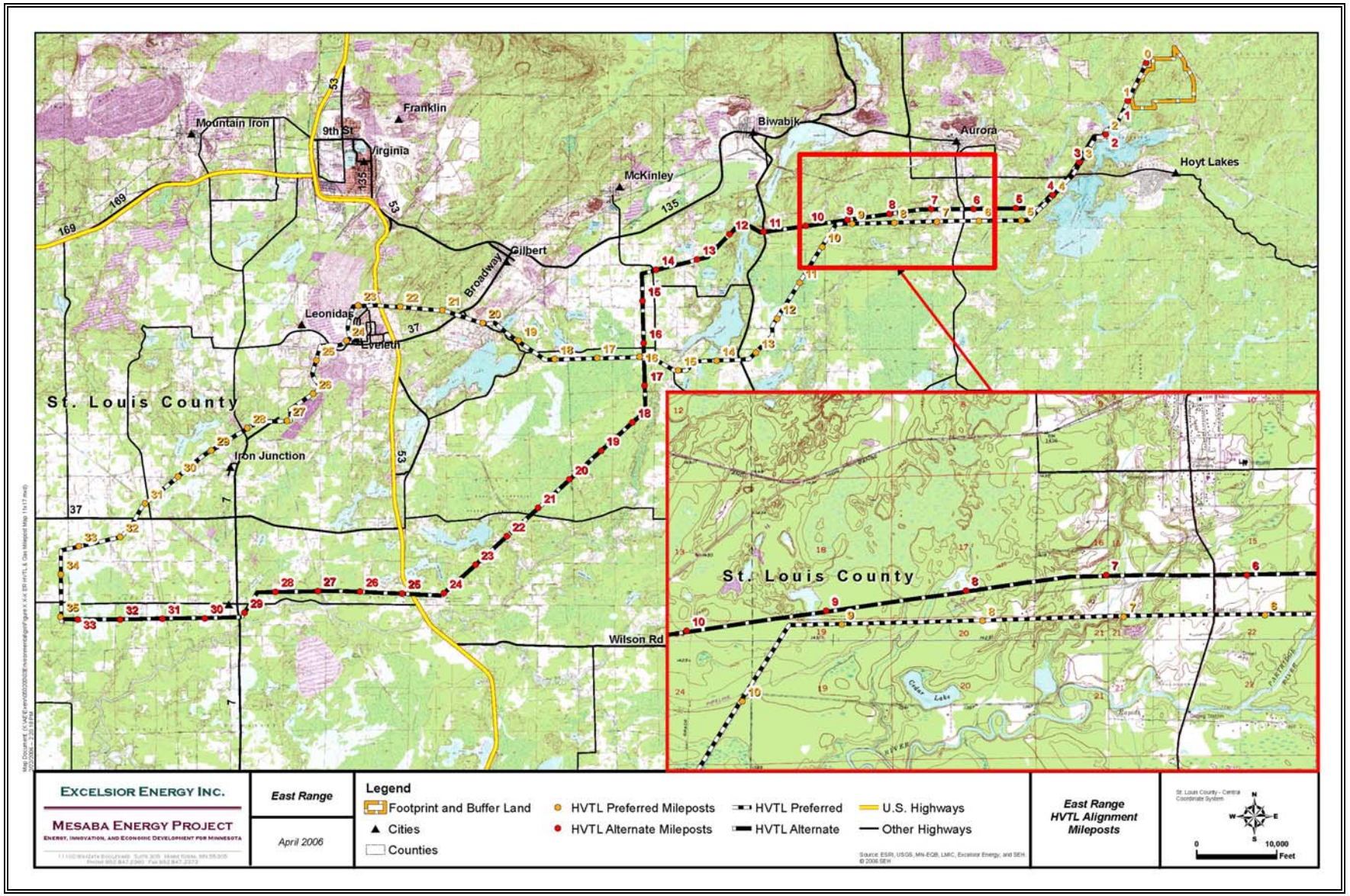
- Constructing new 345kV/115kV double circuit structures (shown in Figure 4.3-23) along the existing 115kV structures (using the new section of ROW to allow such construction to occur)
- Stringing the 345kV conductor on the new tower
- Operating the new 345 kV conductor at 115kV
- De-energizing the existing 115kV HVTL
- Moving the existing 115kV HVTL to the new 345kV/115kV double circuit structure
- Operating both lines at 115 kV until construction of the new 345kV/115kV double circuit structure (see Figures 4.3-25 and 4.3-17) in the other ROW is complete
- Re-energizing the 345kV conductor to its rated capacity for use by the Applicant

Operating both lines at 115kV (the sixth bullet in the above list) will allow the 115kV HTVL in the remaining corridor to be removed and the new HVTL double circuit 345kV/115kV structures to be constructed therein without the need to acquire additional ROW.

The two existing corridors the Applicant proposes to use as routes for its two 345kV GO HVTLs are the 39L/37L Route and the 38L Route. These routes are generally described in Sections 2.2.3.1 and 2.2.3.2 below and shown in Figure 2.2-5. A more detailed description of the routes and a series of maps showing each segment of each alignment superimposed on aerial photographs are contained in Section 2.6.3.

The Applicant has reviewed aerial photographs and flown the proposed HVTL routes in September 2005 to help determine which corridor would be the best from which to take the additional 30 feet of ROW identified above. These efforts resulted in the Applicant selecting the 39L/37L Route to acquire the additional ROW. However, to ensure that both corridors have received adequate consideration, a comparison between the two options is presented in Section 8.

Figure 2.2-5 East Range HVTL Route Milestone Map Showing the Preferred and Alternate Route



In Sections 2.2.3.1 and 2.2.3.2 below, the route configuration labeled as "preferred" thus involves i) acquiring 30 feet of new ROW from the existing 39L/37L Route and ii) working within the existing boundaries of the ROW associated with the 38L. The "alternate" route configuration involves i) acquiring 30 feet of new ROW from the existing 38L Route and ii) working within the existing boundaries of the ROW associated with the 39L/37L Route.

2.2.3.2 Preferred Configuration of Routes

The preferred configuration for the two 345kV/115kV double circuit GO HVTLs will require acquisition of two new ROW segments. One new segment will be about 2 miles in length and travel alongside an existing MP HVTL corridor and connect the IGCC Power Station to the initiation point of the 39L and 38L Routes. The short segment of new ROW added between the IGCC Power Station and Laskin will be used as a part of both the 39L/37L and 38L routes.

A second section of new ROW about 2 miles in length will be required to link the 39L and 37L corridors. This new segment of ROW crosses mostly areas that are disturbed from past mining activities so the environmental impact will be minimal.

The ROW associated with the 38L Route will not require modification.

The length of the 39L/37L and 38L routes is about 35 miles and 33.3 miles, respectively.

2.2.3.3 Alternate Configuration of Routes

The alternate configuration for the two 345kV/115kV double circuit GO HVTLs will require acquisition of the same two new ROW segments identified in Section 2.2.3.1. The only difference is that the 30 feet of ROW will be taken from the 38L instead of the 39/37L.

The length of the two routes remains unchanged from those presented in Section 2.2.3.1.

2.2.3.4 East Range Summary 345kV Route Table

Table 1.5-2 identifies the preferred and alternative route configurations for the East Range IGCC Power Station

Table 2.2-2
Applicant's HVTL Plans for East Range Site (See Note)

	Phase I Development				Phase II Development			
	Route Name: 39L/37L		Route Name: 38L		Route Name: 39L/37L		Route Name: 38L	
	Capacity & Type	30 ft New ROW	Capacity & Type	30 ft New ROW	Capacity & Type	30 ft New ROW	Capacity & Type	30 ft New ROW
P See Figure 2.2-5	345kV/115kV Double Circuit (Figure 4.3-23)	Yes	345kV/115kV Double Circuit (Figure 4.3-17)	No	Additional Phase II Developments Not Needed		Additional Phase II Developments Not Needed	
A See Figure 2.2-5	345kV/115kV Double Circuit (Figure 4.3-17)	No	345kV/115kV Double Circuit (Figure 4.3-23)	Yes				

P= Preferred configuration; A= Alternate configuration

2.2.3.5 Comparison of GO Facilities Development for the West and East Range Sites

Table 2.2-3 is included to enable a comparison of key measures associated with the GO facilities development at each site.

Table 2.2-3
Comparison of GO Facilities for West and East Range Sites

	East Range Site		West Range Site			
			Plan A		Plan B	
PHASE I	**Preferred Route**	**Alternative**	**Preferred Route**	**Alternate**	**Preferred Route**	**Alternate**
Total HVTL Circuit (miles)	68.3	68.3	17.4	16.6	17.4	17.4
New ROW (acres)	4	4	6.2	5.8	6.2	5.8
Widened ROW (acres)	31.5	29	0	0	0	0
Permanent Land Use (acres)	166	165	134	121	134	121
Line Loss (MW)	11	11	1.4	1.4	2.2	2.2
PHASE I + PHASE II						
Total Circuit (miles)	68.3	68.3	17.4	16.6	25.7	35.5
New ROW (acres)	4	4	6.2	5.8	12	6.2
Widened ROW (acres)	31.5	29	0	0	0	0
Permanent Land Use (acres)	166	165	134	121	194	134
Line Loss (MW)	12	12	3.5	3.5	6.5	5.8

The new land use impact for the West Range GO facilities is 134 acres is less than that required for the East Range GO facilities. The 17.4 ROW miles is also about one-fourth of that for the East Range Site. These shorter lengths reduce potential visual and environmental impacts. Lower line losses of one-fourth to one-half effectively increases the Project's overall thermal efficiency, and reduces emission rates.

A comparison of GO HVTL costs between the West Range and East Range Sites is presented in Section 2.8.

Transmission constructability is another component aspect that must be considered when comparing site GO facility developments. Since all plans were developed to minimize the need for new ROW by utilizing existing transmission corridors to the maximum extent possible, issues associated with obtaining extended outages of the existing transmission lines to either upgrade or replace with new double circuit structures is of importance. In the case of the West Range GO facilities development, there are only minor constructability issues in Phase I (the only one identified is associated with the existing HVTL corridor for the last mile entering into the Blackberry Substation). Depending on MISO study results, Phase II development involves replacing portions of two existing 115kV lines with new double circuit 345/115kV structures for about 18 miles (Plan B Phase II Alternate HVTL Route Route, WRB-2A). However, there appears to be sufficient redundancy in the local area 115kV system that would allow for extended outages, especially if coordinated with outages of the Clay Boswell Generating Station and large industrial loads in the area.

For the East Range GO facilities development, the three 115kV lines emanating from the Syl Laskin Generating Station that are proposed to be rebuilt as new double circuit structures are a critical component of the transmission which make up the 'North Shore Loop' system. This system provides service to the entire Arrowhead region of the East Range and Lake Superior North Shore and serves as generator outlet for the Laskin, Taconite Harbor, and Silver Bay generating stations. An outage on any of these three lines necessitates a reduction in this generation and places service to the area load at risk. Extended outages for reconstruction would likely be unacceptable to the industrial and other customers requiring electric service from such facilities. To therefore avoid disruption of service, the concept of building the first new double circuit line alongside (off-centerline) of one of the existing 115kV lines by acquiring an additional 30 feet of ROW has been incorporated into the GO facilities development plans. This would reduce the outages necessary for construction and the cut over to the new circuits. These short duration outages should be able to be coordinated with planned generating unit outages to minimize financial and other impacts. Nonetheless, constructability is a much more significant issue with the East Range GO facility development plans.

2.3 NATURAL GAS PIPELINE ROUTES

This Joint Application describes natural gas pipelines necessary to provide startup and backup fuel to the IGCC Power Station located at the preferred and alternate Sites. The proposed natural gas pipeline routes are referred to in this Joint Application as the "West Range Proposed Natural Gas Pipeline Route" and the "East Range Proposed Natural Gas Pipeline Route."

Natural gas will be used to start up Mesaba One and Two and as a backup fuel when syngas from the gasifiers is unavailable. The maximum one day natural gas flow is expected to be about 105 million standard cubic feet of gas per phase of the IGCC Power Station.

Minnesota's Iron Range is served by two major natural gas pipeline transmission companies: Great Lakes Gas Transmission Company ("GLG") and NNG. The GLG natural gas pipeline transmission system interconnects with NNG's natural gas pipeline system near Carlton, Minnesota. Figure 2.3-1shows the location of the natural gas transmission pipelines north of Carlton for both companies. Figure 2.3-2shows the routing of currently operating GLG and NNG natural gas pipelines in the vicinity of the West Range Site.

For the West Range Proposed Natural Gas Pipeline Route, the Applicant is requesting a partial exemption from the pipeline routing permit procedures. Under Minnesota rules governing the partial exemption, the Applicant is not required to complete a detailed environmental analysis of multiple potential pipeline routes. The Applicant must only identify alternate routes that have been considered and provide evidence in the Application of alternate route consideration (Minn. R. 4415.0140, subp. 2). Such evidence is provided in Section 2.5.4.2.

For the East Range Site, the Proposed Natural Gas Pipeline would be constructed, owned and operated by NNG, and would be an extension of NNG's interstate pipeline system. As an interstate pipeline, the East Range natural gas supply pipeline would not be subject to Minnesota Pipeline Route Permit requirements, but would be permitted by NNG under the FERC process for interstate pipelines (the FERC review process is described in Section 1.10.2.8). A general description of the East Range Proposed Natural Gas Pipeline Route is provided in Section 2.6.4.

Minnesota Rule 4415.0010, subpart 32 defines the permitted gas pipeline "route" as "the proposed location of a pipeline between two end points. A route may have a variable width from the minimum required for the pipeline right-of-way up to 1.25 miles." The Applicant hereby requests a narrower one-half mile wide route for each of the requested gas pipelines. The requested one-half mile route would be one quarter-mile (1,320 feet) in width on each side of the Proposed Natural Gas Pipeline Route centerline alignment. The Proposed Natural Gas Pipeline Route alignments are shown in Figures 2.5-13 through 2.5-16. The requested route width will be sufficient to allow flexibility to minimize impacts and accommodate land owners concerns during final route design. Within the requested routes, the Applicant will acquire a minimum 100-foot-wide temporary ROW for construction of the pipeline and a minimum 70-foot-wide permanent ROW.

Figure 2.3-1 GLG (Red) and NNG (Blue) Natural Gas Pipelines in the Vicinity of the Iron Range

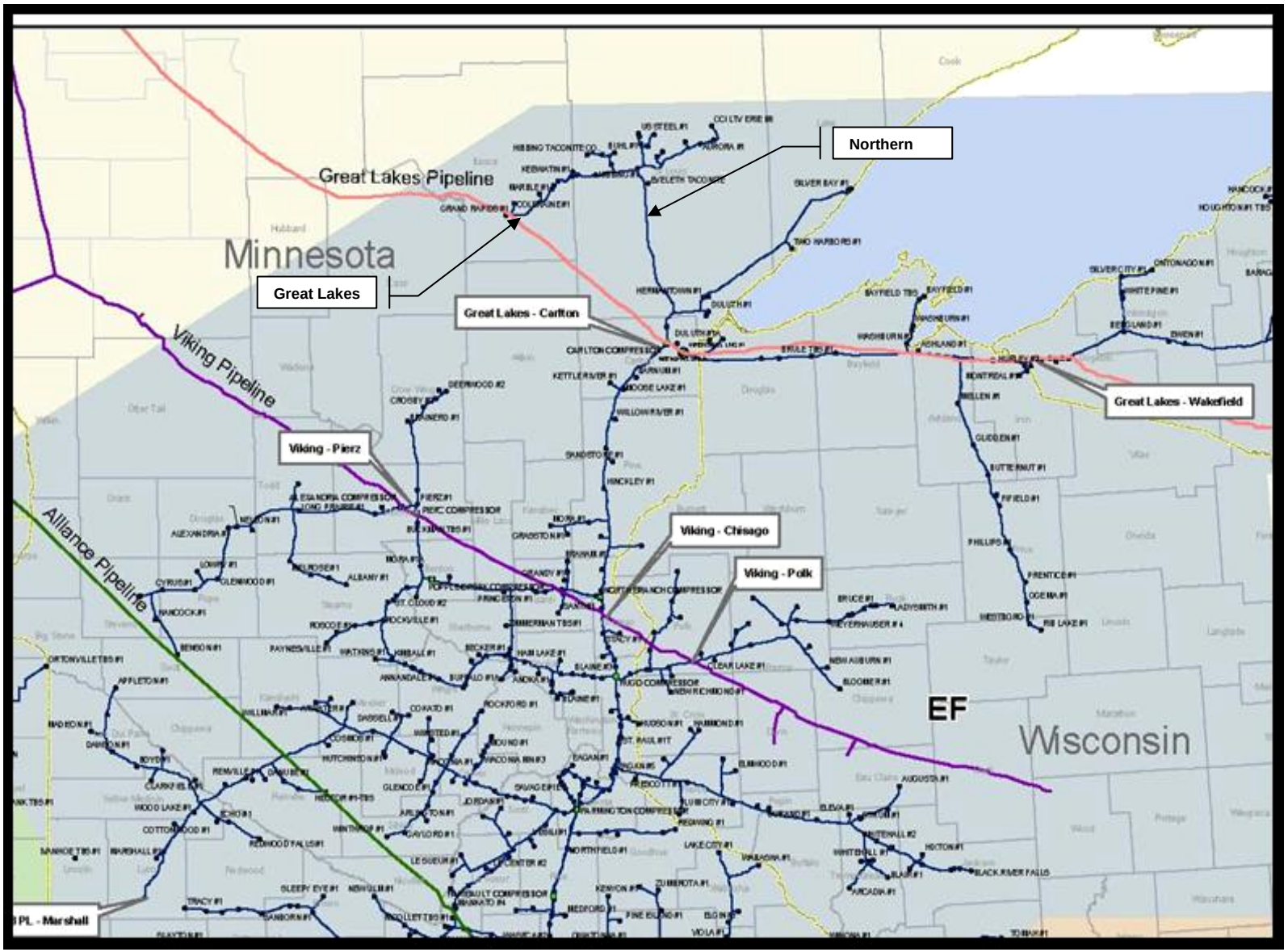
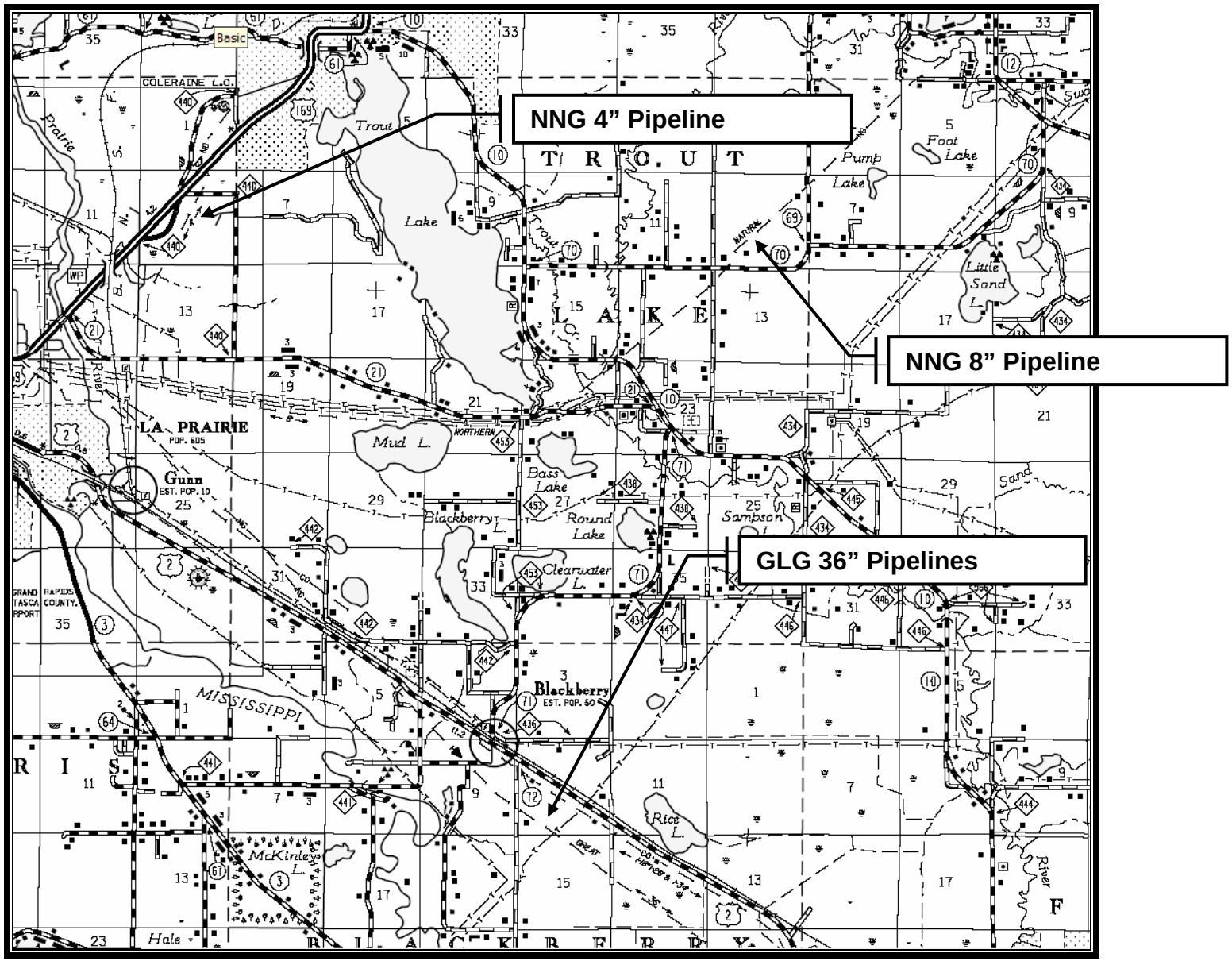


Figure 2.3-2 Natural Gas Pipelines In the Vicinity of the West Range Site



2.4 PROHIBITED HVTL ROUTES AND LEPGP SITES

Minnesota Rules Chapter 4400 specifically identifies prohibited HVTL routes (Minn. R. 4400.3350) and power plant sites (Minn. R. 4400.3450). For example, no HVTL may be routed through state or national wilderness areas. HVTLs also may not be routed through state or national parks or state scientific and natural areas unless the HVTL would not materially damage or impair the purpose for which the area was designated, and no feasible and prudent alternative exists. None of the proposed HVTL routes pass through prohibited areas.

No power plant site may be located in national parks; national historic sites and landmarks; national historic districts; national wildlife refuges; national monuments; national wild, scenic, and recreational riverways; state wild, scenic, and recreational rivers and their land use districts; state parks; nature conservancy preserves; state scientific and natural areas; and state and national wilderness areas.

The prohibited power plant site areas identified above, however, may be used for water intake or discharge facilities. Conditions may be included in a site permit if any of these areas are used for water intake or discharge facilities to protect these areas for the purposes for which they were designated. The permit may consider the adverse effects on these areas of proposed sites. In the case of the West Range Site, the Hill-Annex State Park currently pumps water out of the Hill-Annex pit in order to allow visitors to the Park access to some of the former mining facilities. Part of the water supply infrastructure for the West Range Site may be partially located within the Hill-Annex State Park (see Section 3.6.1.1 and Figure 3.4-6) in order to draw water from and otherwise assist the Park with its ongoing water level management issues.

Finally, Minn. R. 4400.3450, subp. 4 dictates that no LEPGP 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 reservoir 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. Neither the West Range nor East Range Site will violate these rules as neither Site exceeds this 0.5 acres/MW. Sections 7.1.10.3 and 8.1.10.3 provide information on prime farmland on the West Range and East Range Sites, respectively.

Minnesota Rules chapter 4415 has no specific reference to prohibited routes for gas pipelines. However, the proposed gas pipeline routes do not pass through the prohibited areas described in the HVTL or LEPGP rules.

2.5 PREFERRED SITE-WEST RANGE

This section describes the IGCC Power Station Footprint, Buffer Land, the Associated Facilities, and the Additional Lands that comprise the West Range Site.

2.5.1 IGCC Power Station Footprint and Buffer Land

The IGCC Power Station Footprint and Buffer Land currently includes approximately 1,260 acres of undeveloped land that is unoccupied. The IGCC Power Station Footprint is located

completely within the city limits of Taconite, Minnesota in Iron Range Township (i.e., 4th Principal Meridian, T56N, R24W) and is generally bounded by County Road 7 to the west, an HVTL corridor to the north, and the Township boundary to the east. Only the northern-most 200 acres of the Buffer Land is outside the City limits. Figures 2.1-2 and 2.1-3 show the IGCC Power Station Footprint, the Buffer Land, Water Resources, and the Associated Facilities. The Station Footprint and Buffer Land lie completely within an area that is zoned industrial by Itasca County. The equipment layout within the Station Footprint is shown in Figure 3.2-1.

The IGCC Power Station Footprint and Buffer Land are mostly wooded and include about 300 acres of wetlands. Approximately 35 acres of wetland will be permanently affected by the Station Footprint and require wetland mitigation. Figure 2.5-1 shows that the terrain within the Buffer Land on site is dominated by a hill that rises approximately 60 feet above the IGCC Power Station's base grade. One HVTL corridor traverses the Buffer Land in a north/south direction and another east-west HVTL traverses the buffer land to the north of the IGCC Power Station Footprint. The HVTLs that occupy the north-south corridor are not currently used. Information on the environmental setting and potential environmental impacts from Mesaba One and Mesaba Two are discussed in detail in Section 7.

Excelsior has obtained option rights to purchase the 1,260 acre parcel that includes the IGCC Power Station Footprint and Buffer Land. Several areas of the optioned property may be able to be used to offset wetlands impacts caused by the construction of the IGCC Power Station and its Associated Facilities.

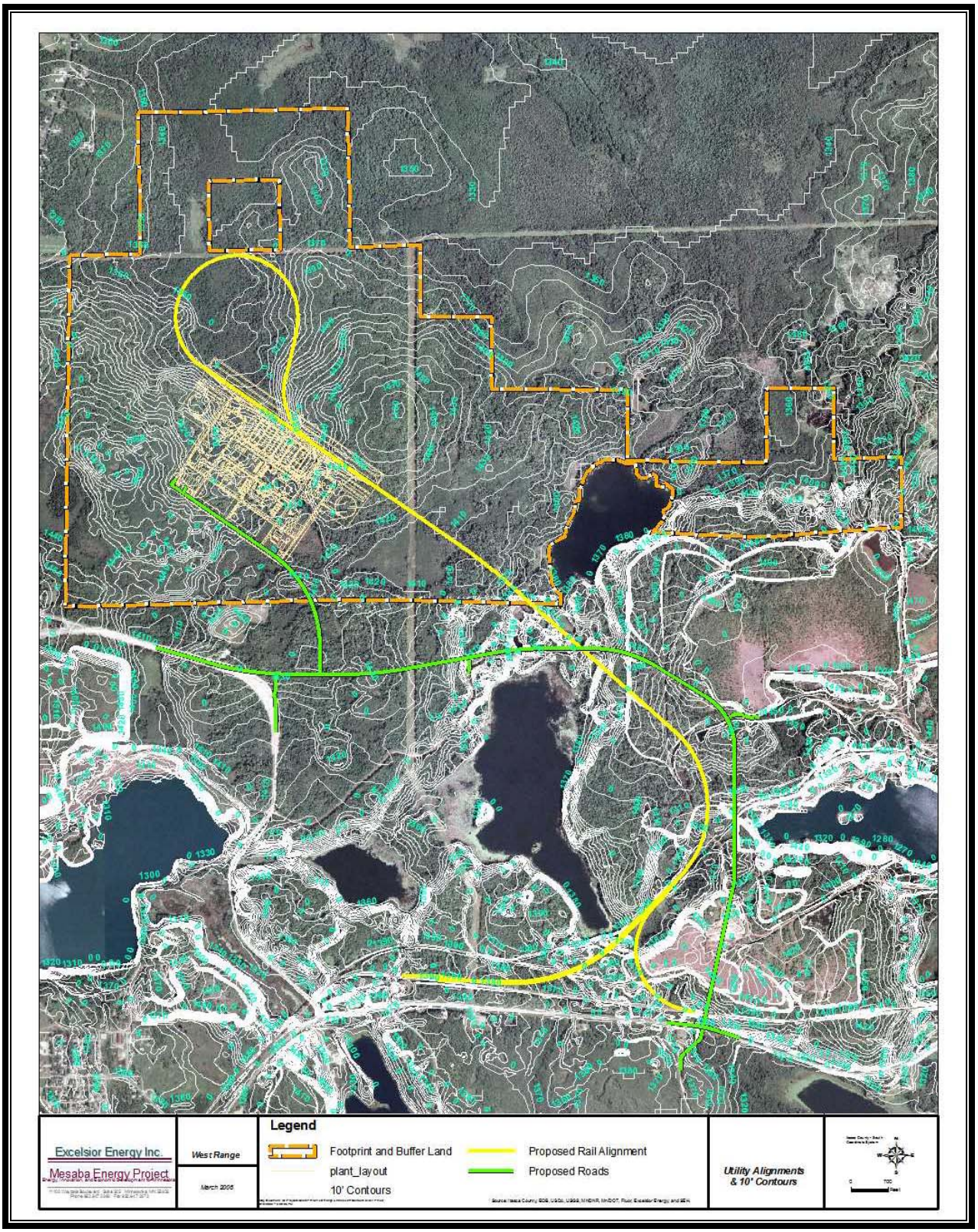
2.5.2 Associated Facilities

Easements across public and private lands would be required for the Associated Facilities. Figures 2.1-2 and 2.1-3 show the location of Associated Facilities on the West Range Site. Environmentally relevant details of the Associated Facilities required for the construction, maintenance, and operation of Mesaba One and Mesaba Two are presented in Section 3. Information on the current environmental setting of the Associated Facilities' corridors and the potential environmental impacts that would result from Mesaba One and Mesaba Two are discussed in Section 7. HVTL routes associated with the West Range Site are described below in Section 2.5.3; natural gas pipeline routes are described in Section 2.5.4.

2.5.3 HVTL Routes

The Applicant considered a range of alternate HVTL configurations, including staggered and unstaggered 230kV and 345kV transmission concepts, each of which offered varying levels of cost and reliability. The development of alternative transmission configurations to meet the Phase I and II IGCC Power Station GO requirements is discussed in Section 4 and in the ES. Figure 2.2-1 shows the Applicant's West Range Preferred and Alternate HVTL Routes for interconnecting Mesaba One and Two to the POI. Subsections 2.5.3.1 and 2.5.3.2 below contain a narrative description of the two routes. Figure 2.5-2 shows the significant receptors that are in the vicinity of the two routes.

Figure 2.5-1 West Range Site Topography



2.5.3.1 West Range Preferred Plan (Plan A)

The Applicant believes its preferred 345kV double circuit plan is the superior transmission choice. In addition to making use of exiting ROW, it also minimizes the distance between the Station Footprint and the Blackberry Substation. Further, the Applicant believes that over time, 345kV transmission development will be necessary or desirable both on the Iron Range and from the Blackberry POI to other facility interconnection points. Thus, designing the Mesaba generator outlet facilities to initially operate at 230kV and then convert to 345kV will both minimize capital costs and be in concert with necessary longer term regional transmission needs.

The design and configuration of the proposed line is described in detail in Section 4. Information on the environmental setting and potential environmental impacts of the West Range Preferred HVTL Route are discussed in detail in Section 7.

2.5.3.1.1 Preferred Route (WRA-1)

The West Range Preferred HVTL Route would be developed in two stages. The corridor would contain single pole, double circuit structures and would carry two bundled conductors rated as 345kV between the West Range Site and the Blackberry Substation (see Figures 4.3-1 and 4.3-2). The double circuit 345kV HVTLs would be initially operated at 230kV voltage to support Mesaba One operations. When operation of Mesaba Two commences, necessary transformers and other substation equipment would be added to upgrade the HVTL to its rated 345kV capacity.

Route WRA-1 extends east from the IGCC Power Station's high voltage switchyard about 0.8 miles to Minnesota Power's ("MP") existing 45 Line ROW and then south from the southern boundary of the Buffer Land about 1.6 miles to the retired Greenway Substation. The route continues south from the Greenway Substation approximately 6.2 miles over new, but relatively remote, ROW to intersect MP's 83L and 20L. At that point, the route follows the existing MP ROW about 1 mile east to the Blackberry Substation.

Route WRA-1 is shown in a series of maps in Figures 2.5-3, 2.5-4, and 2.5-5.

2.5.3.1.2 Alternate Route (WRA-1A)

Minn. R. 4400.1150, subp.2.C requires that at least one alternate route be proposed if the HVTL exceeds 200kV, is five miles or greater in length, and less than 80 percent of the HVTL is located along existing HVTL rights of way (Minn. R. 4400.2000, subps. 1.D and 1.E). Because the West Range Preferred HVTL Route will require additional new ROW of about six miles, the Applicant must propose at least one alternate HVTL route.

The alternate route proposed by the Applicant to satisfy the above requirement is shown in Figures 2.5-6, 2.5-7 and 2.5-8. This alternate route shares in common with the Preferred Route WRA-1 about 3.3 miles of ROW and parallels about 2 miles of the secondary road known as Twin Lakes Road. Route WRA-1A crosses or abuts the Swan River in several locations and crosses numerous areas that have been cleared but are unoccupied. This route provides a direct path to the POI, affects a limited number of residents (see Section 7.2.2), can be moved to generally avoid nearby residents, and shares 0.9 miles of ROW with MP's existing 62L corridor.

2.5.3.2 West Range Contingent Plan (Plan B)

As noted in Section 2.2.2.2, Plan B will be implemented if MISO determines that the 345 kV development associated with Plan A is inconsistent with regional transmission planning initiatives. The design and configuration of the proposed HVTL and structures are described in detail in Section 4. Information on the environmental setting and potential environmental impacts of the West Range Alternative HVTL Route are discussed in detail in Section 7.1.3.3.

2.5.3.2.1 Plan B Phase I

2.5.3.2.1A Preferred Route (WRB-1)

The preferred Route WRB-1 is identical to the preferred Route WRA-1 but involves the use of a double circuit 230kV HVTL instead of a 345 kV double circuit HVTL. The Plan B preferred route will also require the same additional new six miles of ROW and, therefore, the Applicant must propose at least one alternative HVTL route.

2.5.3.2.1B Alternate Route (WRB-1A)

The alternate Route WRB-1A is identical to the preferred Route WRA-1A with the exception that Route WRB-1A will involve use of a double circuit 230kV HVTL.

2.5.3.2.2 Plan B Phase II

2.5.3.2.2A Preferred Route (WRB-2)

See Section 2.2.2.2.2. The preferred route WRB-2 for Phase II under Plan B is the route not selected in Plan B Phase I (in other words one of the two routes identified in the previous Section 2.5.3.2.1).

2.5.3.2.2B Alternate Route (WRB-2A)

See Section 2.2.2.2.2. The alternate route WRB-2A involves use of the existing 28L and 62L corridors as shown in Figures 2.5-9 through 2.5-12. See Figure 4.3-15 to identify HVTL structure differences used in this route.

Figure 2.5-2 Significant Receptors Along the West Range Preferred and Alternate HVTL Routes

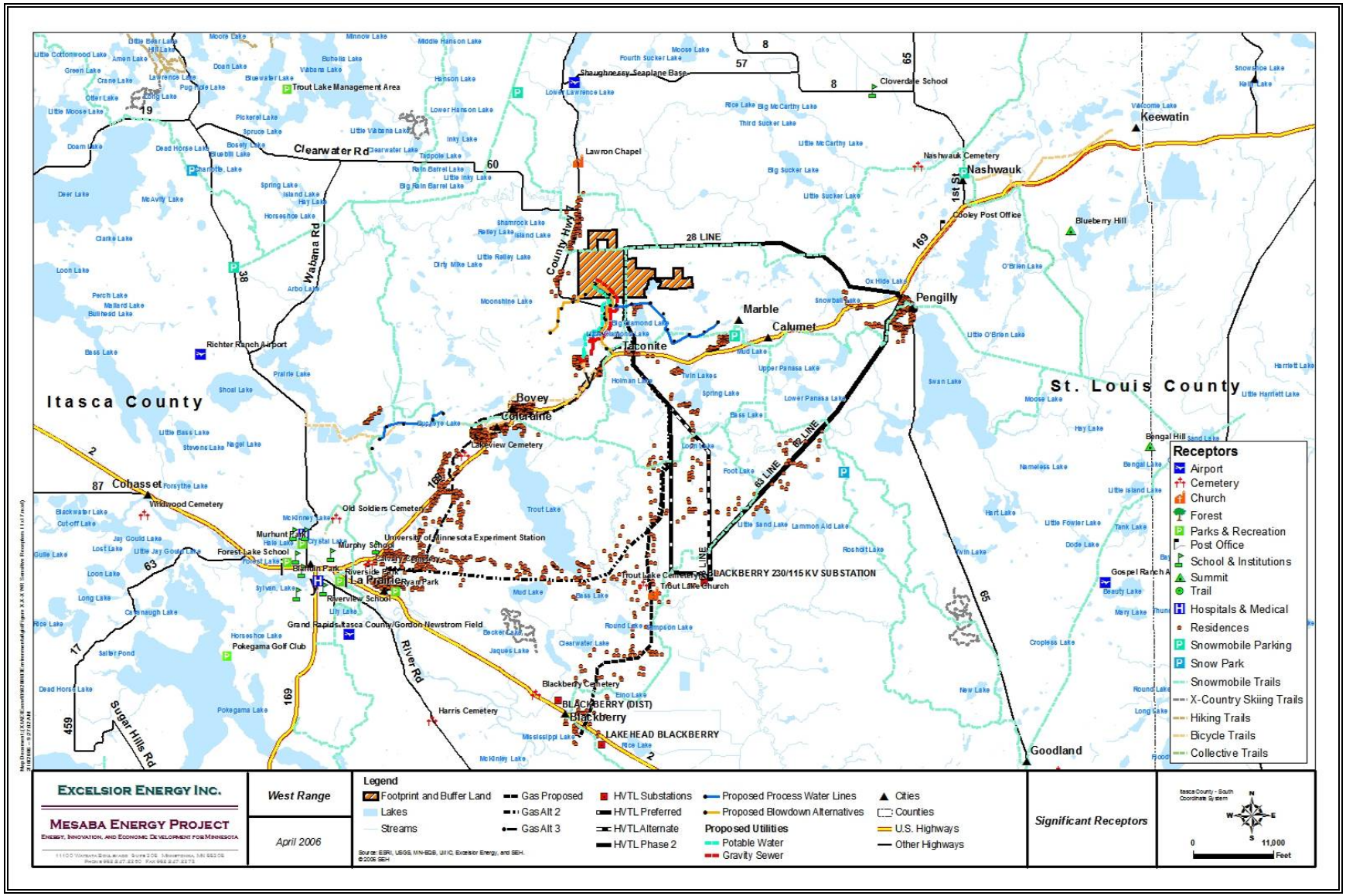


Figure 2.5-3 West Range Plan A: Preferred HVTL Route (WRA-1), Segment 1

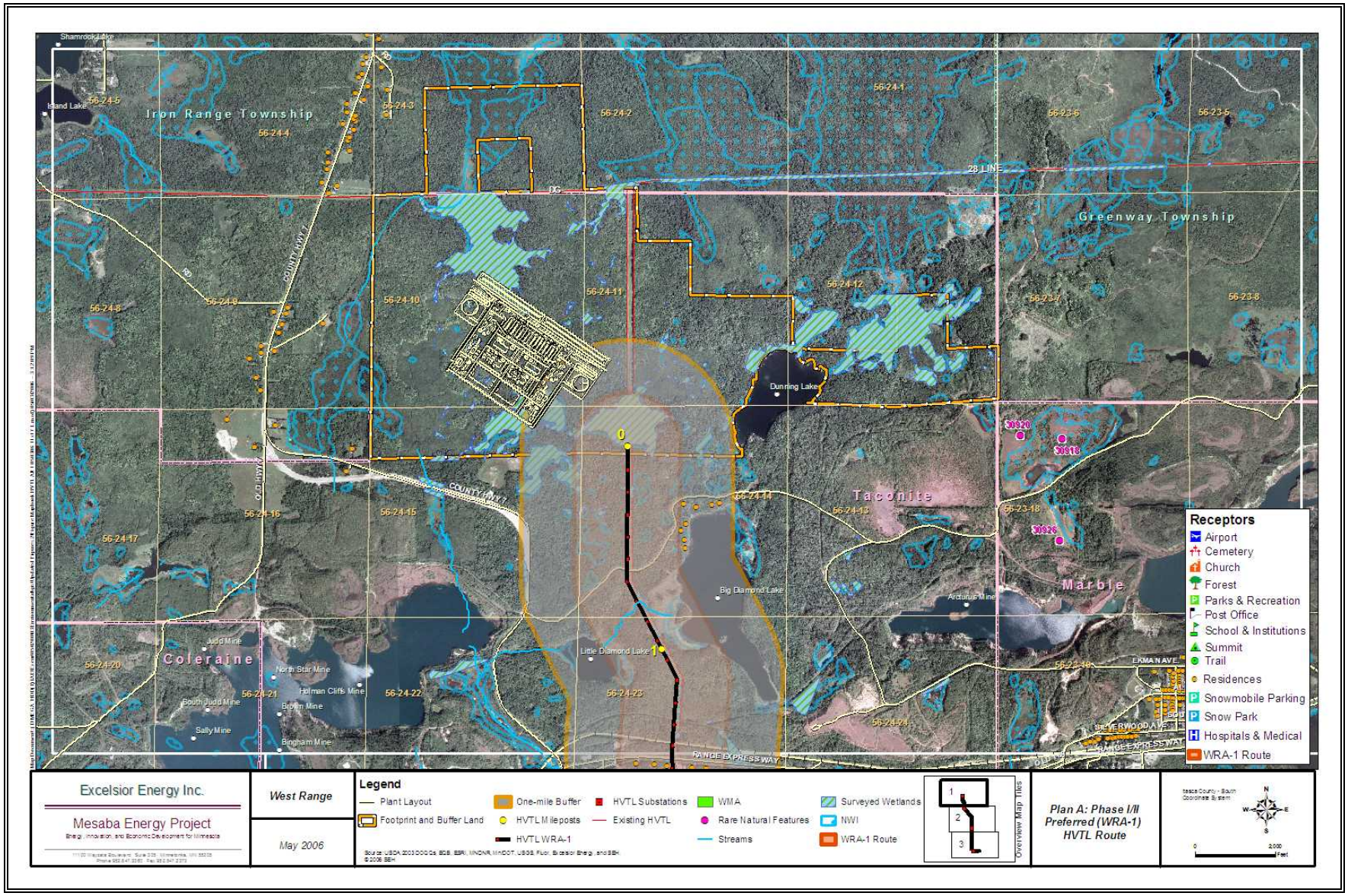


Figure 2.5-4 West Range Plan A Preferred HVTL Route (WRA-1), Segment 2

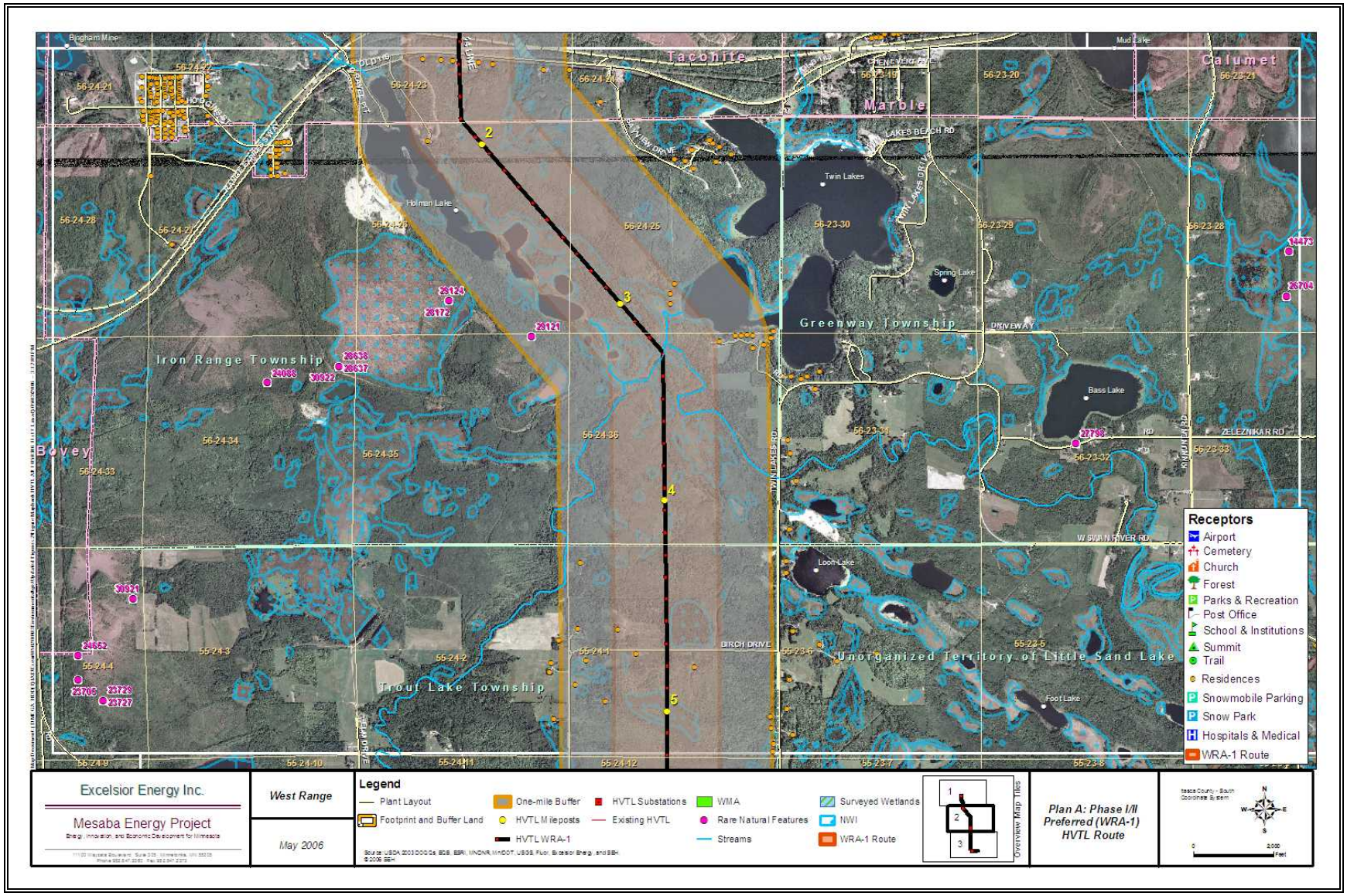


Figure 2.5-5 West Range Plan A Preferred HVTL Route (WRA-1), Segment 3

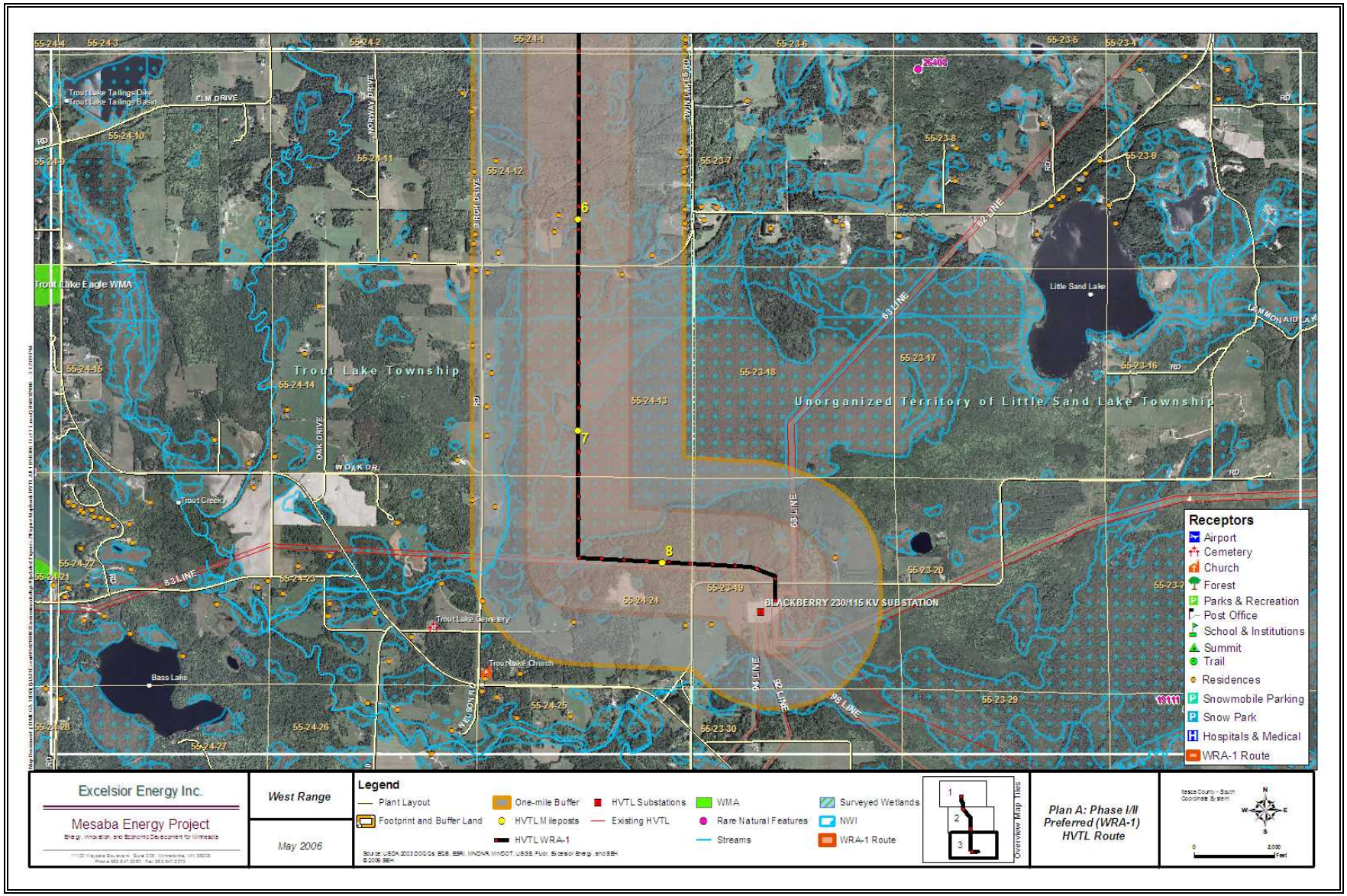


Figure 2.5-6 West Range Plan A Alternate HVTL Route (WRA-1A), Segment 1

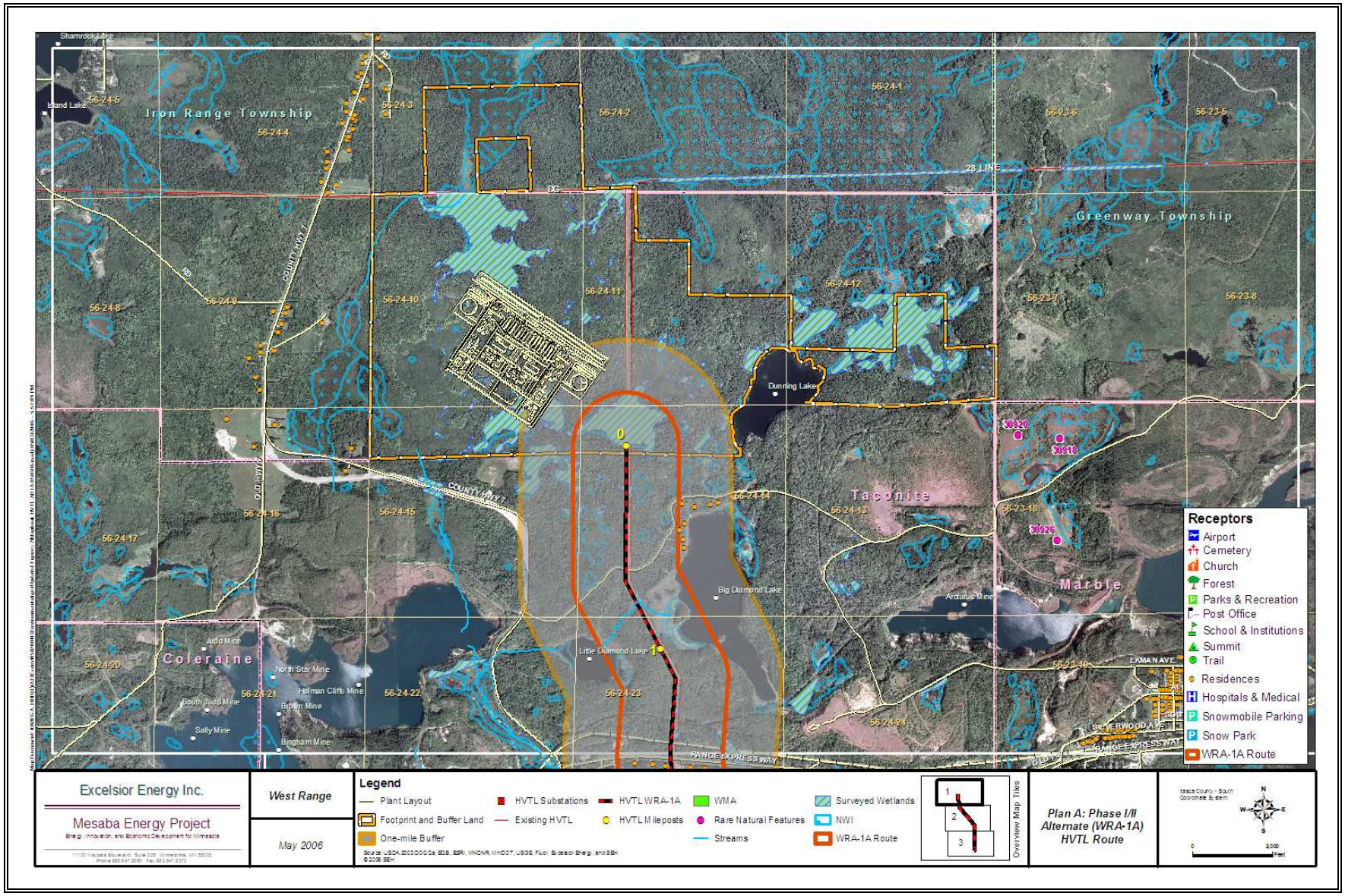


Figure 2.5-7 West Range Plan A Alternate HVTL Route (WRA-1A), Segment 2

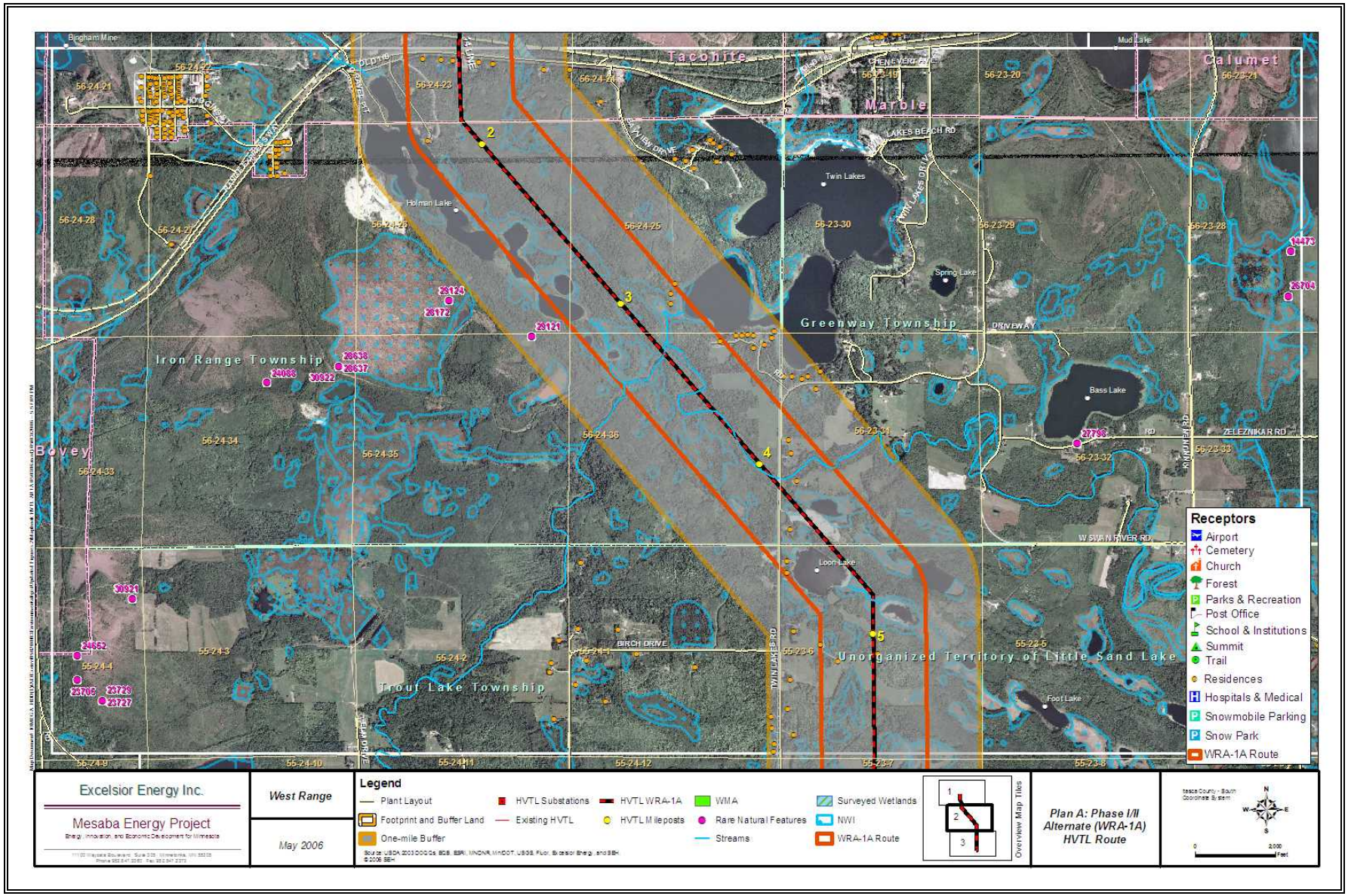


Figure 2.5-8 West Range Plan A Alternate HVTL Route (WRA-1A), Segment 3

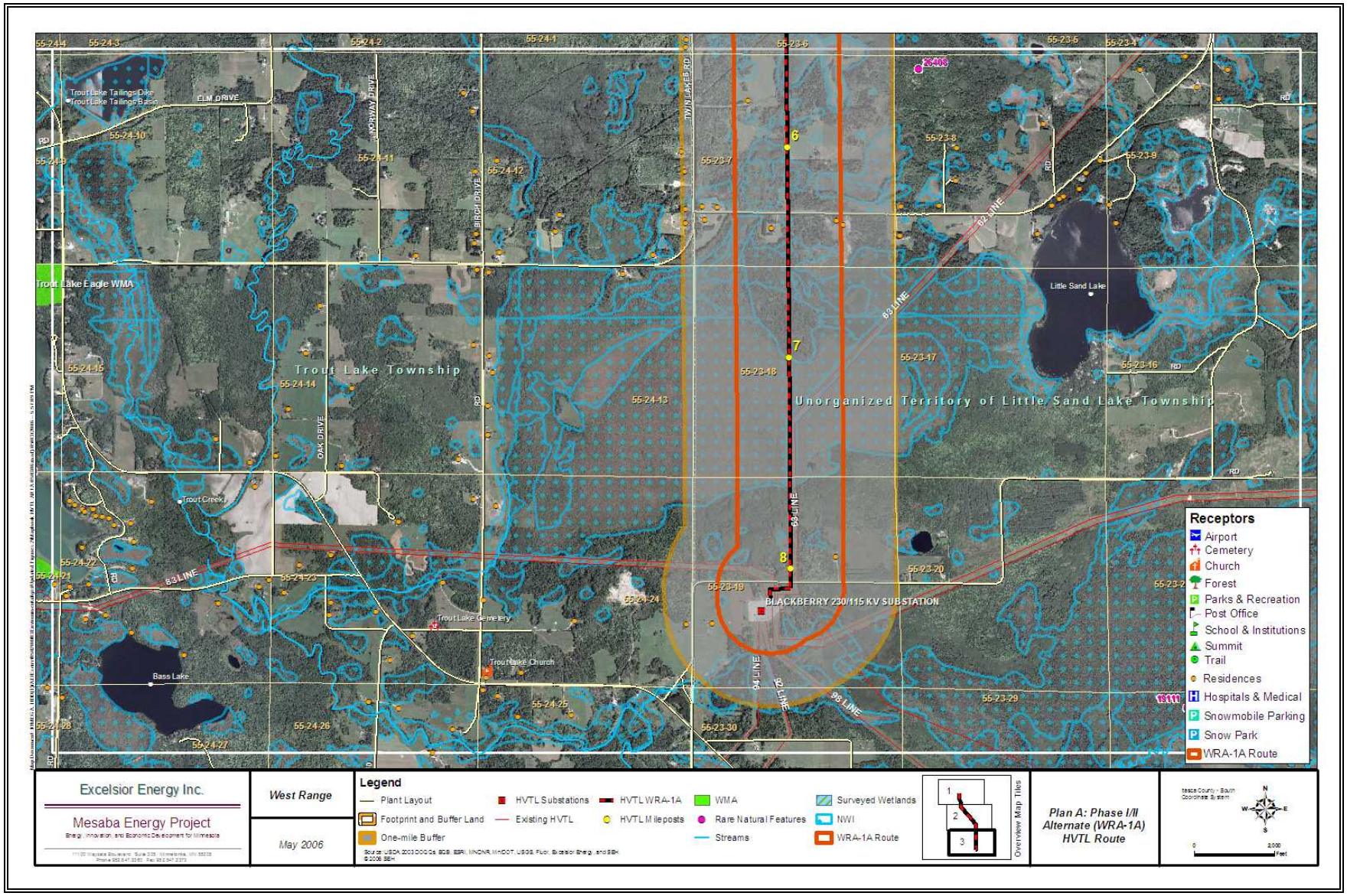


Figure 2.5-9 West Range Plan B Phase II Alternate HVTL Route Route Phase II (WRB-2A), Segment 1

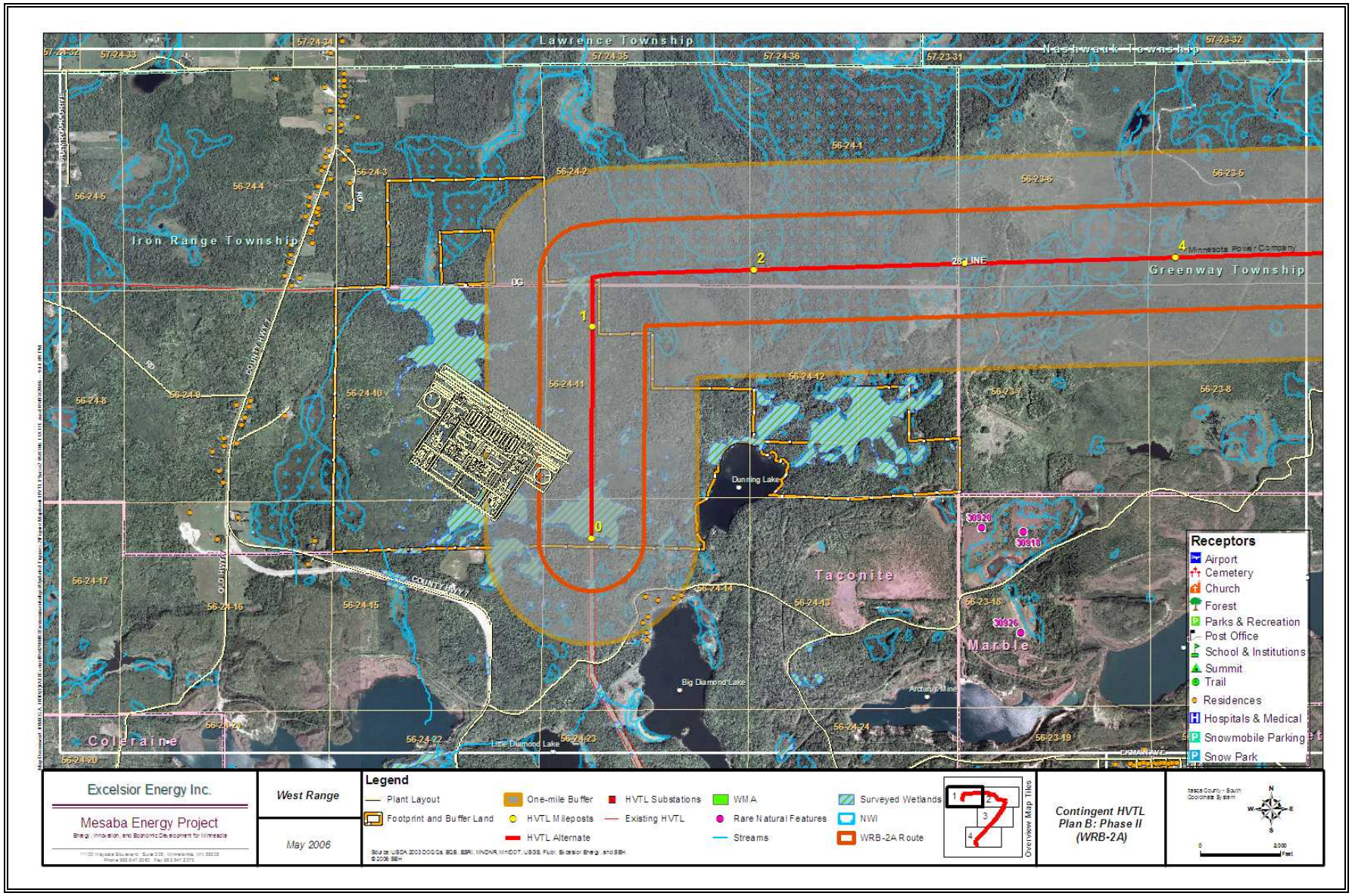


Figure 2.5-10 West Range Plan B Phase II Alternate HVTL Route Route Phase II (WRB-2A), Segment 2

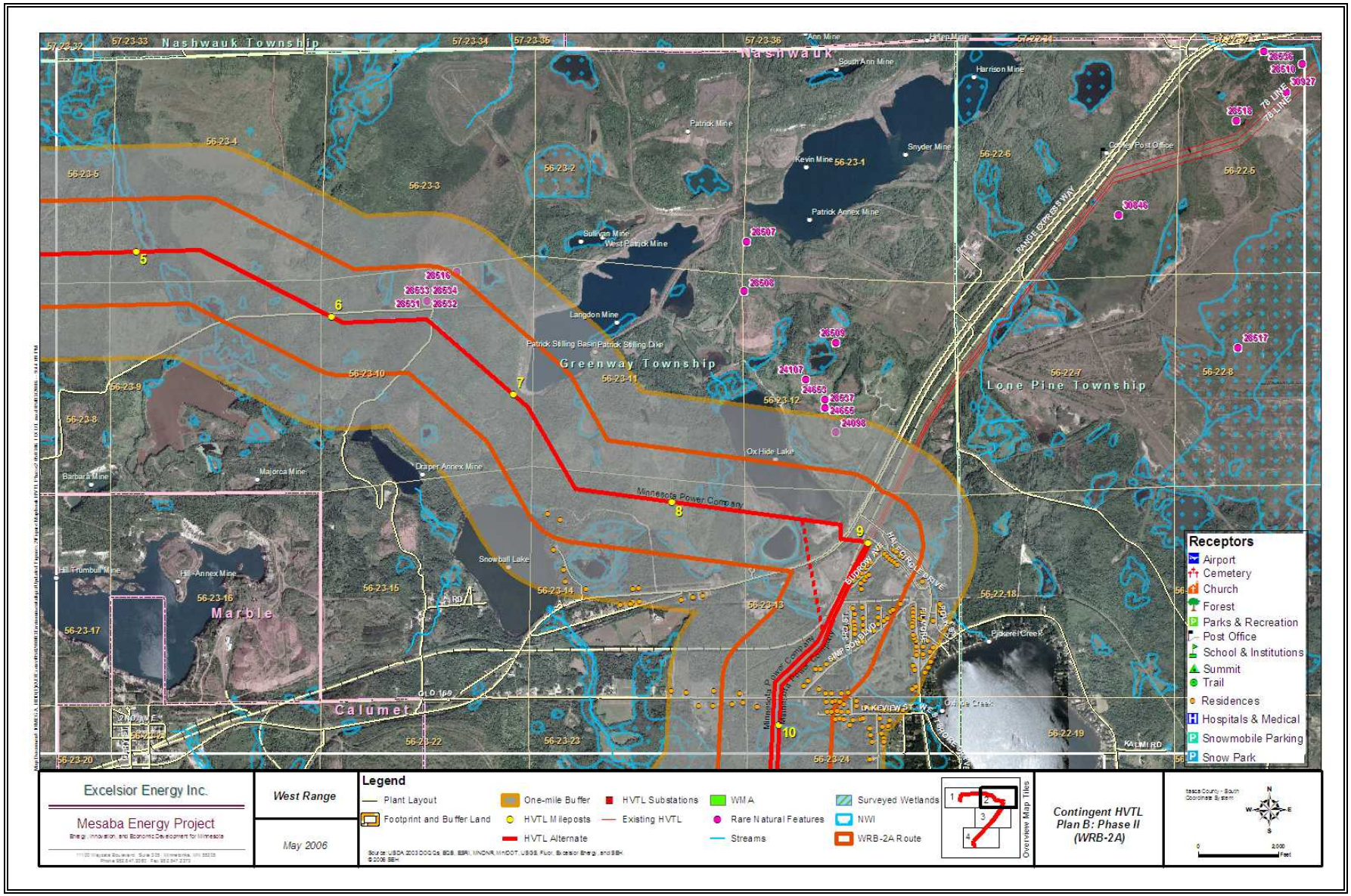


Figure 2.5-11 West Range Plan B Phase II Alternate HVTL Route Route Phase II (WRB-2A), Segment 3

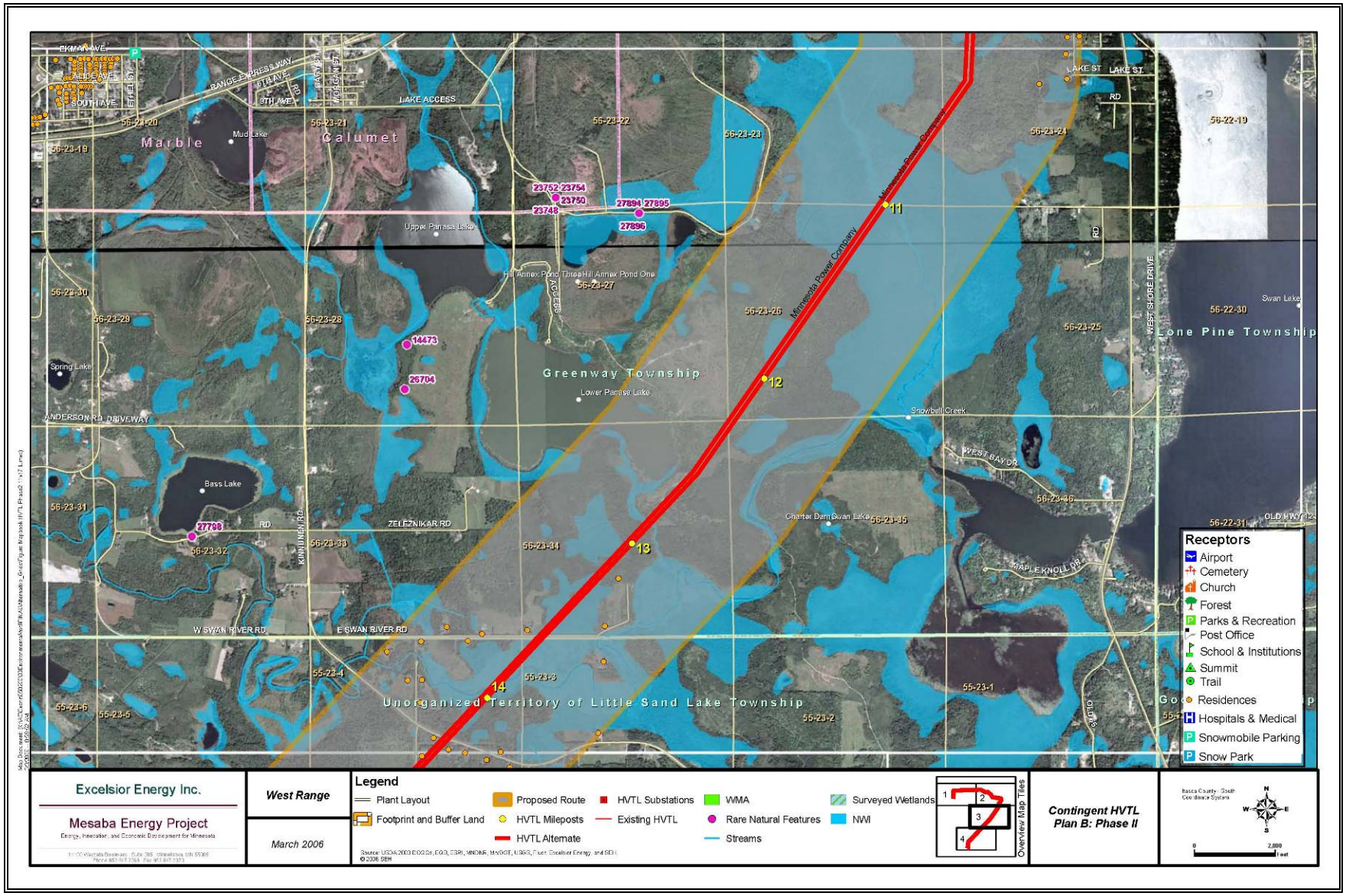
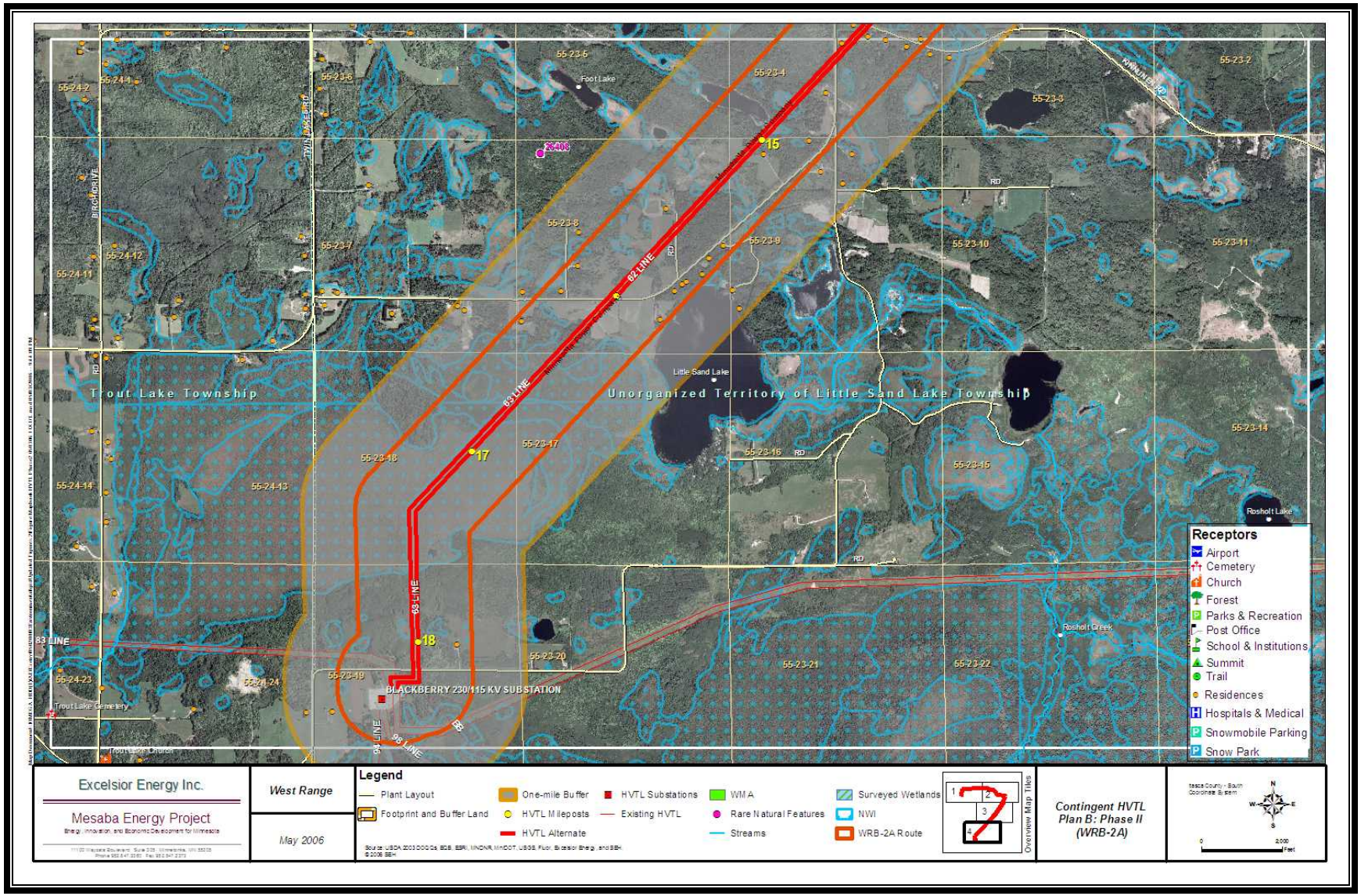


Figure 2.5-12 West Range Plan B Phase II Alternate HVTL Route Route Phase II (WRB-2A), Segment 4



2.5.4 Natural Gas Pipeline Routes

2.5.4.1 Proposed Natural Gas Pipeline Route

The Applicant proposes to construct, own and operate one 16-24 inch diameter gas pipeline to supply natural gas to the IGCC Power Station that would tap the existing 36-inch GLG pipelines located approximately 12 miles due south of the West Range Power Station Footprint. The proposed gas pipeline route would originate about 0.6 miles southeast of the GLG block valve station located just south of U.S. Highway 2 near the unincorporated town of Blackberry, Minnesota (see Figure 2.3-2). The proposed pipeline route would follow 0.9 miles of existing pipeline or HVTL ROWs, and will require approximately 12.3 miles of new pipeline easements along the 13.2 mile proposed route. Figures 2.5-13 through 2.5-16 provide detailed aerial photographs of the proposed pipeline route and indicate the significant receptors identified in Figure 2.5-2.

The first 2.0 miles of the route would extend north-northeast to avoid a large wetland bog north of U.S. Highway 2. From there the proposed route would turn due east approximately 2 miles to be aligned directly south of the West Range IGCC Power Station. The proposed route would extend north from this point about 1.5 miles where it would cross the Swan River and then continue until intersecting with NNG's 8-inch pipeline ROW. The route would parallel the NNG pipeline 0.9 miles and then follow the proposed HVTL preferred corridor ROW for 4.2 miles. Within this segment, the route would cross the Swan River a second time. The last 1.3 miles of the proposed route would run within an existing unused HVTL corridor to the West Range Site. A milepost map is provided as Figure 2.5-17 identifying significant features along the West Range Proposed Natural Gas Pipeline Route and other pipeline routes considered.

The following information is required by Minn. R. 4415.0115, subps. D.1 through D.5. for the West Range Proposed Natural Gas Pipeline Route:

- The general location of the West Range Proposed Natural Gas Pipeline Route is shown in Figure 1.5-2 as traversing from the GLG 36 inch diameter pipeline south of State Highway 2 near the unincorporated community of Blackberry, Minnesota to the West Range Site termination point, approximately 12 miles north in the City of Taconite, Minnesota. Figures 2.3-2 and 2.3-3 shows the GLG natural gas pipeline near the proposed tapping point.

- The planned use and purpose of the natural gas pipeline will be to provide startup and backup fuel for Mesaba One and Mesaba Two.

- The estimated cost of the West Range Proposed Natural Gas Pipeline Route is contained in below in Section 2.8.

- The planned in-service date for the West Range Proposed Natural Gas Pipeline Route is the 4th quarter of 2010. However, if a municipal entity constructs the pipeline for use by both Mesaba and Minnesota Steel, such in-service date could be earlier than 2010. (See Section 5 for a compilation of pipeline design and operational information.)

- Land uses traversed by the proposed route include grasslands, regeneration/young forest, deciduous forest land and smaller tracts of agricultural lands and wetlands. Detailed information regarding the existing land uses along the route and the environmental impacts to be expected in constructing and operating the West Range Proposed Natural Gas Pipeline are provided in Section 7.1.4. Three residences appear to be located between 100-300 feet of the centerline of the proposed route (see Section 7.2.3).

Sections 5.5 and 5.6 provide further descriptions of ROW requirements and pipeline construction procedures, respectively.

The design and configuration of the proposed pipeline is described in Section 5. Information on the environmental setting and potential environmental impacts of the proposed gas pipeline route are discussed in Section 7.

2.5.4.2 Other Considered Gas Pipeline Routes

The Applicant has considered two other possible natural gas pipeline routes to bring the required natural gas to the West Range IGCC Power Station. Both alternate routes, like the proposed route, would involve tapping the two existing 36-inch diameter GLG pipeline with an identically sized 16-20 inch pipeline. Unlike the proposed route, a pipeline developed along either of the other considered routes may be licensed, permitted, constructed, owned and operated by NNG rather than the Applicant (see Section 1.0 and Section 1.10.2.8). Both alternate routes would originate approximately 9.4 miles southwest of the West Range IGCC Power Station at the La Prairie tap and metering point located in La Prairie, Minnesota. These potential pipeline routes are presented in two sets of figures in this section for comparison purposes only as they are described in more detail and compared with the proposed route in Table 1.5-5 in Section 1.5.2.4.2 of the ES.

Figures 2.5-18 to 2.5-21 trace the NNG pipeline route labeled Alternate 2 from its tapping point in La Prairie to the IGCC Power Station Footprint via Trout Lake. Figures 2.5-22 through to 2.5-24 trace the NNG pipeline route labeled Alternate 3 from its tapping point in La Prairie to the IGCC Power Station Footprint via Coleraine and Bovey. Either of these two routes would be utilized by NNG for construction of its pipelines. However, the Applicant has evaluated each to assess its licensability and has placed such evaluations into the record of this proceeding in recognition of the potential for working with NNG to supply natural gas to Mesaba One and Mesaba Two.

Figure 2.5-13 West Range Proposed Natural Gas Pipeline Route: Segment 1

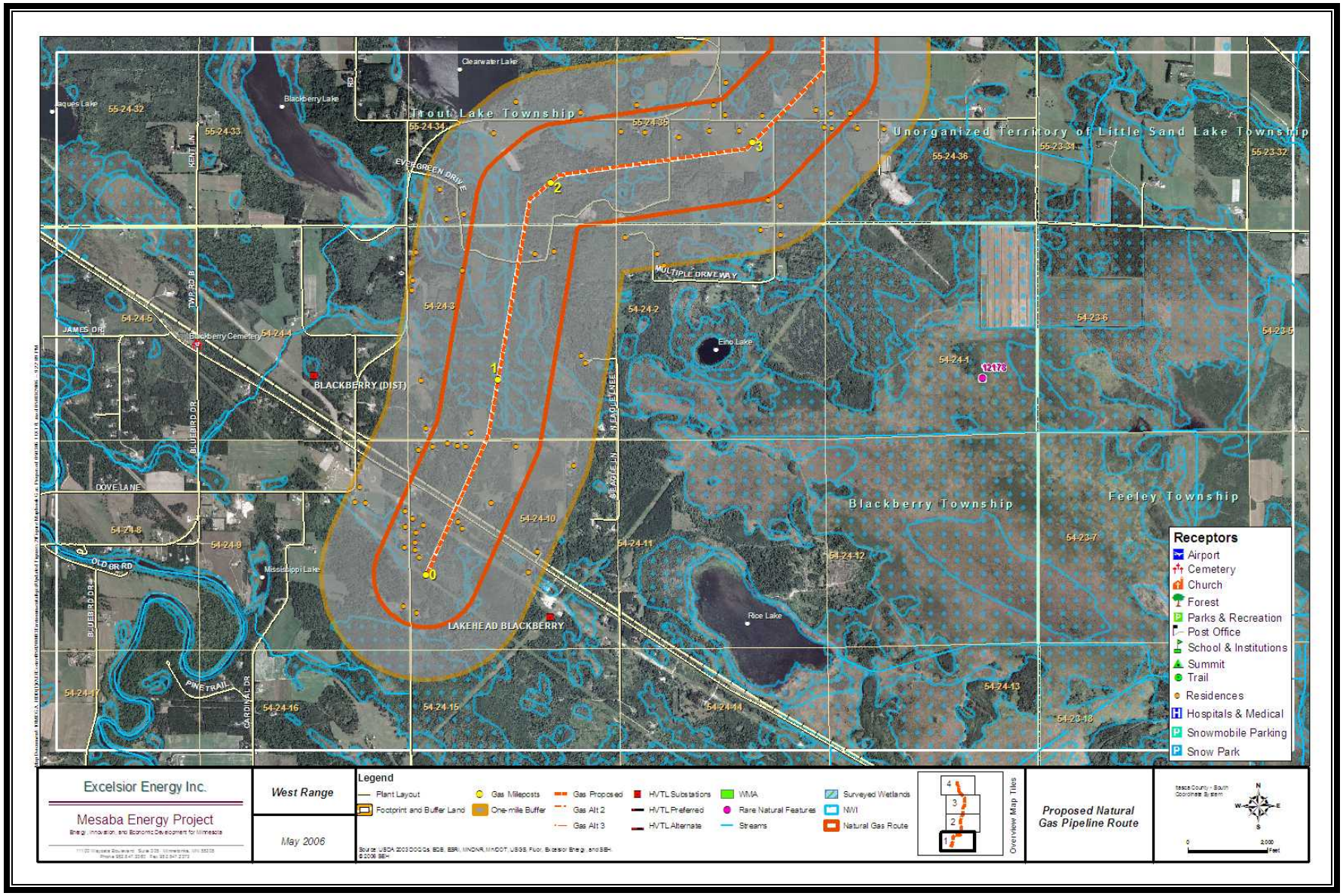


Figure 2.5-14 West Range Proposed Natural Gas Pipeline Route: Segment 2

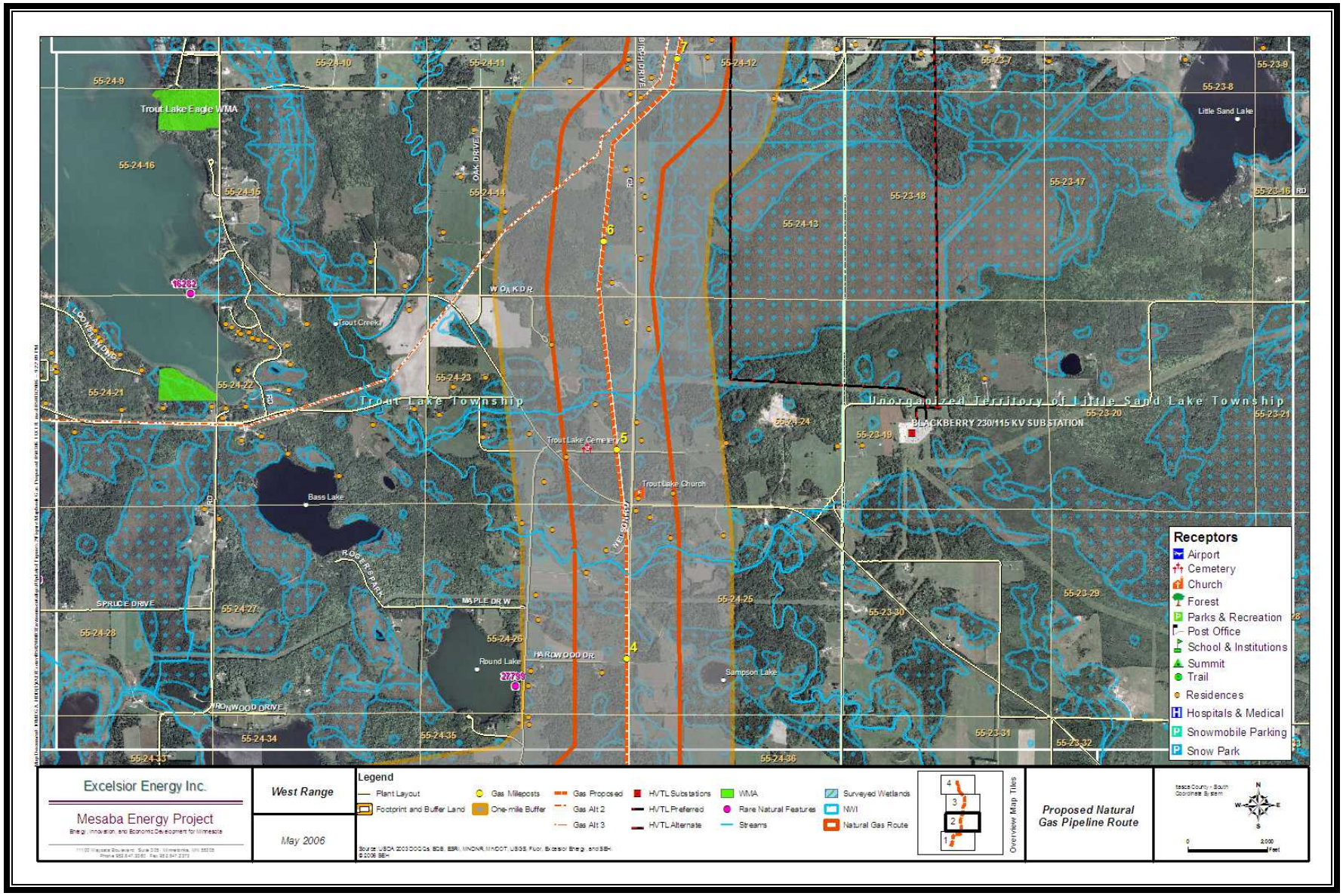


Figure 2.5-15 West Range Proposed Natural Gas Pipeline Route: Segment 3

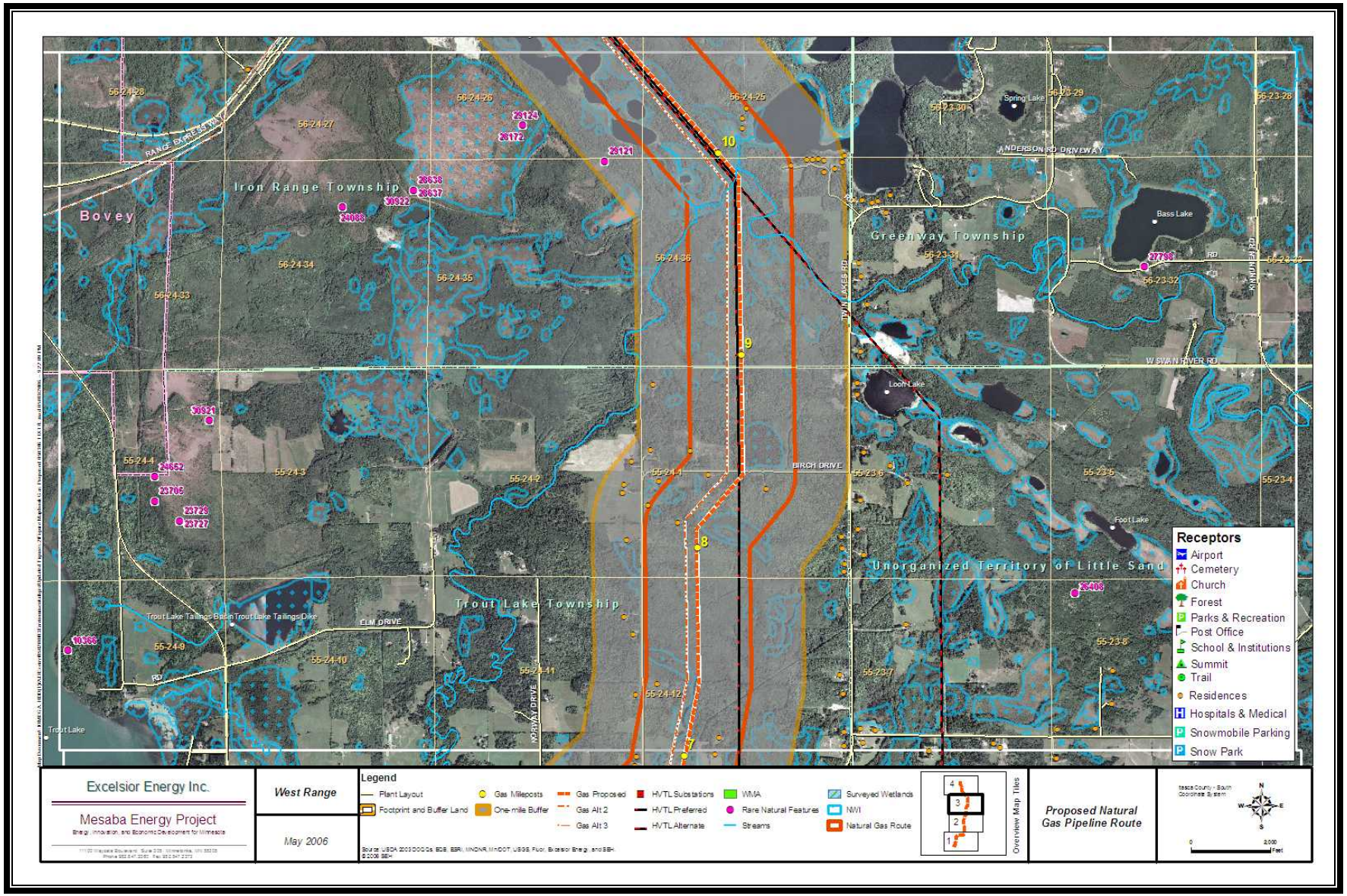


Figure 2.5-16 West Range Proposed Natural Gas Pipeline Route: Segment 4

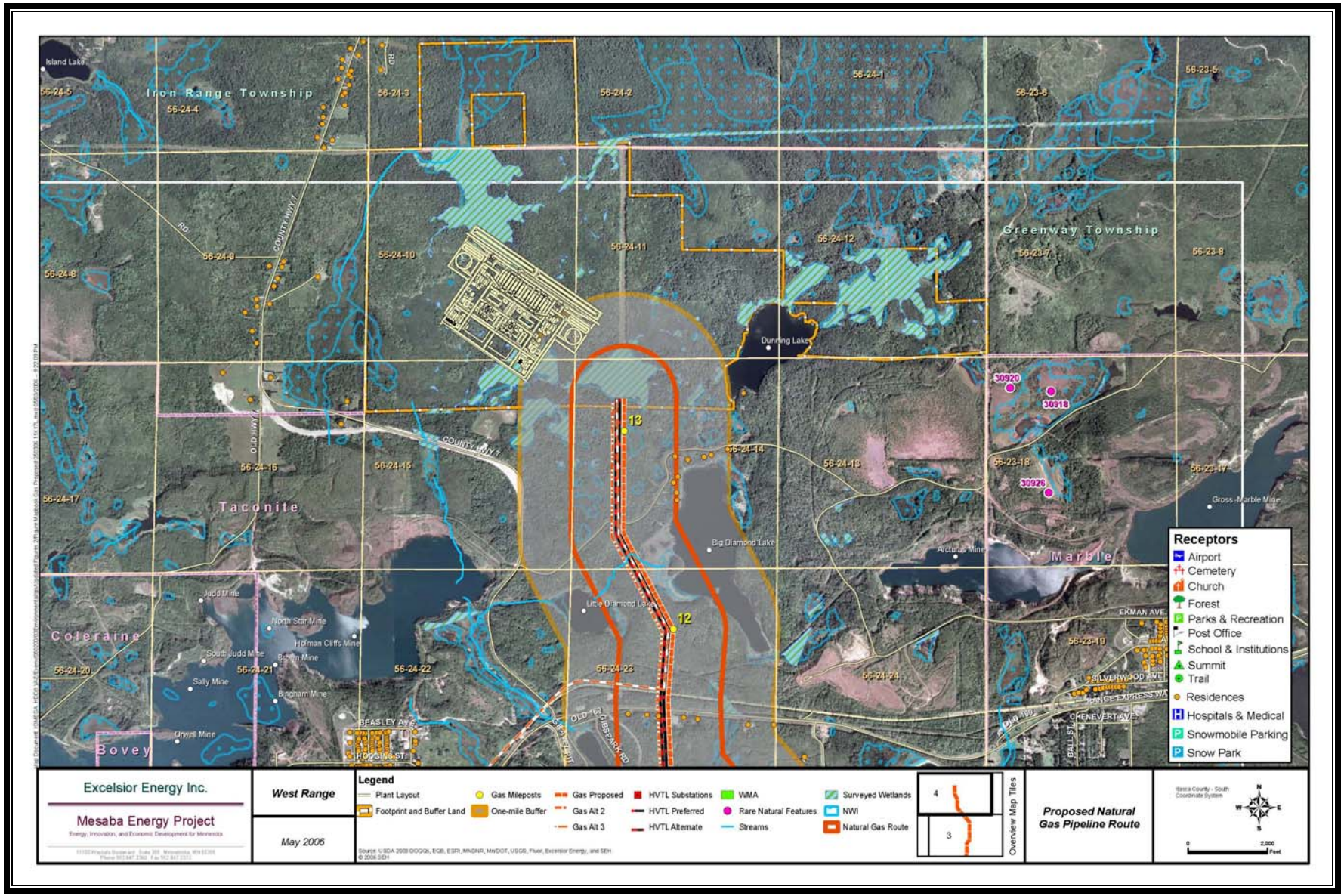


Figure 2.5-17 West Range Natural Gas Pipeline Route Milepost Map

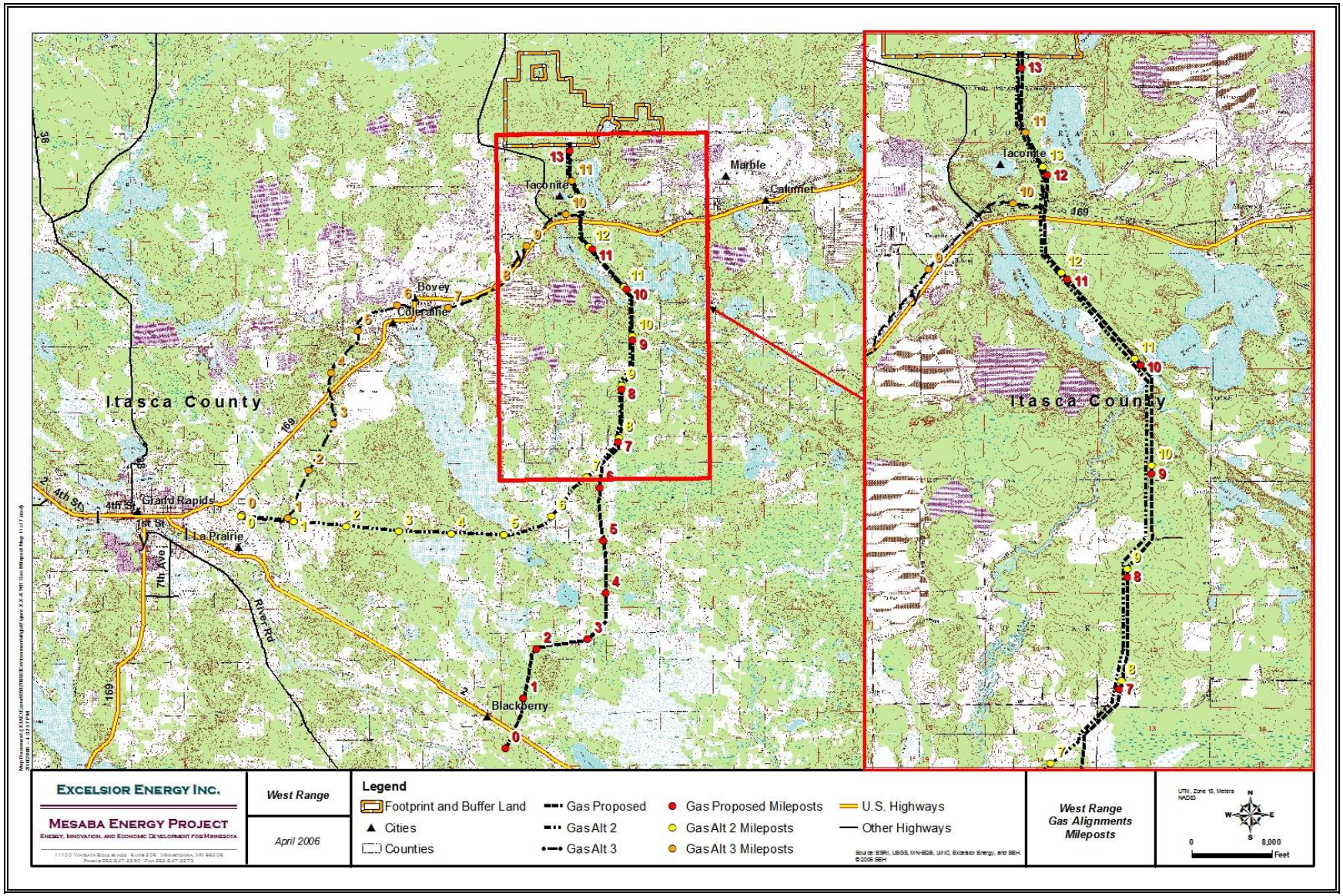


Figure 2.5-18 West Range Alternate Natural Gas Pipeline Route: NNG No.2, Segment 1

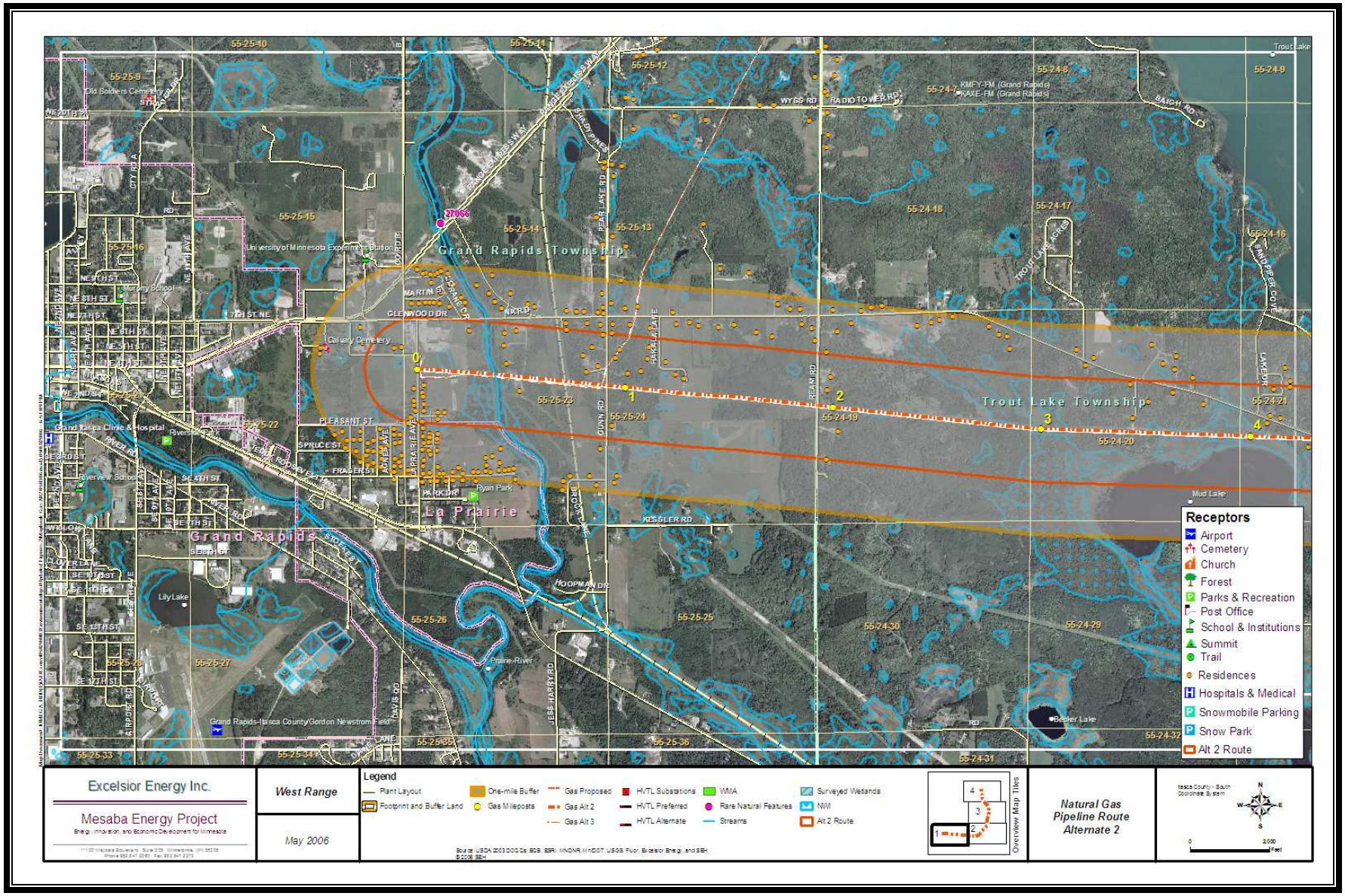


Figure 2.5-19 West Range Alternate Natural Gas Pipeline Route: NNG No.2, Segment 2

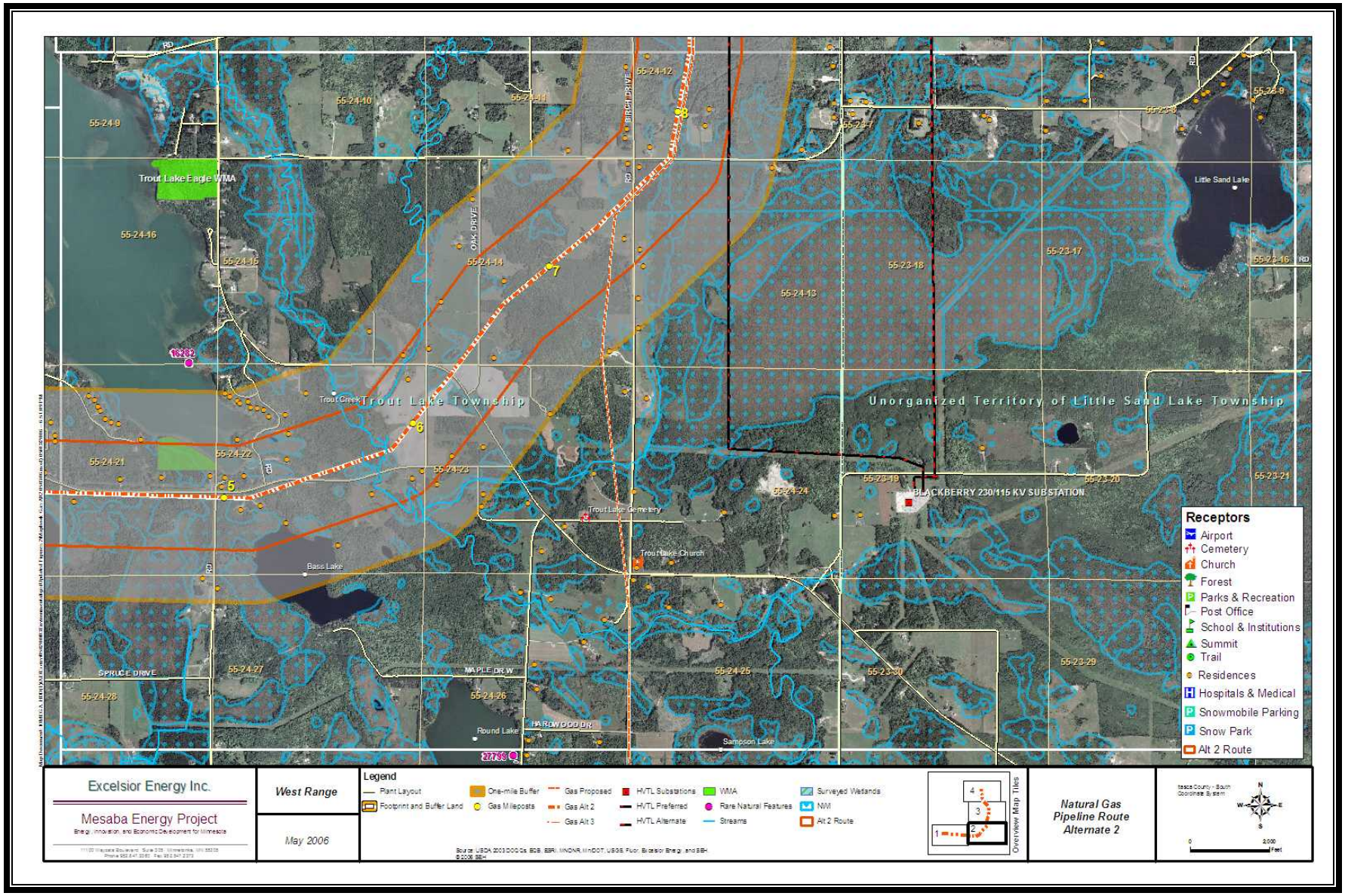


Figure 2.5-20 West Range Alternate Natural Gas Pipeline Route: NNG No.2, Segment 3

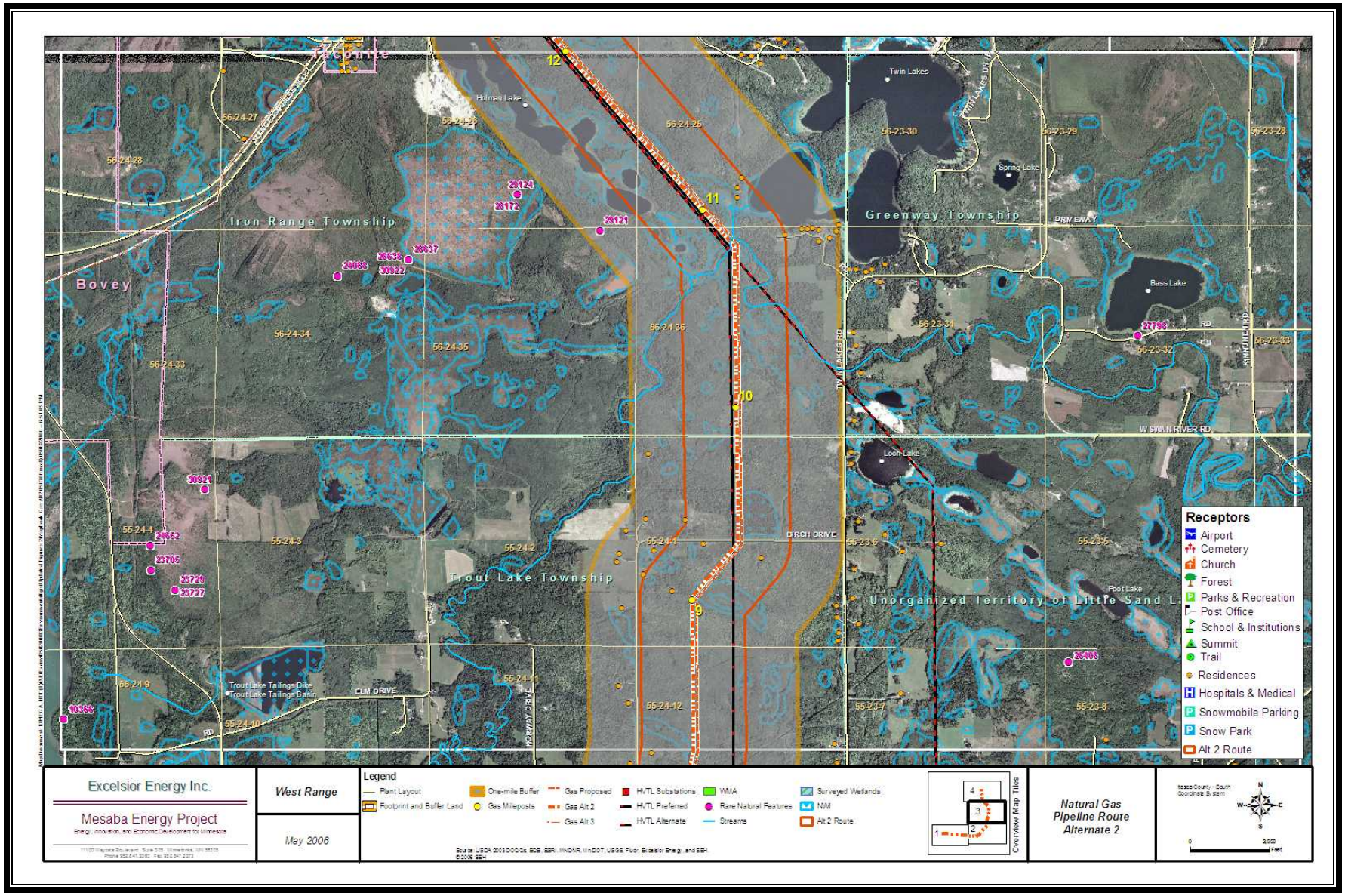


Figure 2.5-21 West Range Alternate Natural Gas Pipeline Route: NNG No.2, Segment 4

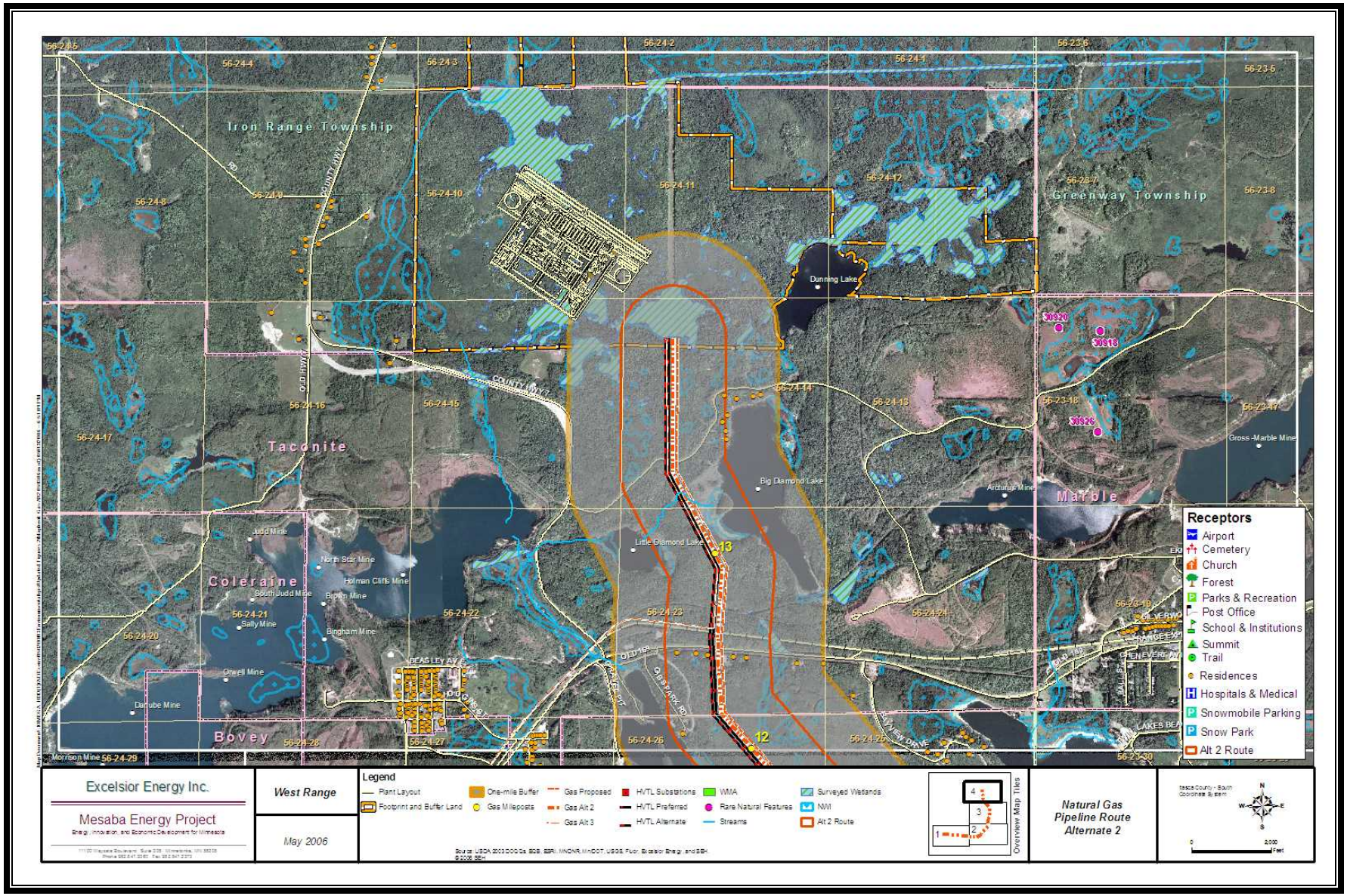


Figure 2.5-22 West Range Alternate Natural Gas Pipeline Route: NNG No.3, Segment 1

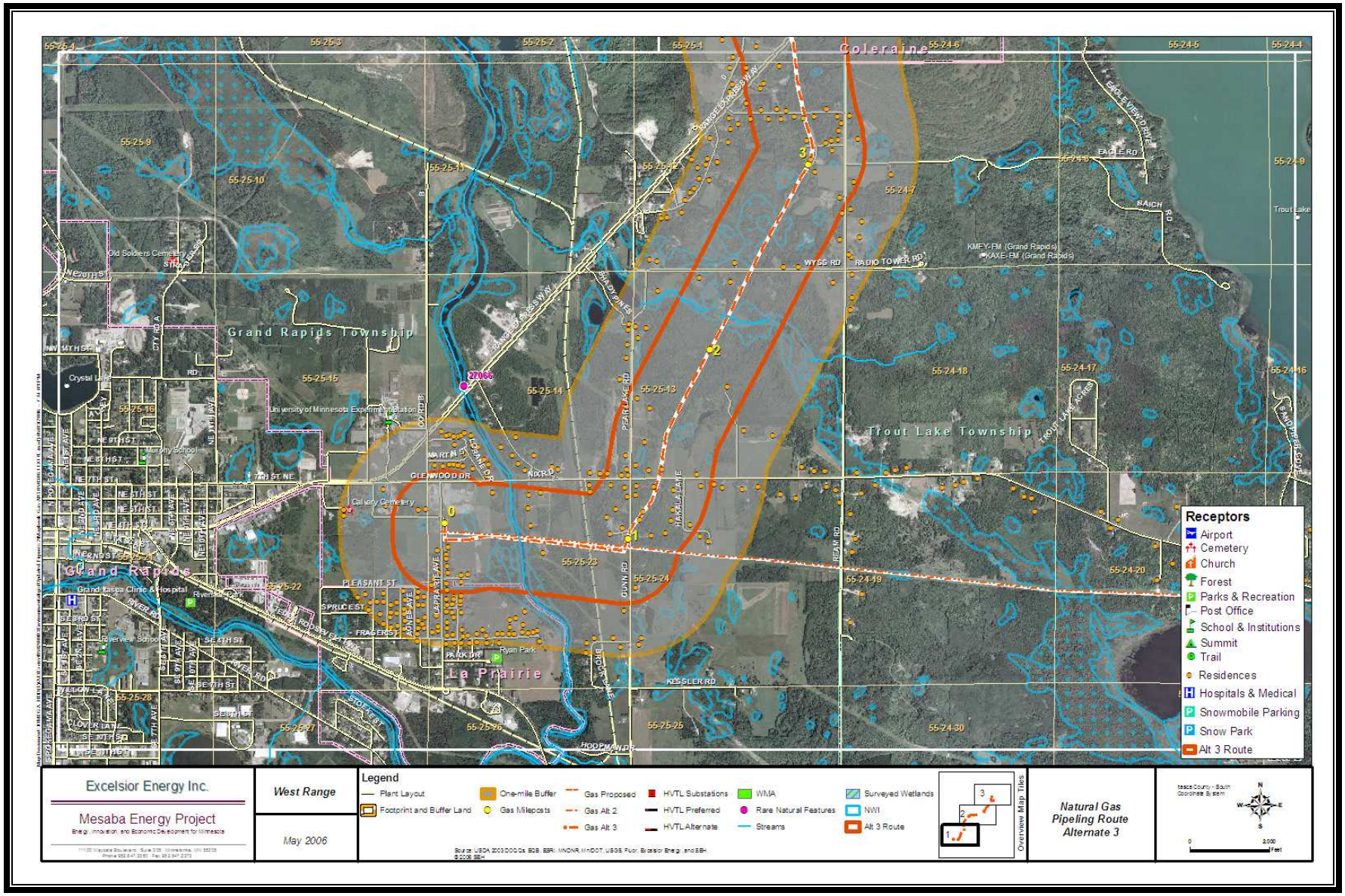


Figure 2.5-23 West Range Alternate Natural Gas Pipeline Route: NNG No.3, Segment 2

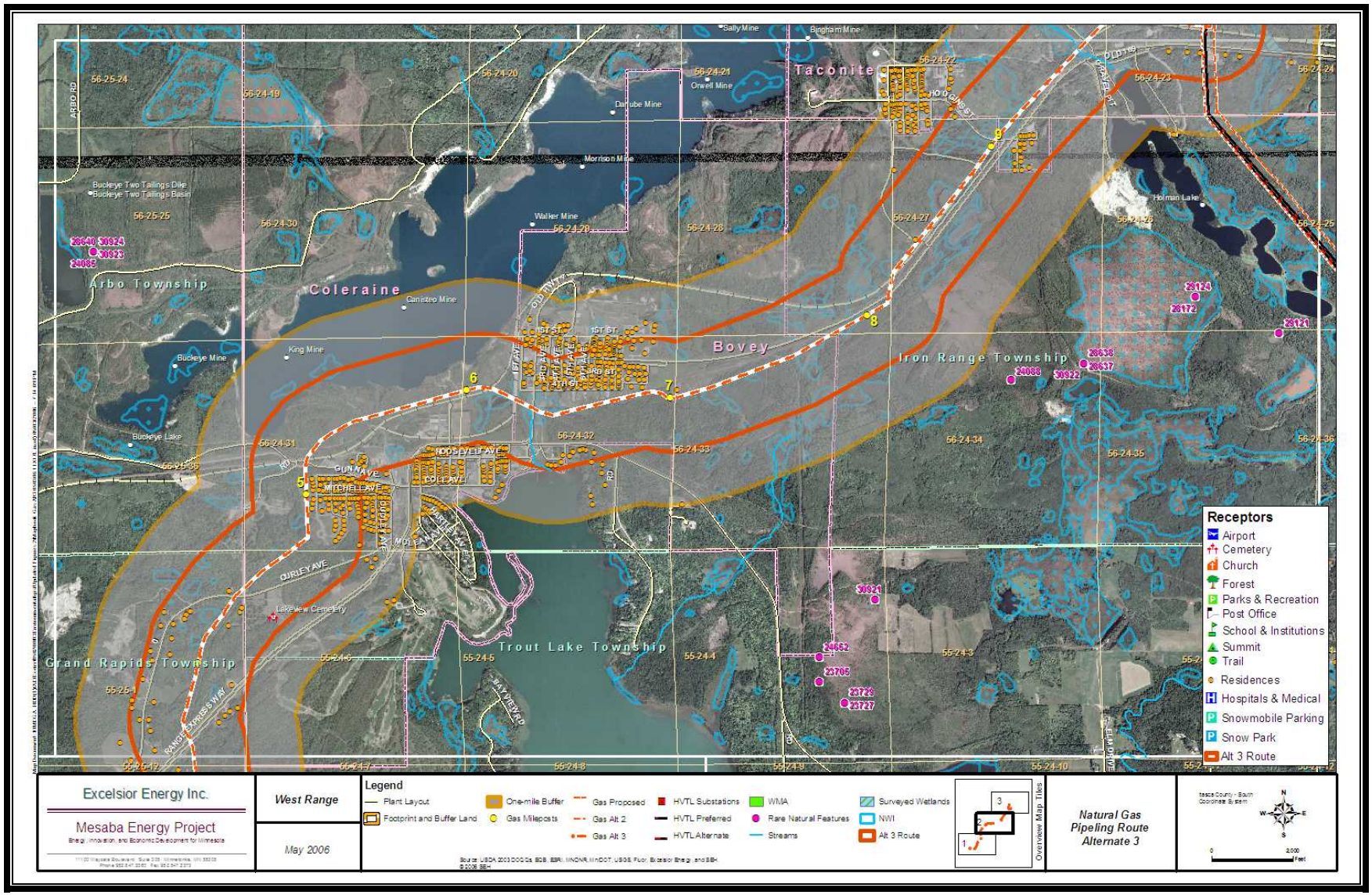
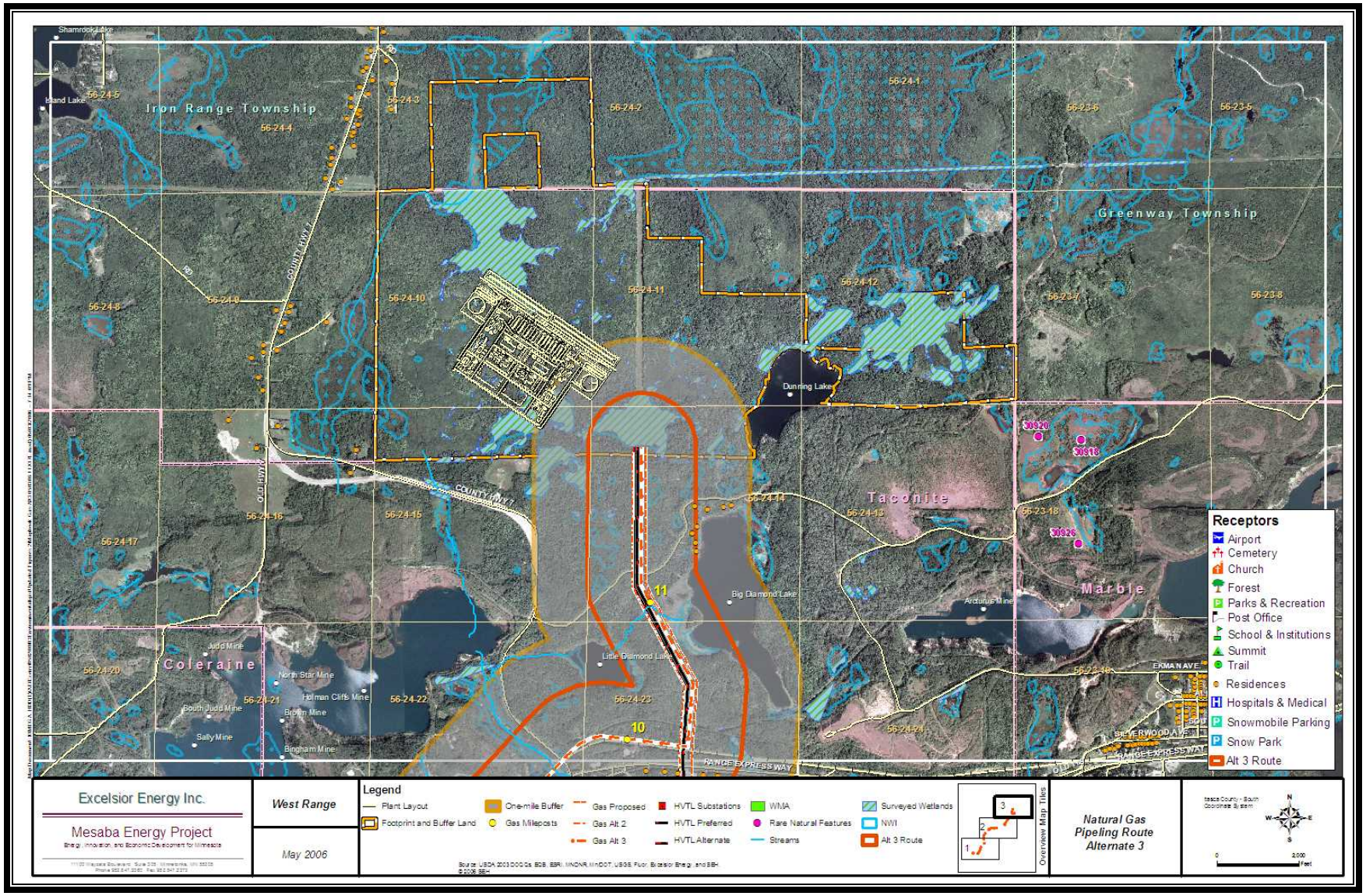


Figure 2.5-24 West Range Alternate Natural Gas Pipeline Route: NNG No.3, Segment 3



2.6 ALTERNATE SITE – EAST RANGE

The alternate site for Mesaba One and Mesaba Two is the East Range Site. This section describes the IGCC Power Station Footprint, Buffer Land, the Associated Facilities, and the Additional Lands that comprise the East Range Site.

2.6.1 IGCC Power Station Footprint and Buffer Land

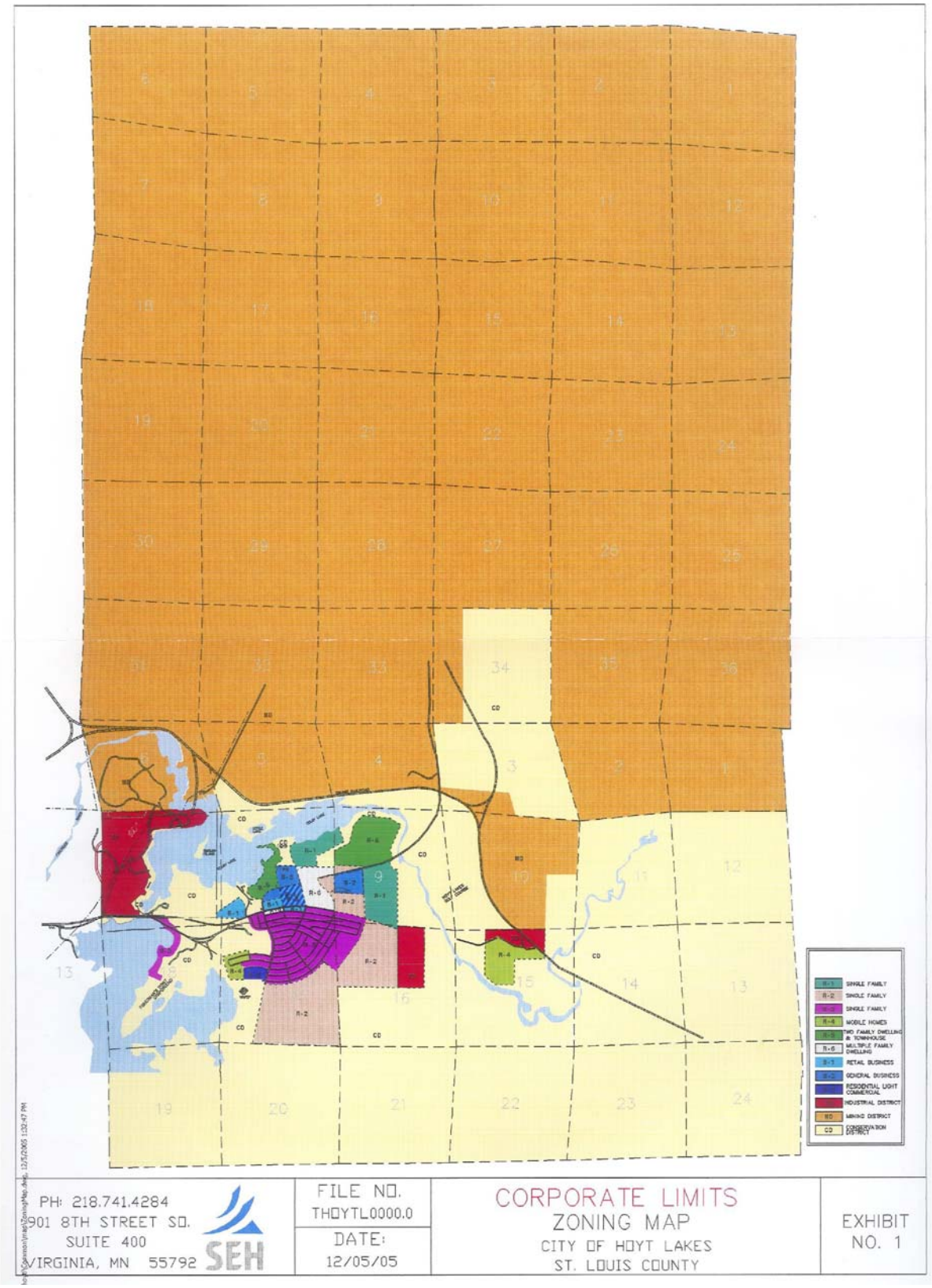
The East Range IGCC Power Station Footprint and Buffer Land shown in Figures 2.1-4 and 2.1-5 comprise approximately 810 acres of undeveloped property located completely within the city limits of Hoyt Lakes, Minnesota. The Station Footprint and Buffer Land are located within Township 59N, Range 14W and are generally bounded by CR 666 to the east and the Superior National Forest boundary to the north. A wetland area found in the southeastern part of the site drains via an unnamed creek to Colby Lake, and an existing 138kV HVTL corridor leading to MP's Syl Laskin Energy Center Substation ("Laskin Substation") runs along the Site's western boundary.

The IGCC Power Station Footprint and Buffer Land is currently owned by Cliffs-Erie, LLC (CE) and is zoned MD (mineral mining district) to support mining operations that historically took place within the immediate vicinity of the Site. The purpose of the MD district is to "identify areas of existing and potential mineral mining, processing, storage and loading, tailings and waste disposal, and accessory and support activities required for proper operation of mining activities located outside of the limits of the open pit and ore formation, and to assure the compatibility of these uses to other uses within the City of Hoyt Lakes." The current Hoyt Lakes zoning map is provided in Figure 2.6-1. The Station Footprint and Buffer Land are currently unoccupied, but have direct access to CR 666 and include a private, unpaved road used by CE to access its pump house on Colby Lake. A Canadian National (CN) railroad line is located about one-half mile south of the site.

Land uses within the IGCC Power Station Footprint and Buffer Land are natural, exhibiting no structures or other major land use conversions. Upland forests occur on the north, west and east sides of the East Range Site. All of the East Range uplands are vegetated with northern mesic mixed forest – aspen birch forest (balsam fir subtype) as described in the "Field Guide to Native Plant Communities in Minnesota: The Laurentian Mixed Forest Province" (MDNR, 2003). Within the past year, a sizable portion of the site's upland forest cover has been harvested for timber production. The remaining forest cover is relatively young, with such lands having also been harvested within the past 25 years. There is no old growth forest cover within the IGCC Power Station Footprint and Buffer Land. The upland forest composition and character demonstrates that the area has served as a timber source and been impacted by timber production for several decades. The site topography of the upland portion of the Buffer Lane generally varies between 1,490-1,525 feet above mean sea level ("ft MSL"). A small but relatively pronounced hill approximately 15 acres in size and located immediately north of the unnamed creek and about 2,000 feet from CR 666, rises to about 1,550 ft MSL. The 2003 aerial photograph in Figure 2.6-2 shows the following notable terrain features:

- A large waste rock pile approximately 300 acres in size (resulting from placement of overburden materials excavated as part of past mining operations) is located immediately

Figure 2.6-1 Hoyt Lakes Zoning Map



west of the site, and quickly rises in elevation about 80-100 feet above the ground surface of the Station Footprint.

- A 20-40 foot drop in elevation on the southeastern part of the site to a large wetland area.

There are no lakes, major bedrock outcrops, unique ecological resources, or other natural features within the area occupied by the Station Footprint and Buffer Land. Figure 2.1-5 shows the orientation of the IGCC Power Station Footprint, the Buffer Land and the infrastructure required for the Station's operations. The layout of the IGCC Power Station for the East Range Site differs from that presented for the West Range Site with respect to its orientation, rail approach, rotary dumper location, and access road configuration. The equipment layout plan within the Station Footprint is shown in detail in Figure 3.2-1.

Some wetlands on the IGCC Power Station Footprint and Buffer Land would be impacted by the Phase I and II Developments. Information on the environmental sitting and potential impacts from Mesaba One and Mesaba Two are discussed in detail in Section 8 and in Sections 2 and 3 of the ES.

2.6.2 Associated Facilities

Easements across public and private lands would be required for the Associated Facilities. Figures 2.1-4 and 2.1-5 show the location of the Associated Facilities on the East Range Site. Environmentally relevant details of the Associated Facilities required for the construction, maintenance, and operation of Mesaba One and Mesaba Two are presented in Section 3. Information on the current environmental setting of the Associated Facilities' corridors and the potential environmental impacts that would result from Mesaba One and Mesaba Two are discussed in Section 8. HVTL routes associated with the East Range Site are described below in Section 2.6.3 and the East Range Proposed Natural Gas Pipeline Route is discussed in Section 2.6.4.

2.6.3 HVTL Routes

The Applicant has investigated alternatives for the HVTL GOs for Mesaba One and Two at the East Range Site. As a result of this analysis, 345kV HVTLs have been selected for the East Range generator outlet facilities. In this approach, two unstaggered GO HVTLs are required to provide the necessary route diversity required by the (n-1) single failure criterion (see Section 2.2.1). The development of alternative transmission configurations to meet the Phase I and II IGCC Power Station outlet needs is discussed in the ES.

Three existing transmission lines emanate from the Syl Laskin Energy Center ("Laskin"), located approximately two miles southwest of the Station Footprint, and connect with the Forbes and Virginia Substations. Figure 2.6-3 shows the three 115kV lines that connect the Laskin Substation (34L, 38L, and 39L) with these substations. All three of these lines are candidates for replacement with new double circuit structures to carry the IGCC Power Station's GO HVTLs and the existing 115kV HVTLs.

Figure 2.6-4 is a milepost map showing the East Range Preferred and Alternate HVTL Routes for interconnecting Mesaba One and Two to the Forbes Substation POI. Significant receptors along each route are shown in Figure 2.6-5.

Figure 2.6-2 Topography of East Range IGCC Power Station Footprint and Buffer Land

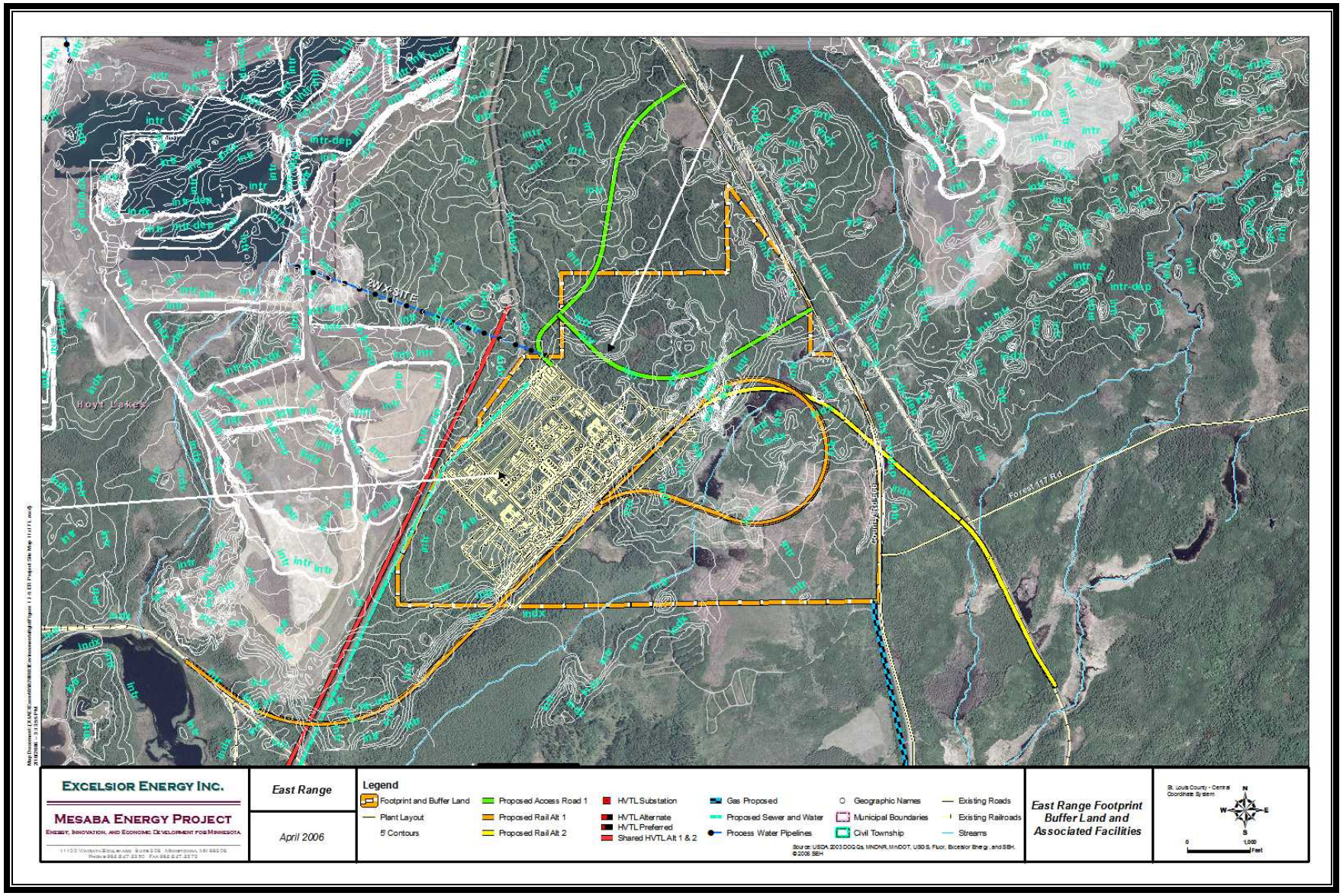


Figure 2.6-3 Existing HVTL Corridors Between the East Range Site and the Forbes Substation

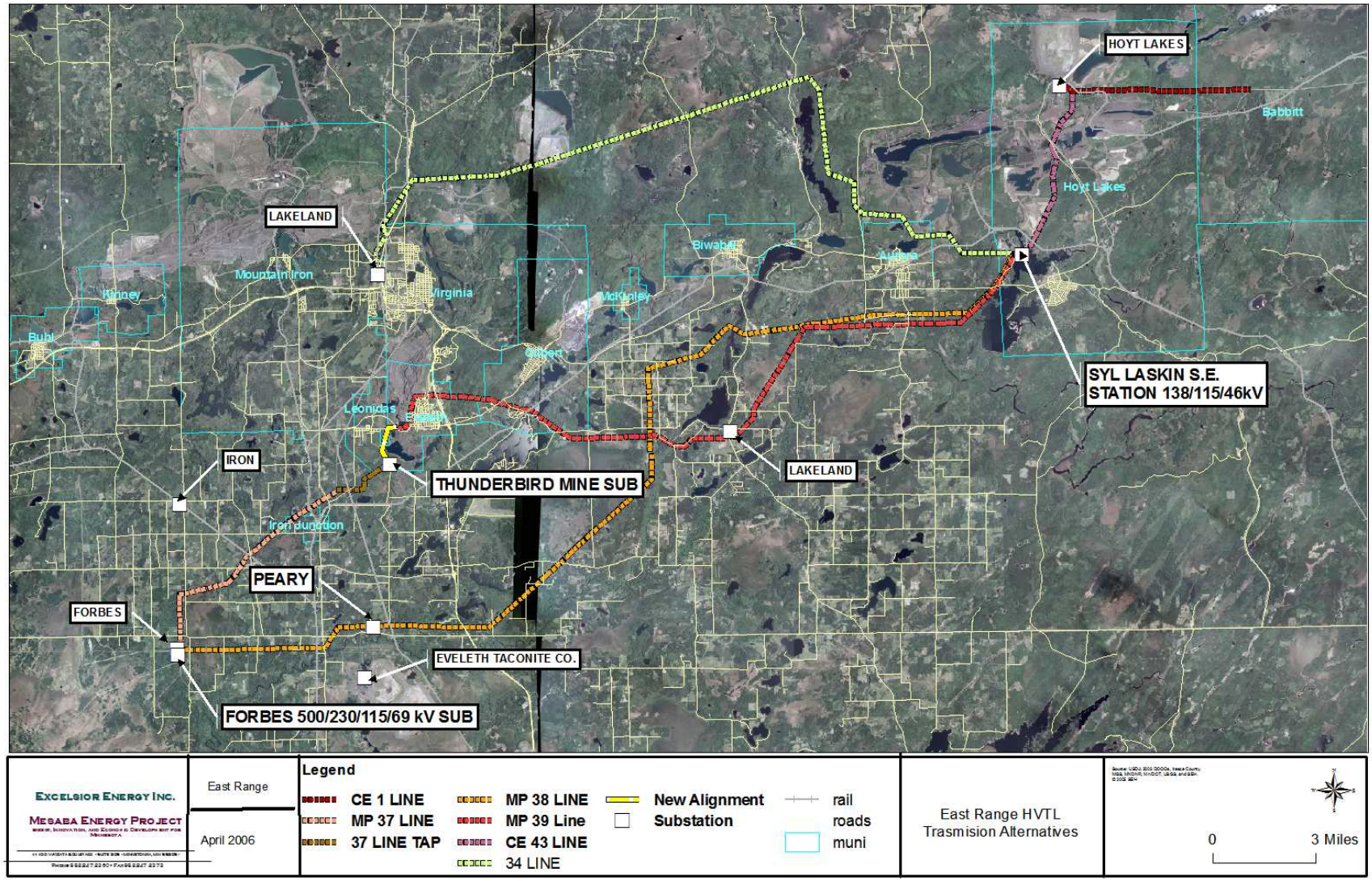


Figure 2.6-4 East Range Preferred and Alternate HVTL Routes and Proposed Natural Gas Pipeline Route with Milepost Indicators

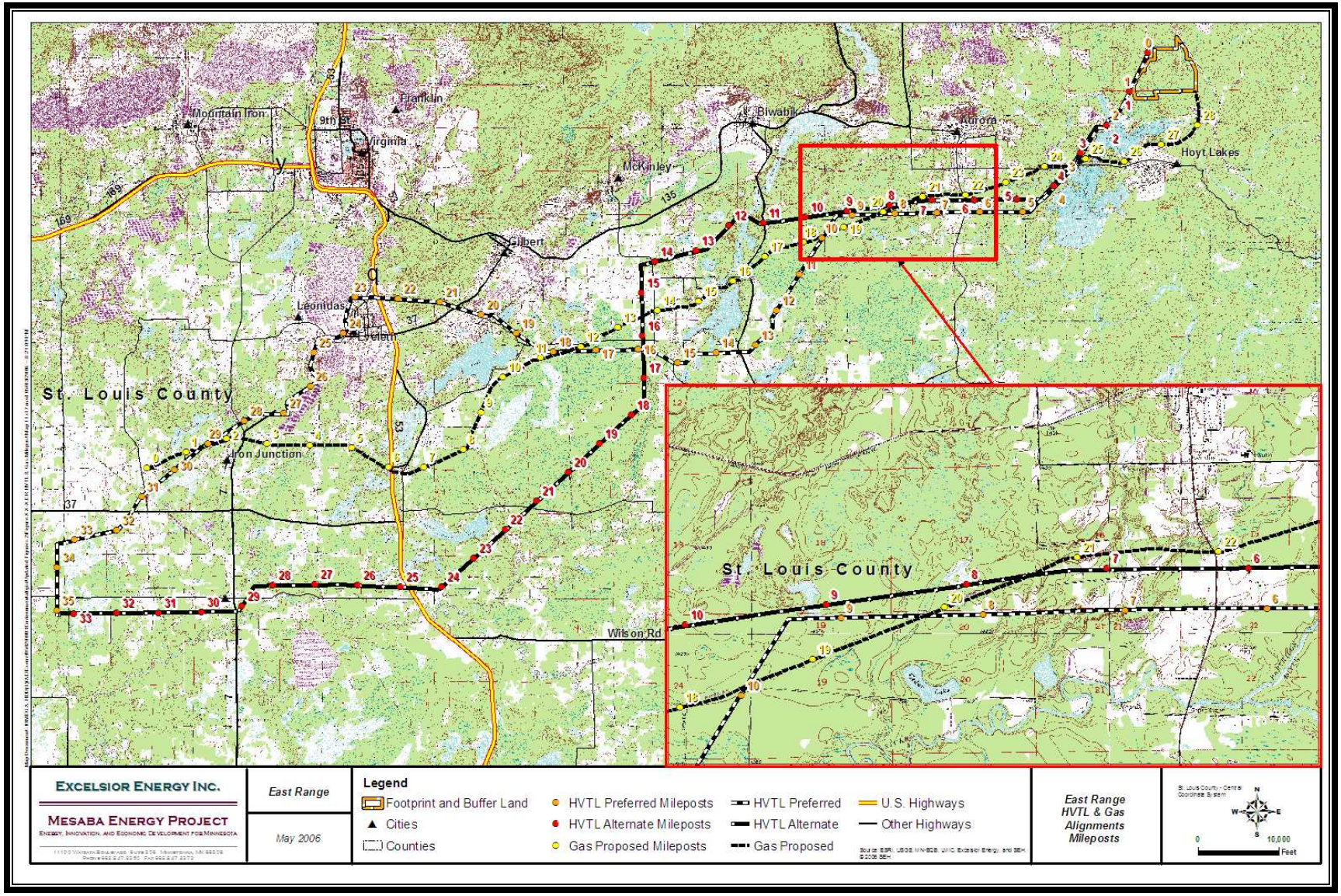
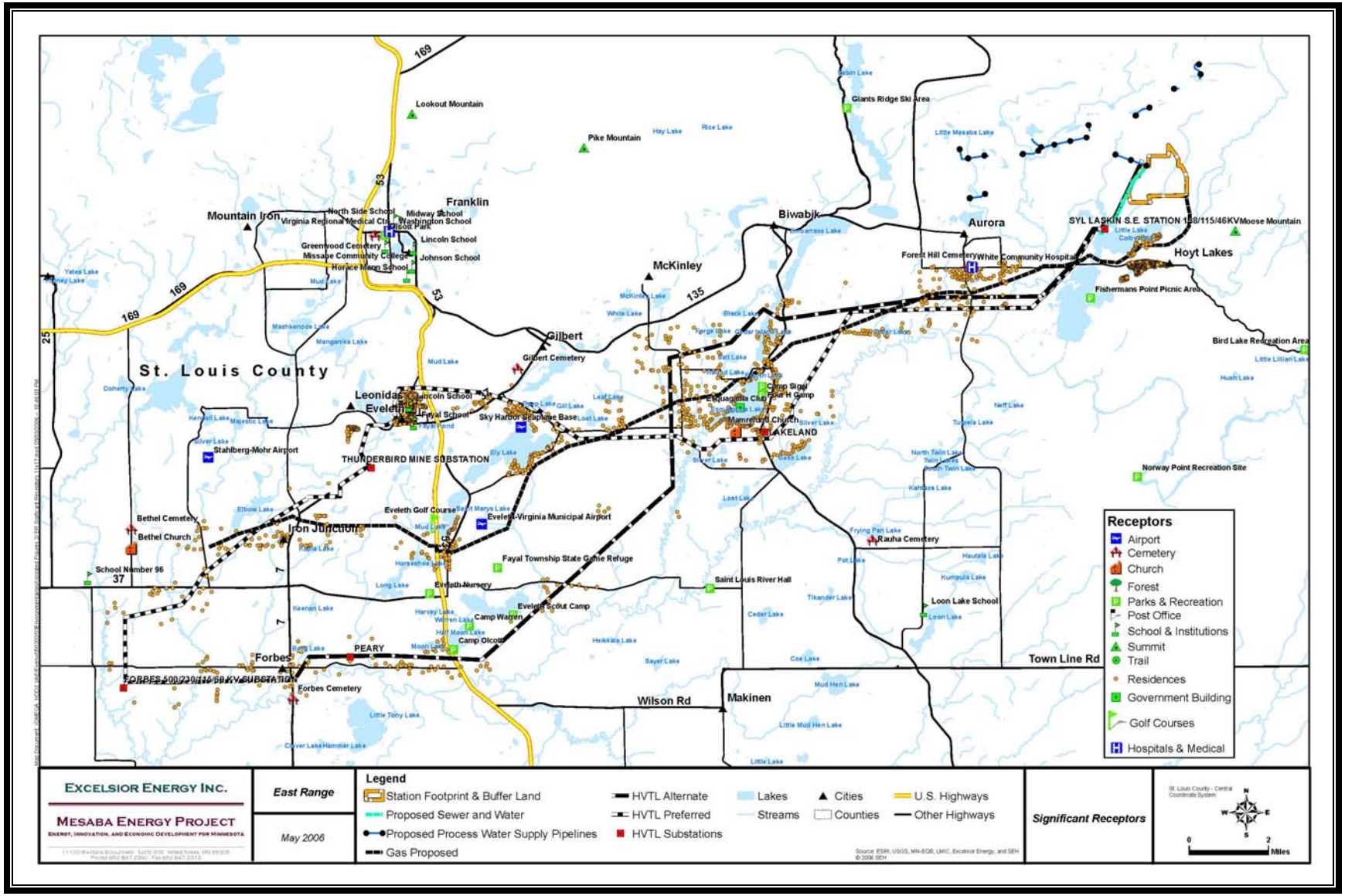


Figure 2.6-5 Significant Receptors Along the East Range Preferred and Alternate HVTL Routes and the Proposed Natural Gas Pipeline Route



The 38L interconnects directly to the Forbes Substation, is about 33 miles in length, is rated at 149 MVA[4], and has one intermediate distribution load service substation (the Peary Substation) to maintain service during potential reconstruction. For the 39L and 34L routes that connect to the Virginia Substation, there are existing 115kV lines (37L direct to the Forbes Substation and 16L/18L to the Forbes Substation via United Taconite) that could be reconstructed as double circuits to support the direct routing of the GO HVTLs to the Forbes Substation. The lengths of the GO lines utilizing these routes are 35.5 miles on the 39L/37L route and 39 miles on the 34L/16L/18L route. The possibility of routing the 34L into the Virginia Substation using existing HVTL routes is not deemed to be a practical alternative given the present spatial constraints that arise from too many HVTLs converging into a narrow corridor and the substation's limited potential to expand. Therefore, the most likely option for use of the 34L corridor is to re-route the corridor around the Virginia Substation. This would defeat the rationale for using existing corridors and, therefore, the Applicant limited the HVTL routes it considered to the 39L/37L and 38L options.

To minimize the impact of the IGCC Power Station on the already constrained 115kV transmission system between the Laskin Substation and the Forbes Substation, the Applicant would avoid removing either the 39L/34L or 38L HVTLs from service without providing a replacement HVTL option.

2.6.3.1 Preferred HVTL Route 2

The East Range Preferred HVTL plan includes the construction of two 345kV HVTLs in separate corridors. The first corridor emanates southwest from the Station Footprint past Laskin to the Forbes Substation, approximately 35.5 miles distant. This route follows the existing 39L/37L ROW along most of its length as shown in Figure 2.6-4. The first two miles of this route are on new ROW along 43L. The next 23.6 miles parallel with the existing 39L and in the form of a 345kV/115kV double circuit line carried on single pole structures shown in Figure 4.3-18.. The existing 39L 115kV HVTL would be moved to the new structures and comprise the 115kV circuit on the new line. The next 2 miles would carry a single 345kV circuit on new ROW connecting to 37L at the Thunderbird Mine Substation. From the Thunderbird Mine Substation and along the next 7.4 miles to the Forbes Substation, the line will parallel the existing 37L line and would be a 345kV/115kV double circuit line. The existing 37L line would be moved to the new structures and comprise the 115kV circuit on the new line. Figures 2.6-6 through Figures 2.6-12 show the 39L/37L route in a series of maps superimposed on aerial photos.

The second 345kV transmission outlet travels southwest from the Station Footprint past the Syl Laskin Energy Center to the Forbes Substation, a distance of approximately 35.5 miles. The first two miles would parallel the first segment on new right-of-way along 43L and carry a single 345kV circuit. The remaining 31 miles parallel the 38L line and would be a 345kV/115kV double circuit line. The existing 38L line would be moved to the new structures and comprise the

[4] Minnesota Power, 2003. "Navitas Energy Wind Generation, G-239 Impact Study," October 10, 2003, Generation Interconnection Request #37715-01.

115kV circuit on the new line. Figures 2.6-11 through 2.6-17 show the 38L route in a series of maps superimposed on aerial photos.

The sequence that would allow construction of the new lines without disrupting existing service will require that an additional 30 feet of ROW be acquired immediately adjacent to either the 39L/37L ROW or the 38L ROW. The design, configuration and construction sequencing of the proposed line is described in detail in Section 4. Information on the environmental setting the existing 39L/37L route and the potential environmental impacts of associated with acquiring an additional 30 feet along its entire length are discussed in Section 8.

2.6.3.2 Alternate HVTL Route 1

In accordance with Minn. Stat. §§ 116C.51 to 116C.69 of the Minnesota Power Plant Siting Act and Minn. R. 4400.1150 subps. 2C, at least one alternate route must be proposed if the HVTL exceeds 200kV, is five miles or greater in length, and less than 80 percent of the HVTL is located along existing HVTL rights of way (Minn. R. 4400.2000, subps. 1D and 1E). Although the applicant is thus not required to propose an alternative route because the preferred alternative is at least 80 percent located along an existing ROW, the Applicant, nonetheless, believes it is appropriate to propose an alternate route for consideration.

The East Range Alternate HVTL Route 1 configuration includes the same two corridors as the preferred rout configuration. The difference between the alternate and the preferred route configurations is the HVTL along which the Applicant will acquire the additional 30 feet of ROW. For Alternate Route 1, an additional 30 feet of ROW would be acquired along the complete length of the 38L. Information on the environmental setting of the existing 38L route and the potential environmental impacts associated with acquiring an additional 30 feet of ROW are discussed in Section 8.

Figure 2.6-6 East Range Preferred HVTL Route 2 Along 39L/37L Route: Segment 1

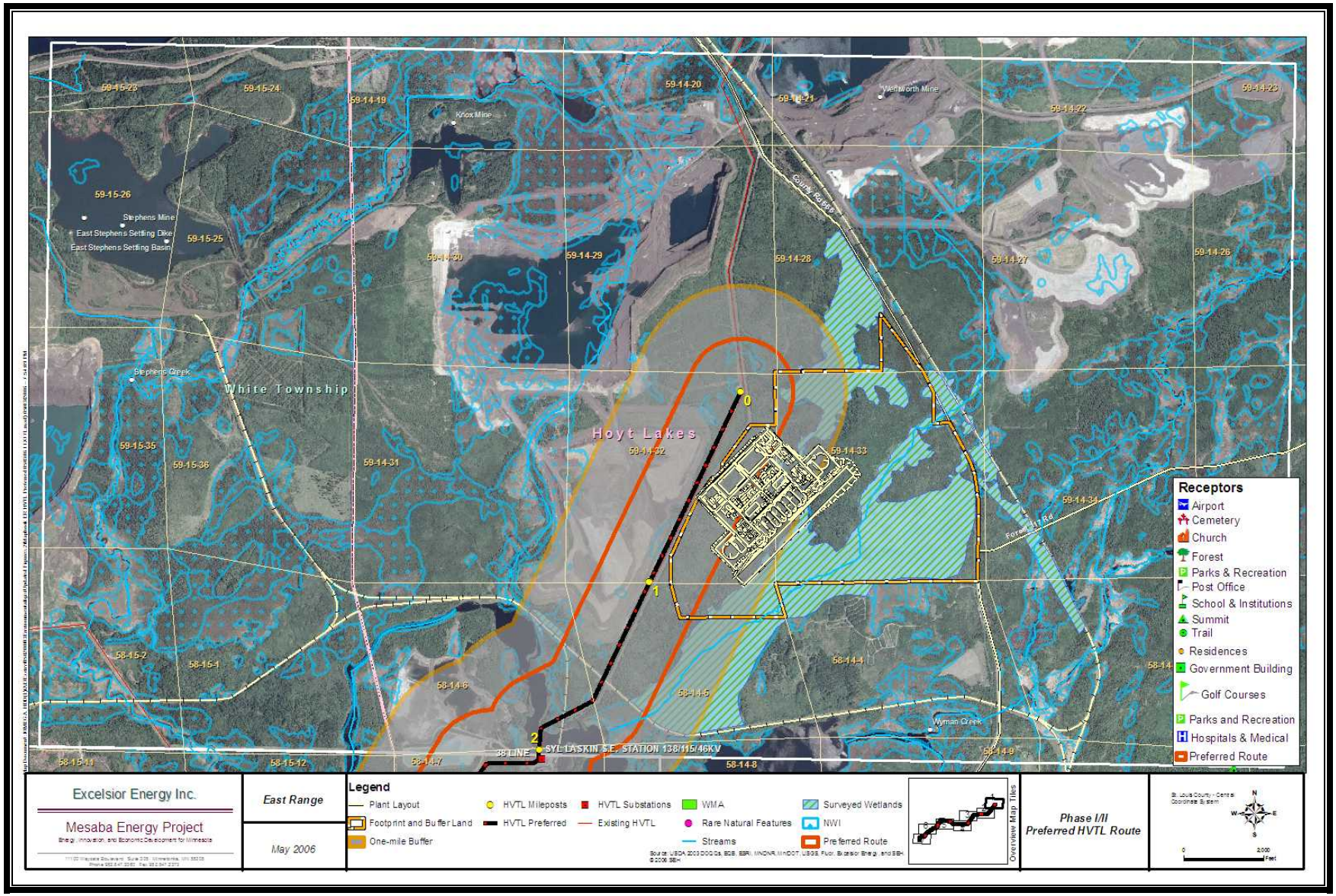


Figure 2.6-7 East Range Preferred HVTL Route 2 Along 39L/37L Route: Segment 2

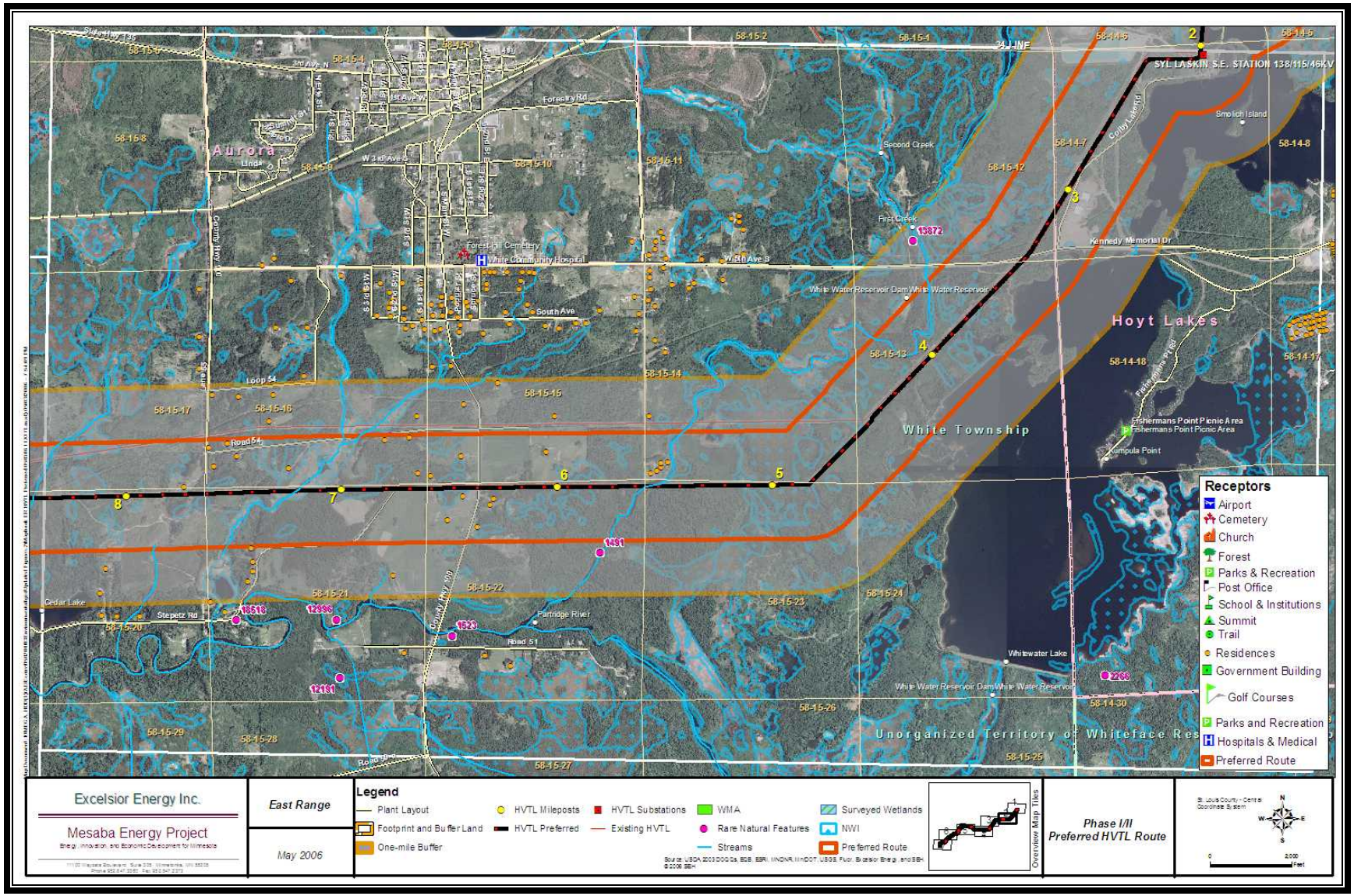


Figure 2.6-8 East Range Preferred HVTL Route 2 Along 39L/37L Route: Segment 3

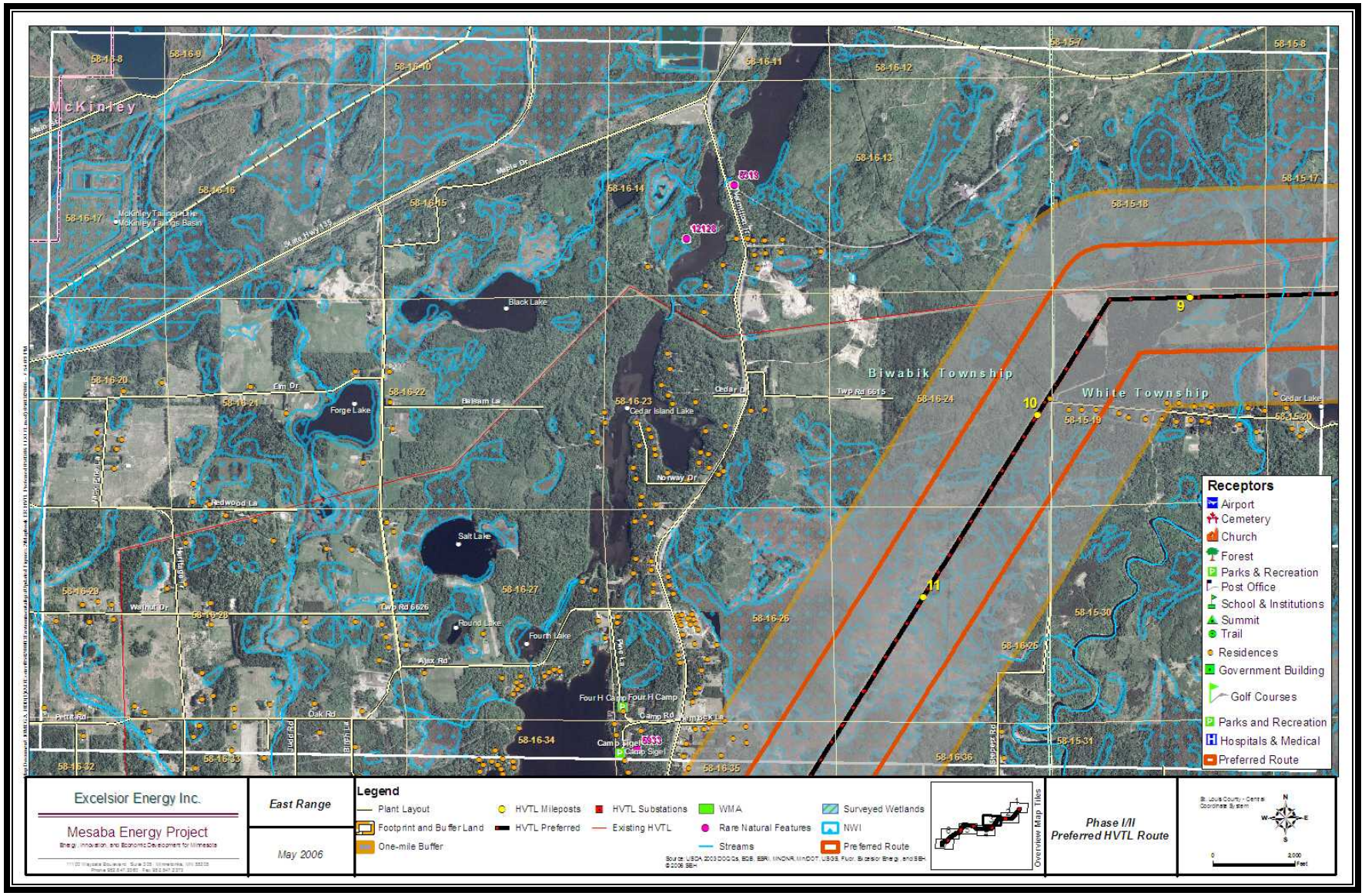


Figure 2.6-9 East Range Preferred HVTL Route 2 Along 39L/37L Route: Segment 4

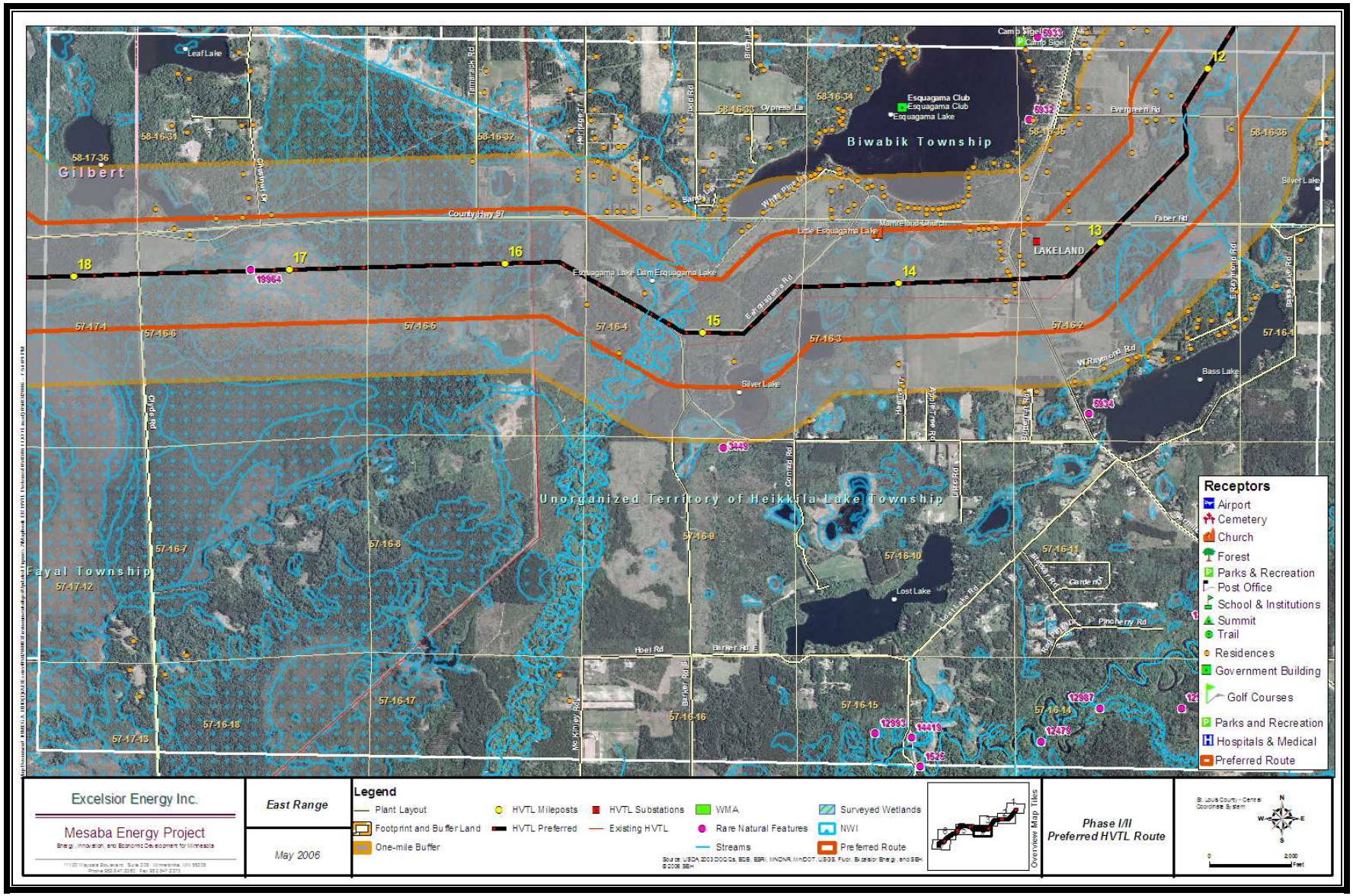


Figure 2.6-10 East Range Preferred HVTL Route 2 Along 39L/37L Route: Segment 5

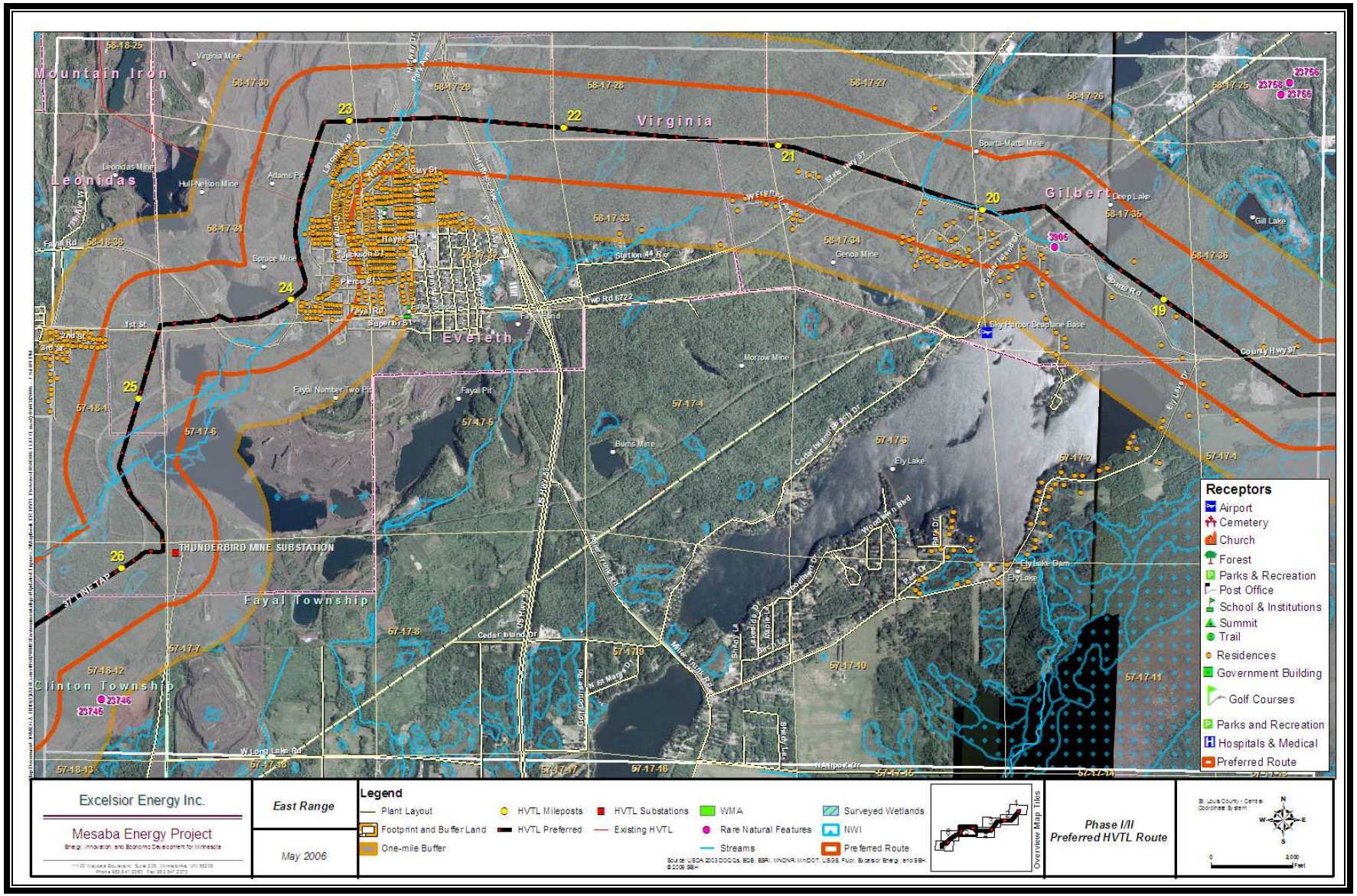


Figure 2.6-11 East Range Preferred HVTL Route 2 Along 39L/37L Route: Segment 6

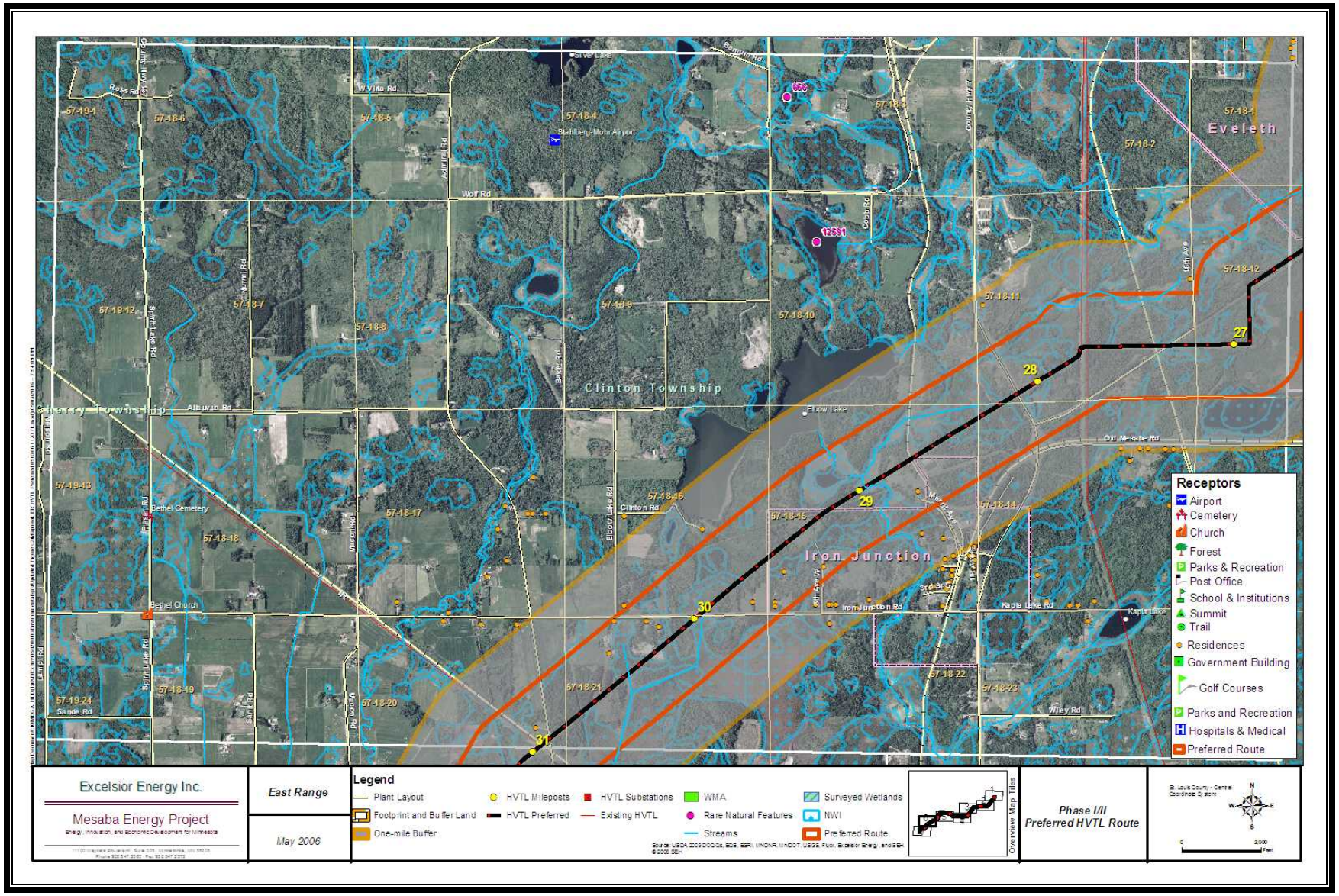


Figure 2.6-12 East Range Preferred HVTL Route 2 Along 39L/37L Route: Segment 7

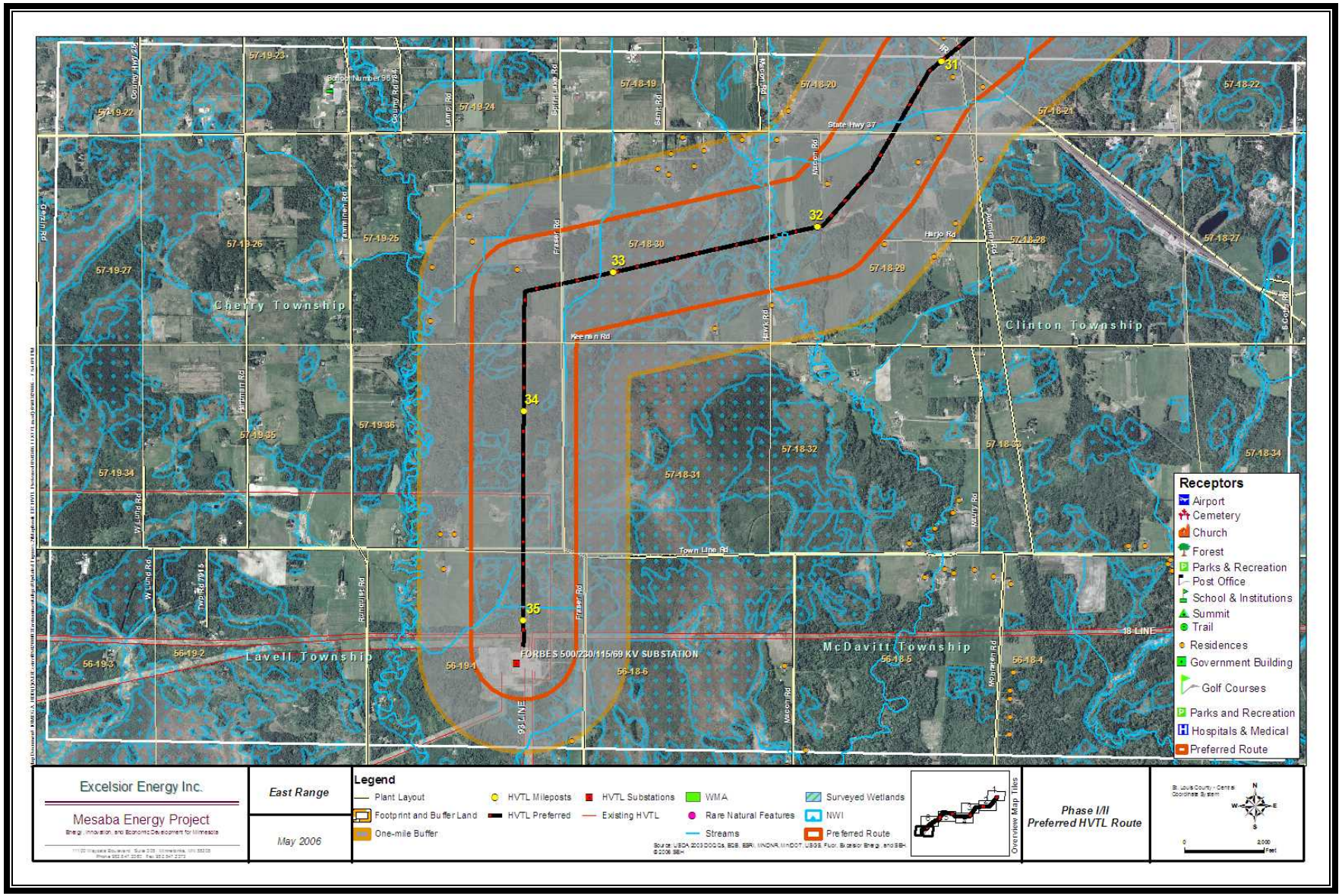


Figure 2.6-13 East Range Alternate HVTL Route 1 Along 38L Route: Segment 1

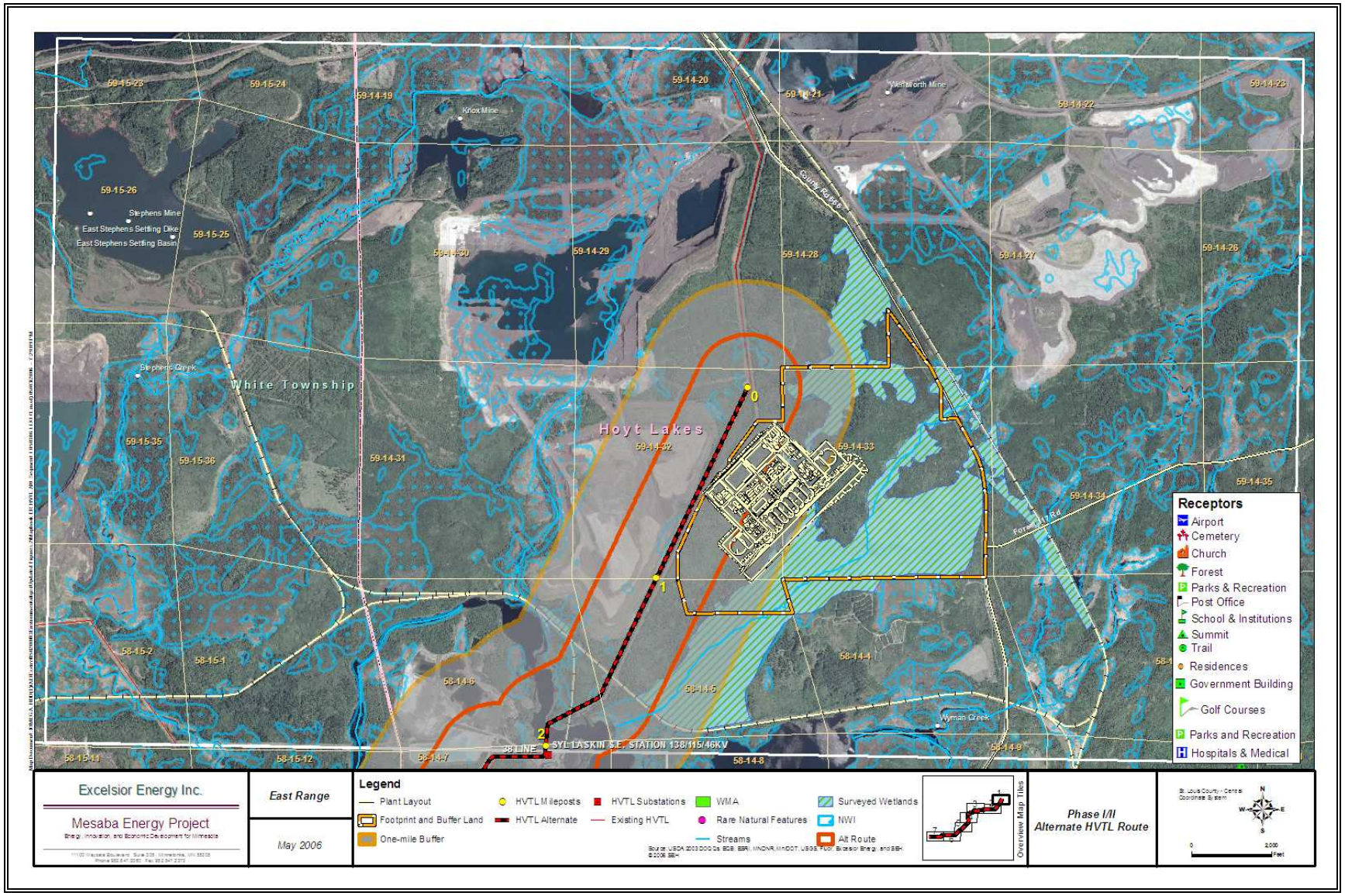


Figure 2.6-14 East Range Alternate HVTL Route 1 Along 38L Route: Segment 2

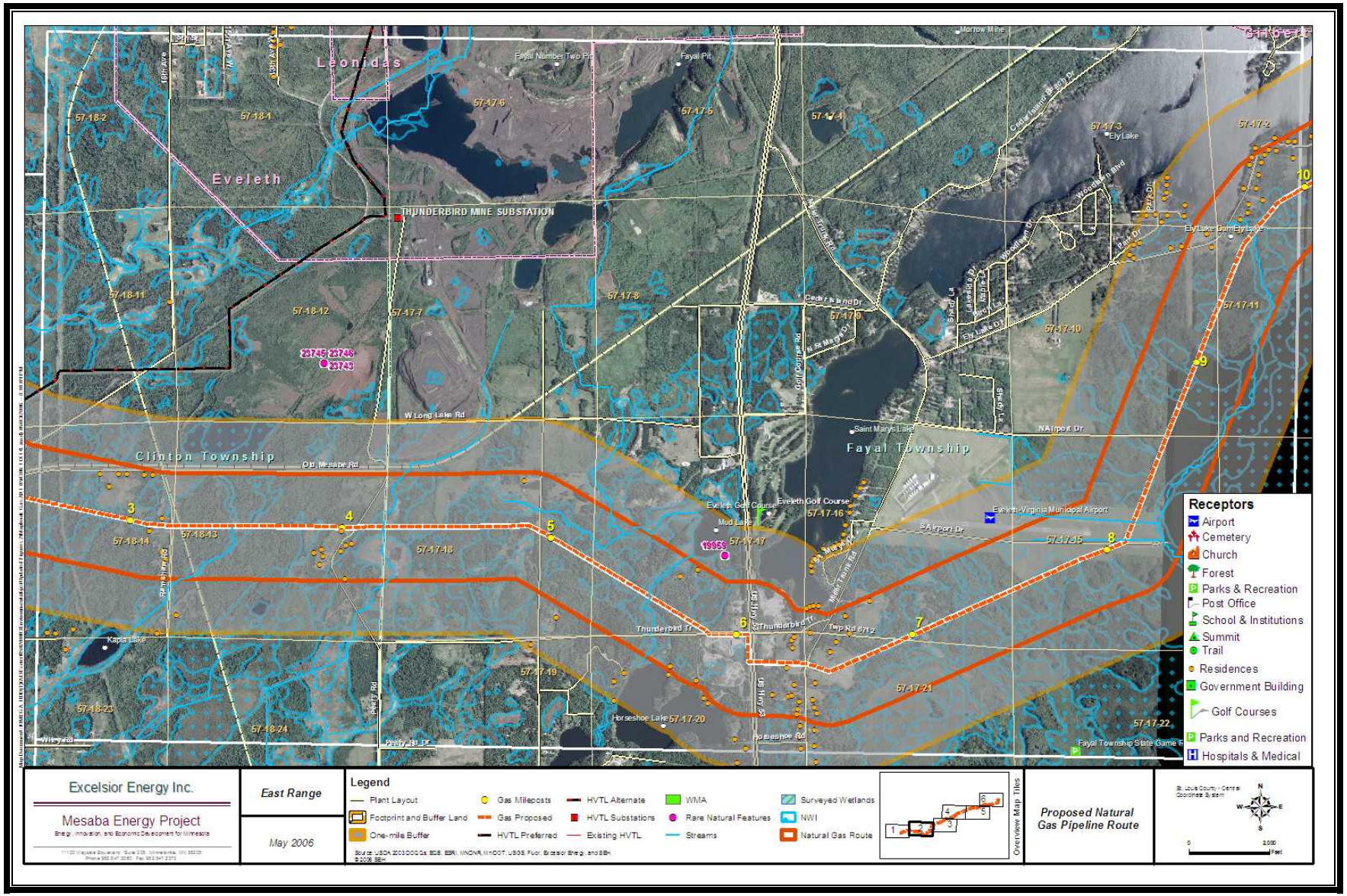


Figure 2.6-15 East Range Alternate HVTL Route 1 Along 38L Route: Segment 3

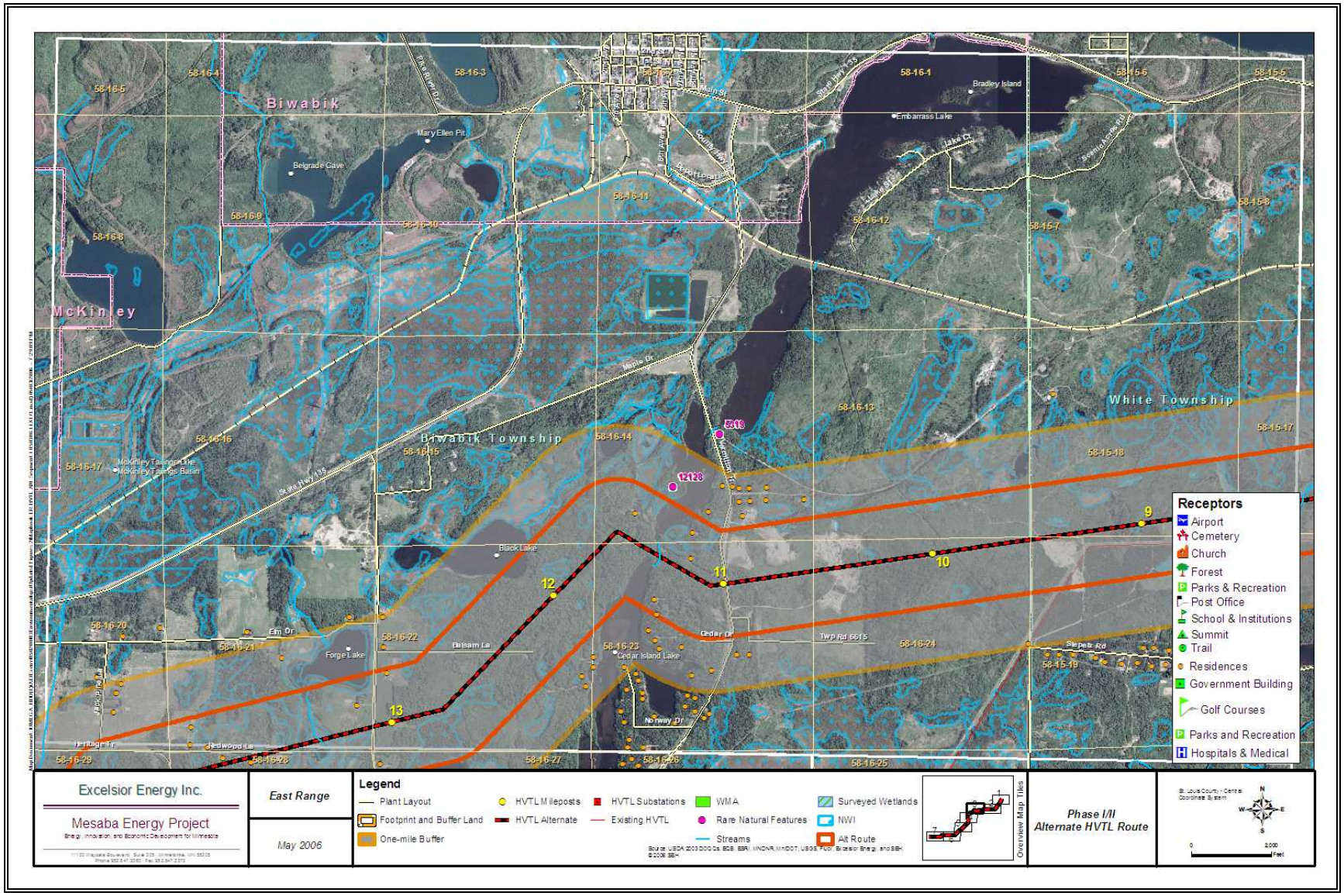


Figure 2.6-16 East Range Alternate HVTL Route 1 Along 38L Route: Segment 4

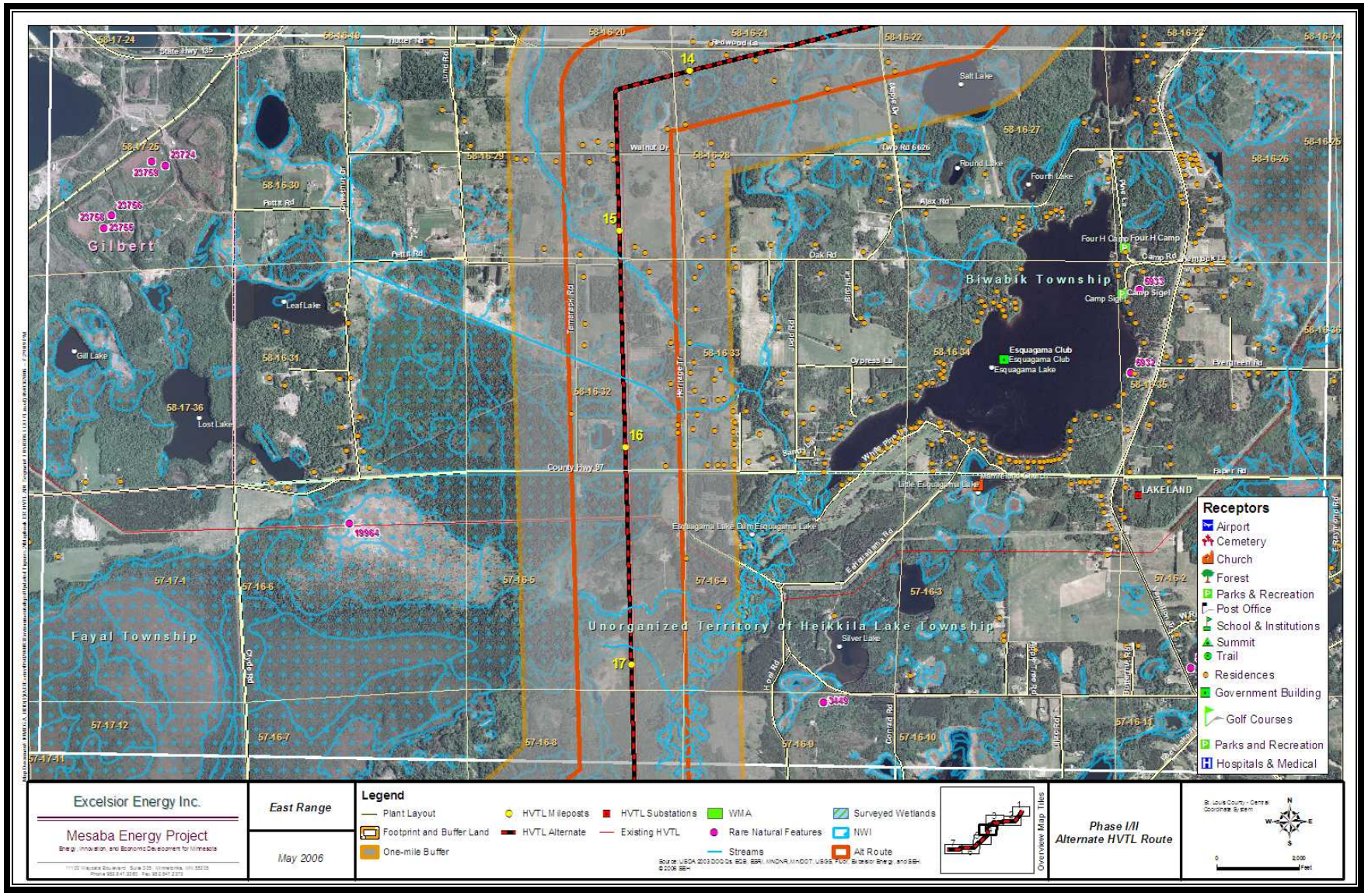


Figure 2.6-17 East Range Alternate HVTL Route 1 Along 38L Route: Segment 5

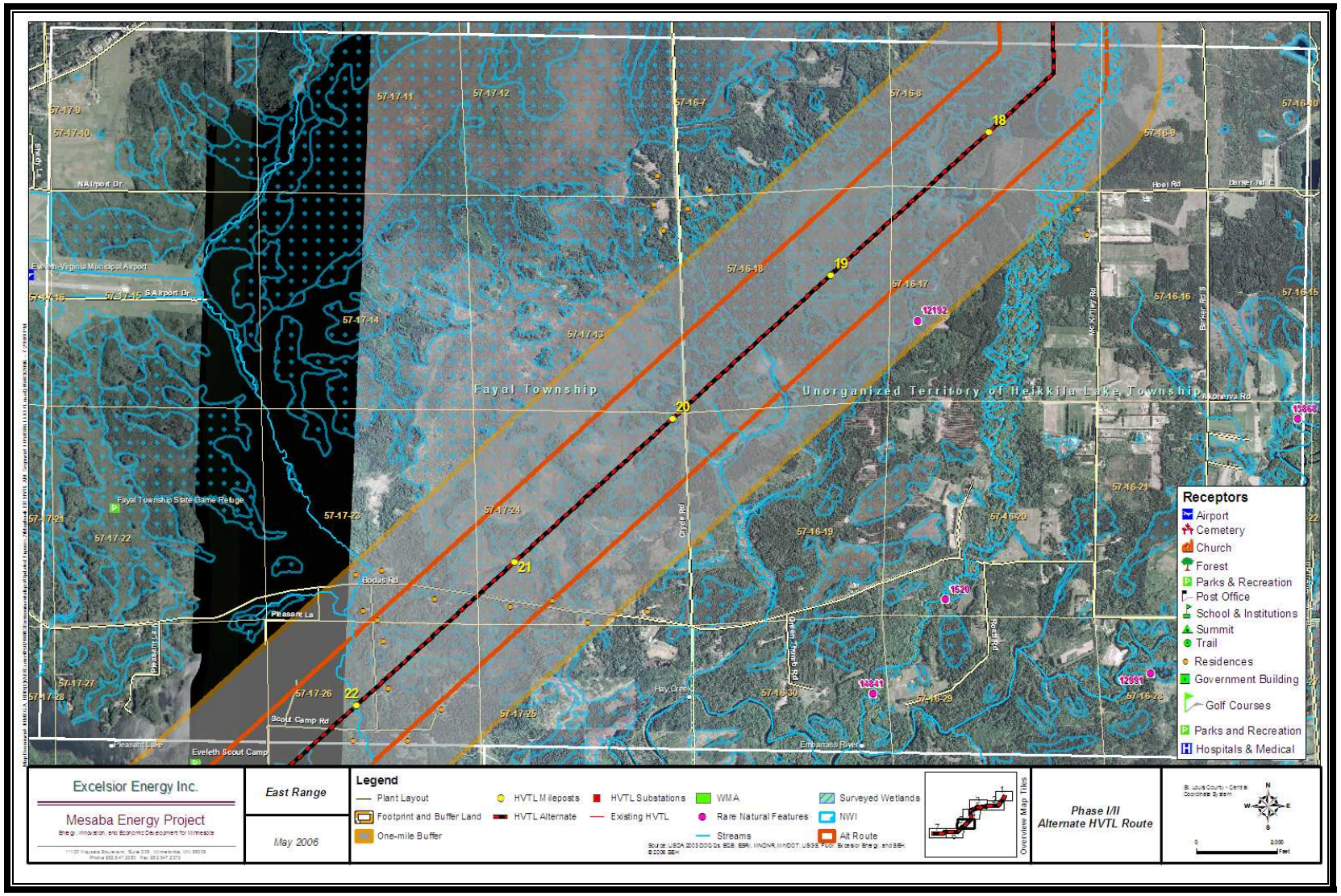


Figure 2.6-18 East Range Alternate HVTL Route 1 Along 38L Route: Segment 6

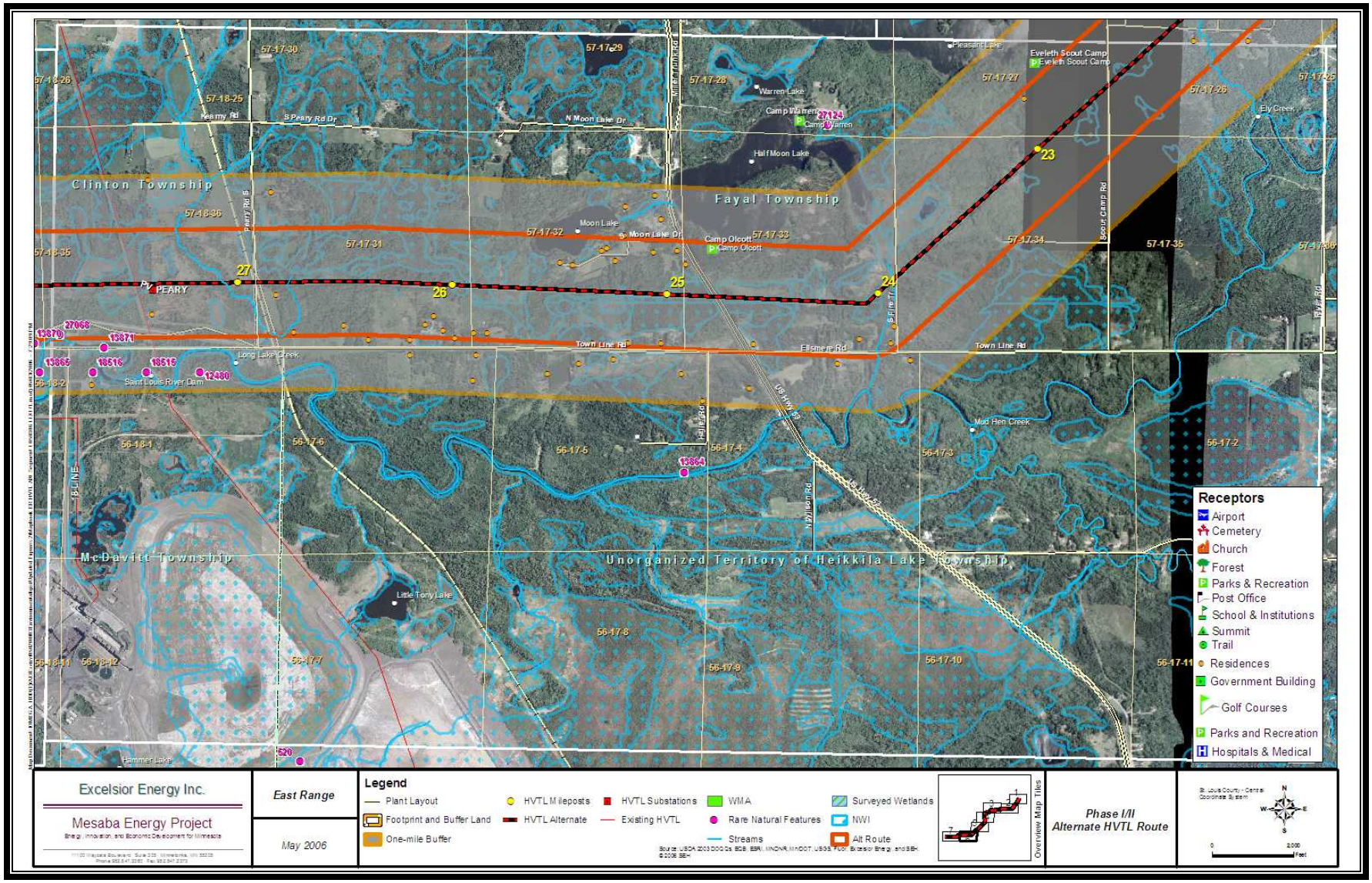
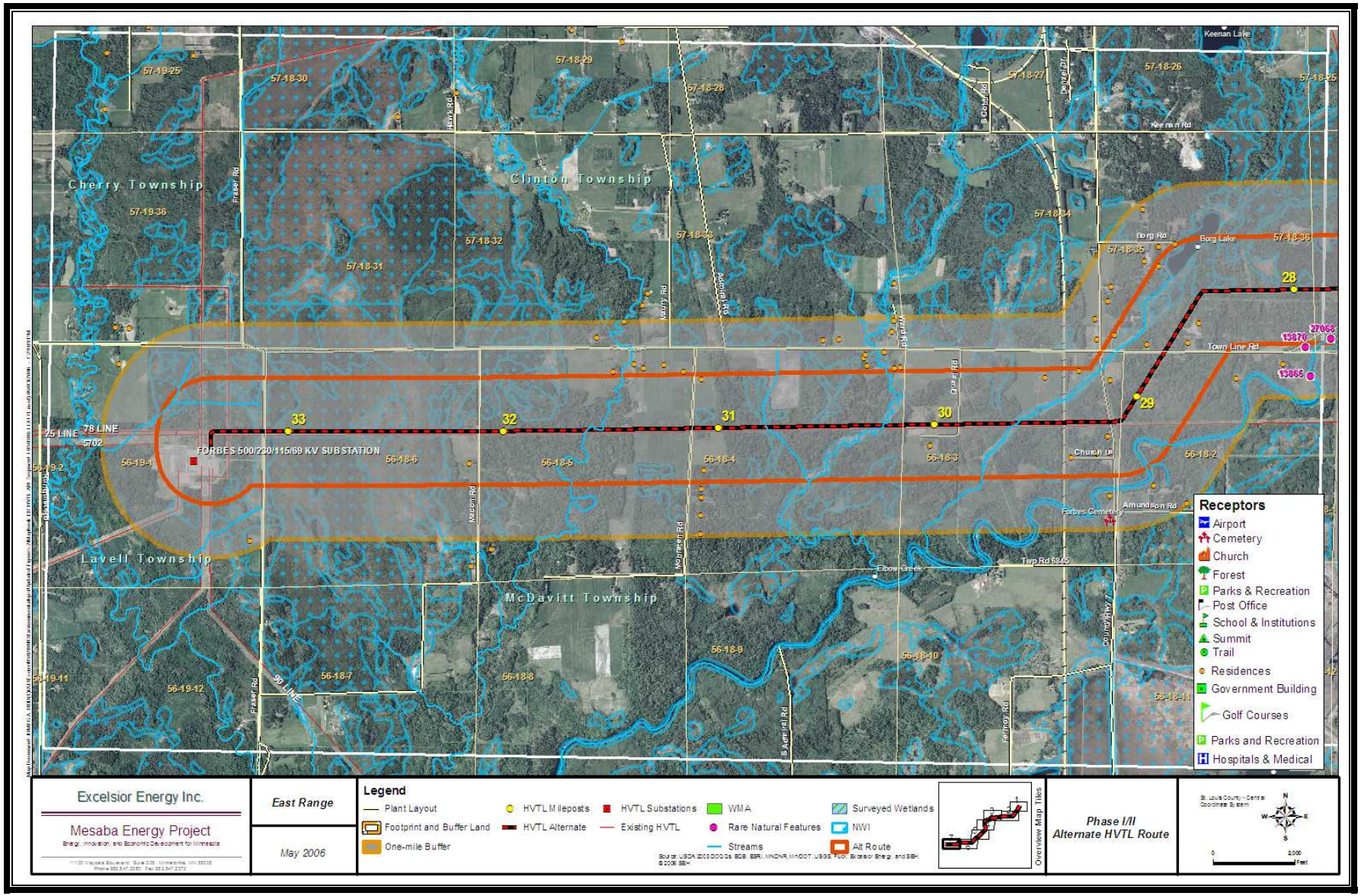


Figure 2.6-19 East Range Alternate HVTL Route 1 Along 38L Route: Segment 7



2.6.4 Natural Gas Pipeline Route

NNG represents the only feasible option for supplying Mesaba One and Two with natural gas as it is the only pipeline company within the immediate vicinity of the East Range Site. NNG's existing pipeline serves CE (and the former LTV mining operation) and abuts the IGCC Power Station Footprint on its eastern boundary. The diameter of the NNG pipeline at the point of its interconnection near Carlton, Minnesota with the GLG pipeline is 20-inches. From Carlton, NNG's line generally travels northward until it reaches the junction of St. Louis CR 454 and CR 315 about one mile west of Iron Junction, Minnesota. From there, the pipeline branches into two pipelines. One of the two branches is a 12" pipeline that serves the Hibbing area, and the second is a 10" branch line that travels past the eastern boundary of the East Range Buffer Land to serve Cliffs Erie. In order to provide natural gas in the quantity and at the pressure required to supply the Project's two phases, the following will be required:

- Installation of approximately 33 miles of new, 16-24-inch pipe placed alongside the existing 10-inch branch line now serving CE.
- Addition of a new compressor at the existing point where the GLG and NNG pipelines interconnect.
- Installation of an ultrasonic meter facility to serve IGCC Power Station.

Figures 2.6-18 through 2.6-24 present an overview of NNG's existing natural gas pipeline route from the pipeline tap near Iron Junction, Minnesota to the IGCC Power Station. Significant receptors are shown along the pipeline route in the series of figures presented. Table 8.2-2 shows the number of residences and special receptors (churches, hospitals, cemeteries, etc.) located within a one-half mile band on each side of the centerline of the Proposed Natural Gas Pipeline Route.

Figure 2.6-20 East Range Natural Gas Pipeline Milepost Map

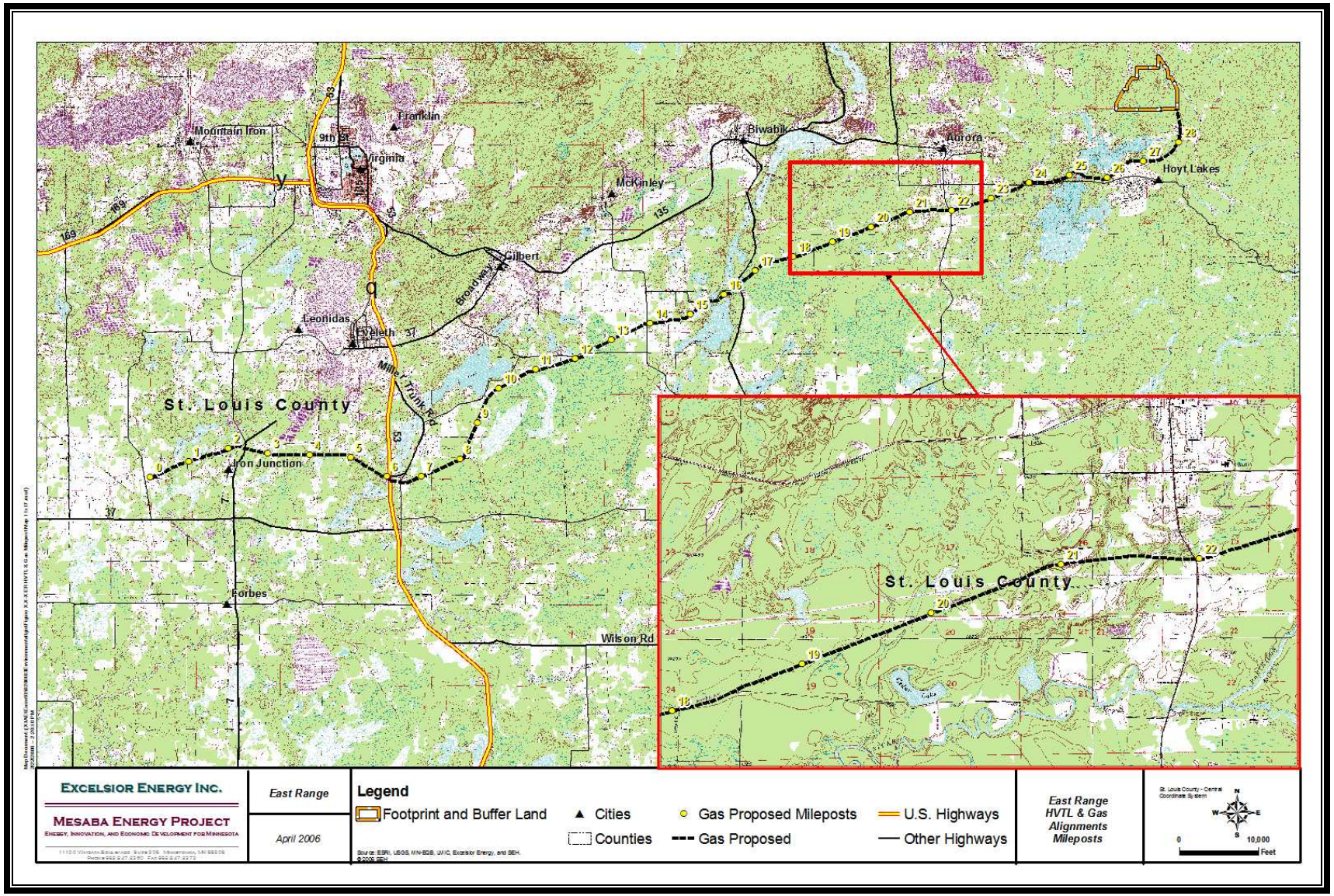


Figure 2.6-21 East Range Proposed Natural Gas Pipeline Route: Segment 1

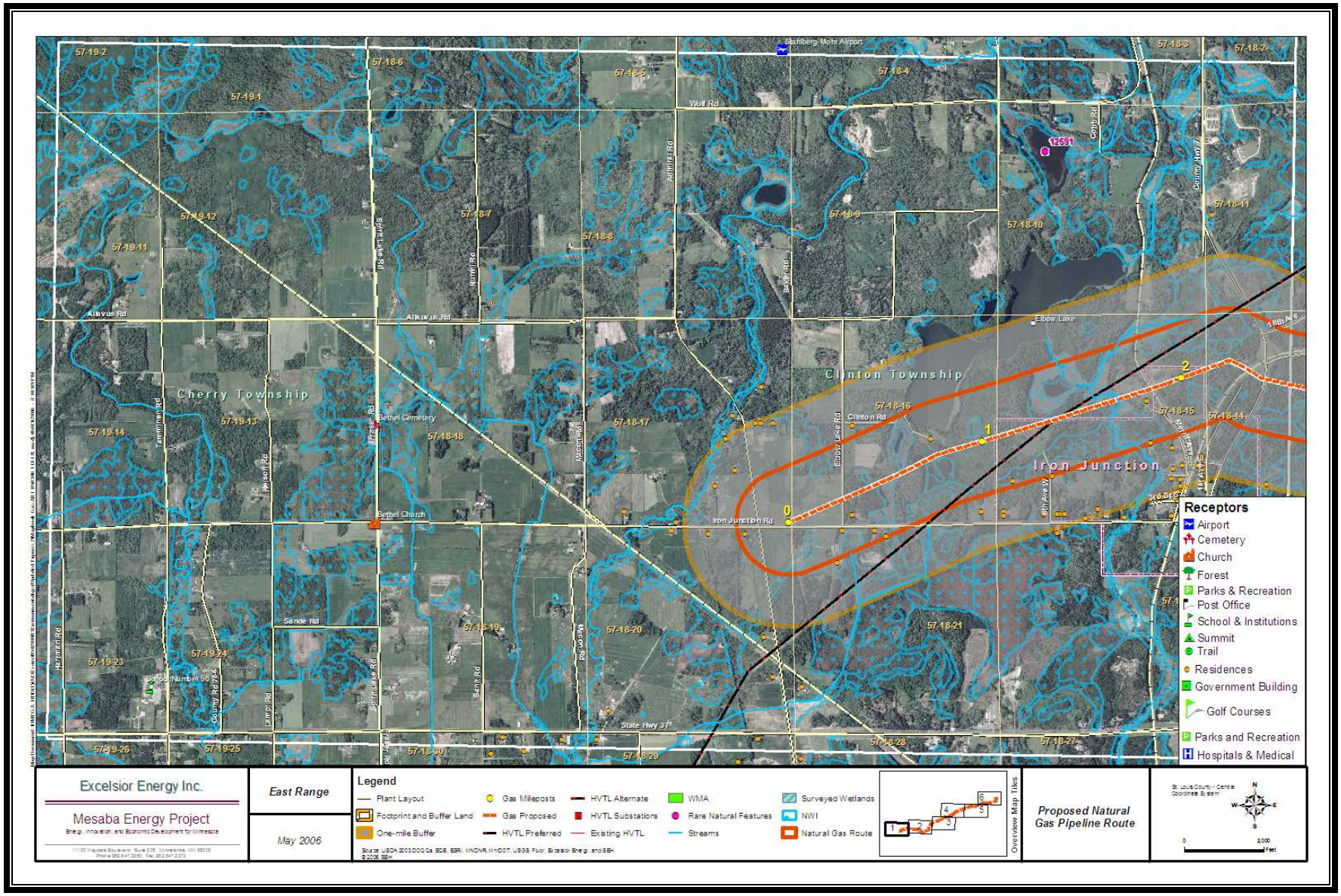


Figure 2.6-22 East Range Proposed Natural Gas Pipeline Route: Segment 2

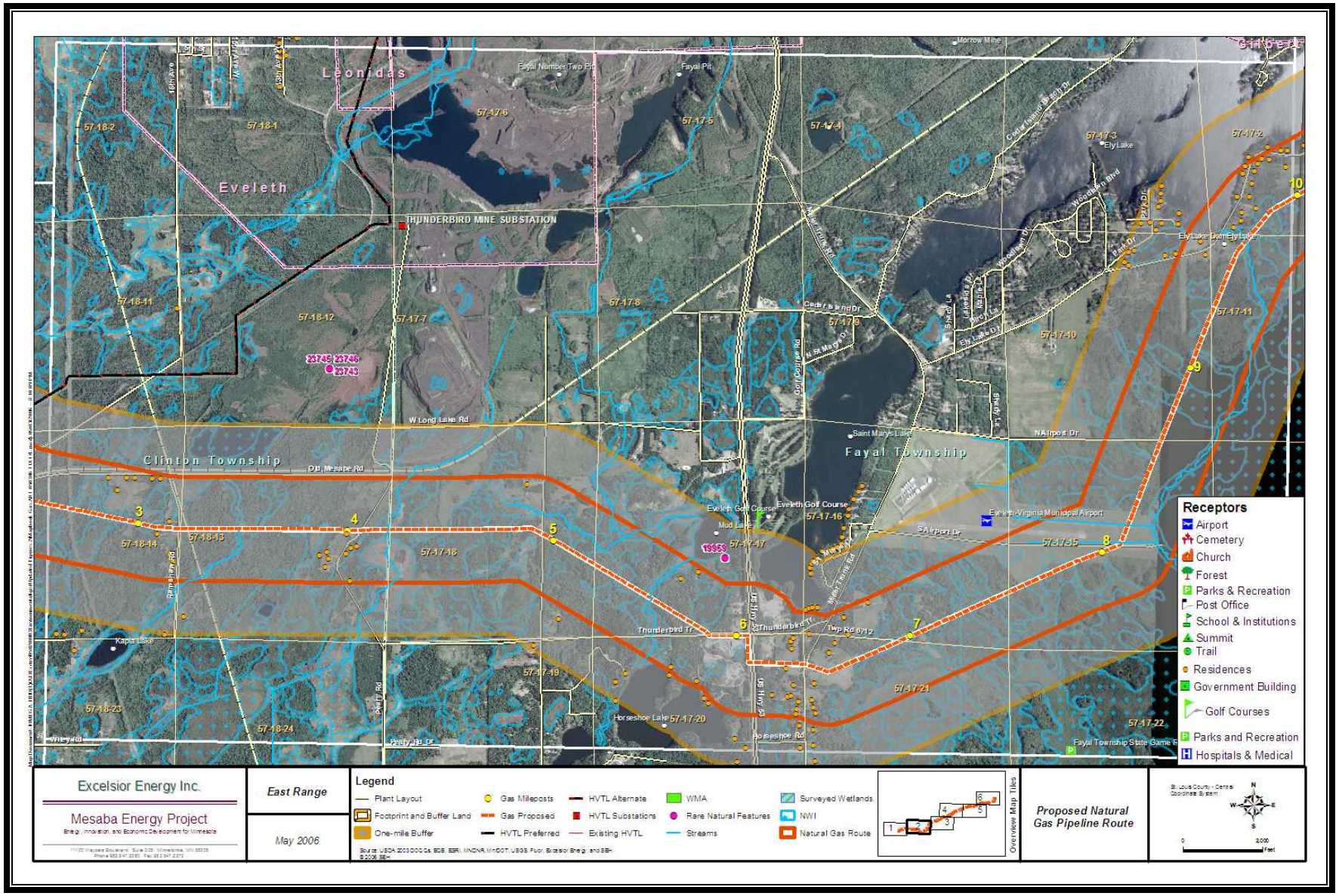


Figure 2.6-23 East Range Proposed Natural Gas Pipeline Route: Segment 3

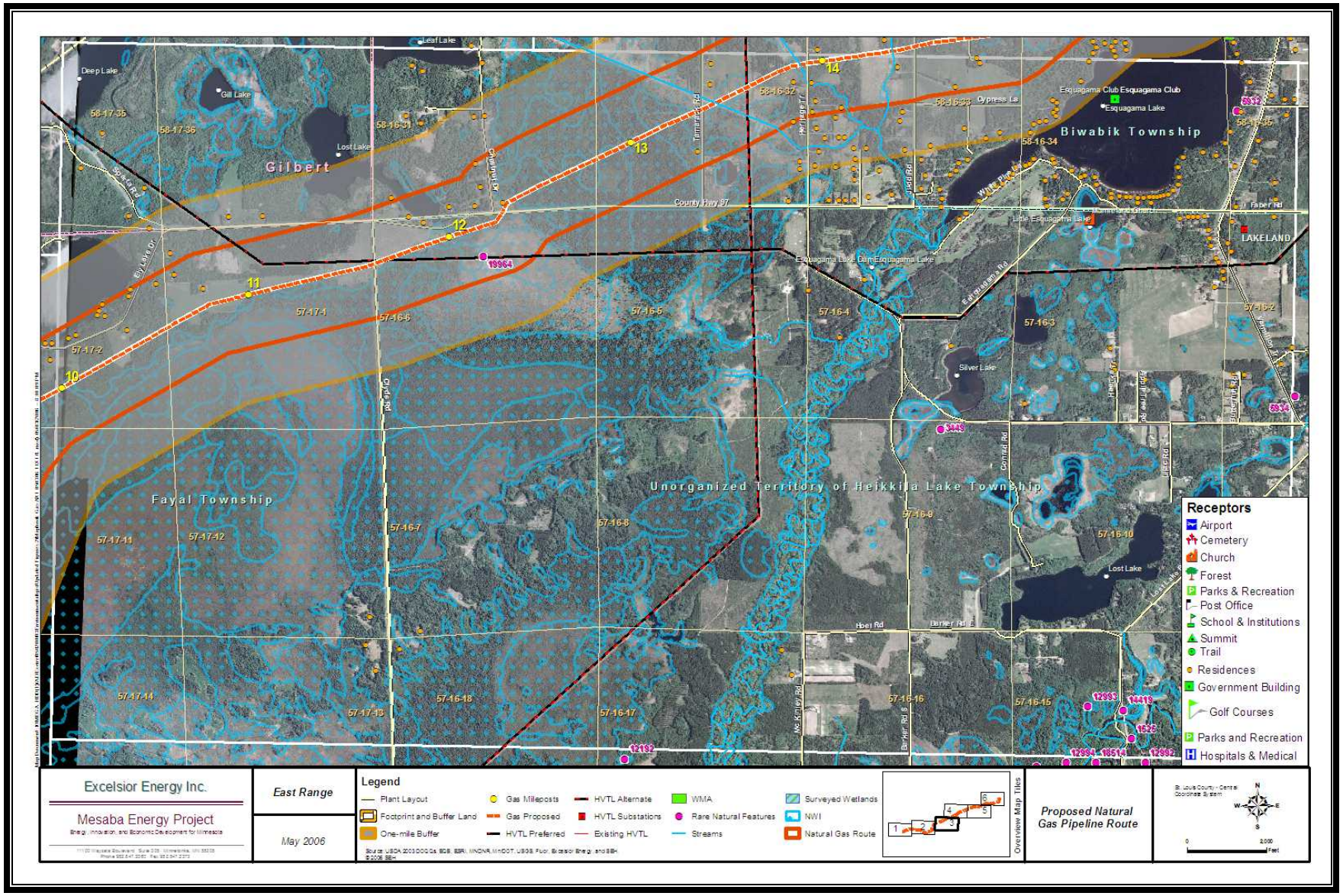


Figure 2.6-24 East Range Proposed Natural Gas Pipeline Route: Segment 4

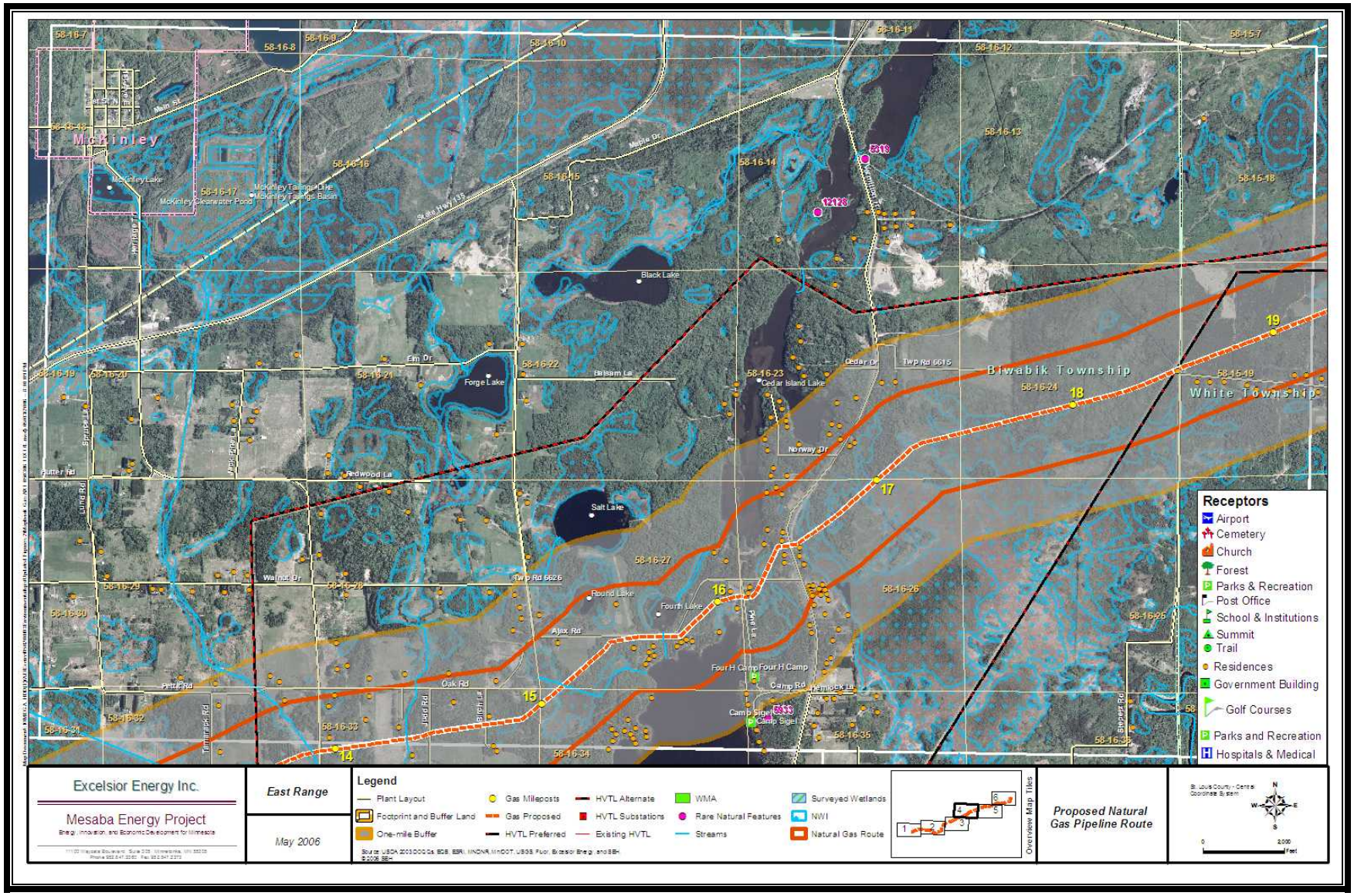


Figure 2.6-25 East Range Proposed Natural Gas Pipeline Route: Segment 5

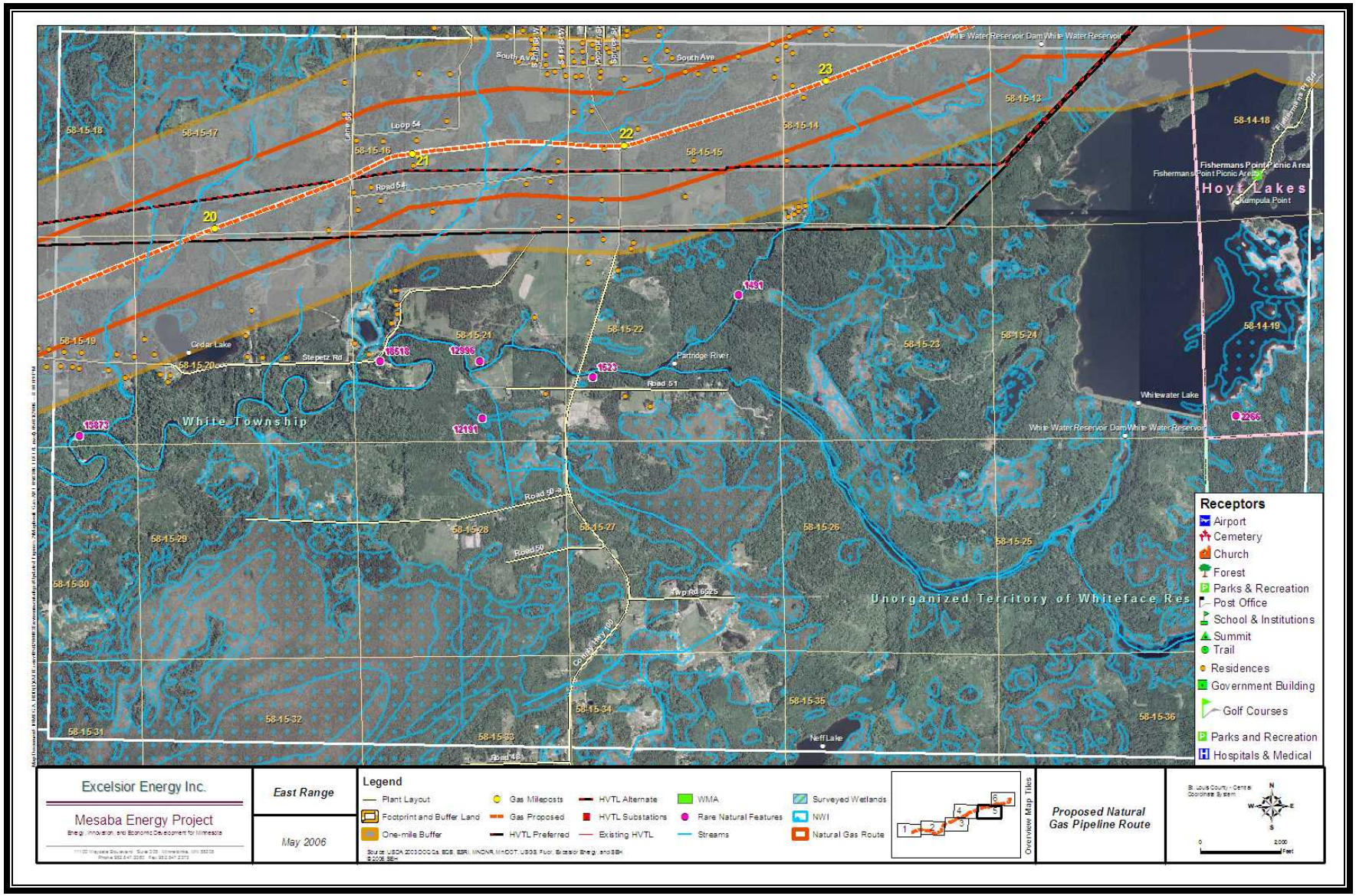
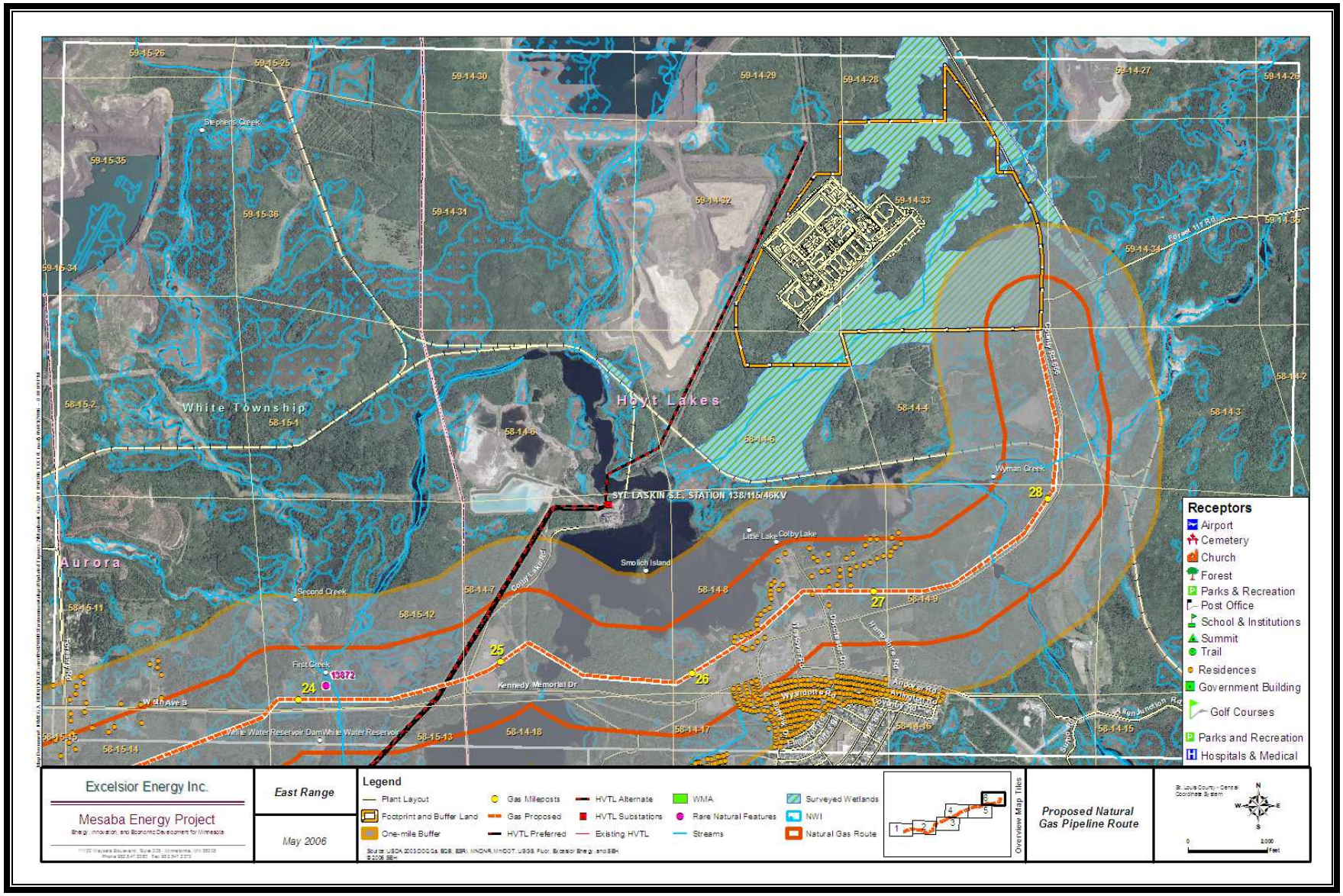


Figure 2.6-26 East Range Proposed Natural Gas Pipeline Route: Segment 6



2.7 SUMMARY COMPARISON OF WEST RANGE AND EAST RANGE SITES

This section compares the West Range and East Range Developments and demonstrates the reasons for the Applicant's preference of the West Range Site. Table 2.7.1 lists key environmental considerations based on the requirements outlined in the PPSA and Minn. R. ch. 4400 and key infrastructure considerations that were evaluated in comparing the preferred and alternate sites. Items marked with a "+" indicate that the physical location under consideration demonstrates environmental characteristics that are decidedly favorable. An "O" indicates that the physical location demonstrates environmental characteristics that are acceptable, but neither decidedly favorable or unfavorable. Neither of the Sites demonstrate environmental characteristics that are decidedly negative.

Table 2.7-1 Comparison of West Range and East Range Sites

Elements of Comparison	West Range	East Range	Comments
Environmental Considerations			
Effects on Human Settlement			
Public health and safety	O	O	
Displacement	O	O	
Noise	O	+	Significant receptors around the East Range IGCC Power Station are further removed than the West Range receptors, reducing potential noise impacts, however, operations at both locations will be conducted in compliance with applicable Minnesota noise standards.
Aesthetics	O	O	East Range IGCC Power Station residents are further removed, but the Station will be more visible to them. West Range will have more passenger car traffic. West Range HTVL is shorter.
Socioeconomic impacts	O	O	
Cultural values	O	O	
Recreation	O	O	
Public services	+	O	The extension of City of Taconite water supply and sanitary sewer systems to serve the West Range Developments will also be able to serve new business or residential development. Power Station will serve as long-term flood control measure.
Effects on Land-based Economies			
Agriculture	O	O	
Forestry	O	O	
Tourism	+	O	West Range Station operating plans support Hill-Annex State Park Plans as a result of lowering water levels in the Hill-Annex Mine Pit.
Mining	O	O	Both West and East Range Phase I and Phase II Developments could provide potential synergies with new industrial entities.

Elements of Comparison	West Range	East Range	Comments
Effects on Archaeological and Historic Resources	+	O	The lowering of water levels in the Hill-Annex Mine Pit will benefit the Hill-Annex State Park by exposing historic mining features
Effects on the Natural Environment			
Air quality	+	O	Developments at both Stations will have very low pollution emissions, however, the East Range IGCC Power Station is less desirable given its closer proximity to the BWCA.
Water quality	O	+	The East Range IGCC Power Station will not discharge any process or cooling water because of ZLD system. The West Range IGCC Power Station discharges will be limited to non-contact cooling water; the pollutant mass discharged will be no greater than that currently permitted.
Solid waste	+	O	The East Range IGCC Power Station will generate up to 24,000 tons of salts per year from the evaporation of process water and cooling tower blowdown in the ZLD systems. The salts produced by the combined ZLD systems must be landfilled. Both Stations will produce marketable by-products.
Flora and fauna	O	O	
Effects on rare and unique natural resources	O	O	
Use of Existing Right-of-Way	O	O	The East Range HVTLs and natural gas pipeline will parallel existing ROWs over much of the length of new lines, however, 30 feet of new ROW will be required along the HVTL route. Approximately 30% of West Range Preferred HVTL Route will use existing ROWs. Use of existing natural gas pipeline rights-of-way on West Range will depend on whether Proposed Route or NNG options are selected.
Infrastructure Considerations			
Site	+	+	The footprint for both the West and East Range IGCC Power Stations are in areas reserved for the support of industrial development.
Electric Transmission	+	O	Shorter new HVTL is needed to connect the West Range IGCC Power Station with its POI.
Gas Supply	+	O	The West Range IGCC Power Station has three viable options supplying natural gas, the East Range has a single source available.
Water Supply/Wastewater	+	O	The West Range location has the need to draw from fewer water sources and will address the existing need for long-term flood control. The East Range Station will not discharge any wastewaters.

Elements of Comparison	West Range	East Range	Comments
Rail/Truck Transportation	+	O	Two railroad companies can immediately serve the West Range IGCC Power Station, providing competition for transportation of fuels, while the East Range Station can be initially served by only one railroad company.
Energy Efficiency	+	O	The efficiency of the East Range IGCC Power Station is reduced compared to the West Range Station due to the additional load from the cooling water ZLD system and higher transmission line losses.
Cost	+	O	The total capital cost of the Project is greater on the East Range Site compared to the West Range Site. *See* Section 2.8.

Minnesota Rule 4400.1150, subparts 3G. and 3H. require an applicant to identify human and natural environmental effects that cannot be avoided if the facility is approved at a specific site, describe measures that might be implemented to mitigate those potential human and environmental impacts, and estimate the costs of such mitigative measures. Potential effects on the human and natural environment from the IGCC Power Station and planned design and operational mitigative measures are described throughout this Application and more specifically in Section 7 (West Range Developments) and Section 8 (East Range Developments). Table 2.7-2 summarizes the most significant unavoidable effects and proposed mitigative measures associated with the IGCC Power Station at each of the proposed sites.

Table 2.7-2 Summary of Unavoidable Effects and Mitigative Measures

Unavoidable Human and Natural Environmental Effects	Mitigative Measures	Estimated Incremental Cost of Mitigative Measures
Common to Both Sites		
1. Taking/disturbance of Land	• Minimize disturbed areas through compact footprint design • Utilized common utility and transportation corridors • Parallel existing utility and transportation corridors	No incremental cost
2. Air emissions	• Minimized through use of IGCC technology and air pollution control equipment; provide basis for reducing importation of air pollutants from out of state	Inherently low polluting technology that is expected to be low cost over its life cycle
3. Aesthetic impacts of stacks and transmission towers	• Maintenance of tree buffers between IGCC Power Station and visual receptors • Parallel existing transmission lines	No incremental cost

Unavoidable Human and Natural Environmental Effects	Mitigative Measures	Estimated Incremental Cost of Mitigative Measures
4. Filling of wetlands	• Siting and routing to avoid and minimize to the extent feasible. Replace in accordance with permit conditions • Construction techniques designed to minimize impacts	See Section 2.8
5. Noise generation	• Comply with applicable noise level standards through employment of noise-dampening generating plant equipment	See Section 2.8 -
6. Increased train traffic	• Provide grade separation at intersections potentially affected by unloading activities	See Section 2.8
7. Increased vehicular traffic	• Upgrade existing roadways and intersections	CR 7 reroute and intersection with US 169 improvement is proposed by Itasca County
Unique to West Range Site		
1. Lowering of mine pit water levels	• Positive effect—benefits interpretation of features in Hill-Annex State Park, maintains Canisteo Mine Pit below flood levels	No incremental cost
2. Discharge of Water	• Reduce water discharges through recycling of cooling water	No incremental cost
	• Reduce water discharges through employment of ZLD system for gasification process	See Section 2.8
	• Use of water from HAMP currently being discharged to Upper Panasa Lake, which discharges to Lower Panasa Lake, and ultimately to the Swan River	No incremental cost
Unique to East Range Site		
1. Discharge of Water	• No discharge of water through employment of ZLD system for gasification process and ZLD for cooling system	See Section 2.8

Table 2.7-3 below provides a quantitative comparison between the Ease Range and West Range Sites.

Table 2.7-3 Quantitative Comparison of Land Use-Related Attributes at West Range (Preferred) and East Range Sites

Site	Mesaba One and Mesaba Two Permanent Land Use Impact (Acres)				Total Route Length Preferred Routes (miles)[1]					New or Widened Right-of-way (miles)[2]					Total Permanent Impacts By Corridor (acres)[3]					Total Permanent Impacts By Land Use (Acres)	
	Forest	Wetland	Cultivated Farmland	Other	Transmisison[4]	Natural Gas Pipeline[5]	Water Pipelines[6]	Roads[7]	Rail	Transmission[4]	Natural Gas Pipeline[5]	Water Pipelines[6]	Roads[7]	Rail	Transmisison[4]	Natural Gas Pipeline[5]	Water Pipelines[6]	Roads[7]	Rail	Wetlands[8]	Forest
West Range Site	150	31	0	5	8.7	13.2	18.6	5.0	6.0	6.2	12.3	9.4	5.0	3.0	134	112	112	45	67	172	456
East Range Site	142	16	0	9	68.3	28.8	10.0	1.9	3.4	35.1	0.0	7.9	1.9	1.3	132	0	51	28	40	133	294

Notes

1 The total route length counts every individual unit (i.e., HVTL structure, pipeline, road and/or rail track) within a defined corridor type For example, if two separate process water supply pipelines one mile in length occupy the same corridor, the total route length would be equal to two miles; if one HVTL double circuit structure carrying two lines traversed a corridor three miles in length, the total route length would be three miles; if two HVTL structures each carrying a single circuit traverse a shared corridor for two miles, the total route length would equal four miles.

2 The total new or widened ROW miles presented does not double count segments of a route occupied by more than one HVTL structure, pipeline or transportation element.

3 Total permanent impacts include land use changes involving terrestrial, aquatic, and/or wetland impacts. Land use changes that involve conversion of gravel pits or mines to a particular corridor type are not counted in this table.

4 West Range Preferred HVTL Route is a double-circuit 345-kV on single route; East Range HVTL Route uses two 345-kV circuits on separate routes (both double circuits with existing 115-kV lines). East Range HVTLs use existing 115-kV ROW (except 4-miles), but one HVTL must use 30' of widened ROW.

5 Natural gas pipeline for East Range falls under FERC jurisdiction, so does not require PPSA HVTL Route Permit.

6 Water pipelines include process water supply, process water blowdown, potable water, and domestic wastewater pipelines.

7 West Range roads include Access Road 1 and Access Road 2. Access Road 1 is 3.4 miles in length and would be constructed by Itasca County for purposes of lessening traffic hazards associated with heavy construction traffic (related to Mesaba One, Mesaba Two, and Minnesota Steel Industries' steel mill).

8 The wetland impacts noted reflect loss of the entire wetland habitat within the rail loop at both sites. The Applicant will strive to eliminate such permanent impacts, however, for purposes of conservatism, the impacts noted above do not reflect such plans.

Table 2.7-4 Quantitative Comparison of Environmental-Related Attributes at West and East Range Sites

	Mesaba One and Mesaba Two Air Emissions[1] (Tons Per Year; Hg in lbs/yr)				lbs/MWh (gross)	Class I Visibility (Days >10% Impact BWCA)[4]	Protected Waters Crossed Preferred HVTL	Protected Waters Crossed Proposed Natural Gas Pipeline	Protected Waters Crossed Water Pipelines	Average Water Appropriation (GPM)[5]	Cooling Tower Blowdown Discharge (GPM)[6]	ZLD Filter Cake Solid Waste (TPY)[7]
	SOx	NOx	PM_{10}	Hg[1]	CO_2[3]							
West Range	1390	2872	493	54	2016(SB) 1831(B)	15	1	2	2	4400(I) 10300(II)	890(I) 3500(II)	~4400(GI)
East Range	1390	2872	709	54	>2016(SB) >1831(B)	69	20	12	5	7,400	0	~4400(GI) <24500(PI)

1 Figures provided represent stack and fugitive emissions of criteria pollutants assuming 100% capacity factor (sulfur dioxide, nitrogen oxides, volatile organic compounds, and particulate matter are included in totals). See Application for Part 70/New Source Review Construction Authorization attached as Appendix 5 for basis of estimate.

2 Mercury emissions from stack emission points represent peak annual emissions accepted as permit limit.

3 SB= Subbituminous Coal; B= Bituminous Coal; East Range Site with ZLD will have lower efficiency and higher emissions per MWh.

4 Visibility based on Calpuff Method 2, 1992 Met.Data.

5 I = Phase I; II= Phase I + II.

6 I = Phase I; II= Phase I + II; East Range ZLD eliminates discharge of cooling tower blowdown.

7 Fuel dependent; GI = Gasification Island; PB = Power Block (i.e., eliminating cooling tower blowdown).

Table 2.7-5 Quantitative Comparison of Environmental-Related Attributes at West and East Range Sites

Site	Number of Nearby Residences Within Distance of Preferred Options								Closest resident to IGCC Power Station Footprint (Miles)	Closest Resident to Rail (Feet)
	One Mile of IGCC Power Station Footprint	300' HVTL Centerline Alignment	1300' HVTL Centerline Alignment	1300' Gas Pipeline Centerline Alignment	300' Rail Centerline Alignment	1300' Rail Centerline Alignment	300' Roads Centerline Alignment	1300' Roads Centerline Alignment		
West Range Site	~46	1	17	78	0	10	1	10	0.6	400-500
East Range Site	1	27	479	46	0	0	0	0	1.0	4400

2.8 PREFERRED AND ALTERNATE SITE COMPARISON OF CONSTRUCTION AND OPERATING COST

As part of the comparison of the Preferred and Alternate Sites, the Applicant evaluated the cost differences of developing each Site and operating each IGCC Power Station and its associated facilities. The capital cost differences shown in Table 2.8-1 represent such costs. Cost elements evaluated included site preparation (site clearing and grading), wetland impacts, and infrastructure such as rail spur, access roads, process water supply and discharge, domestic water supply and wastewater discharges, and generator outlet interconnections.

The ongoing operational costs and site development capital cost differences are presented in Table 2.8-2 as the net present value (NPV) of the difference in annual operating and captial costs for a 25-year period. The operational cost elements included feedstock transportation costs, energy delivered to the POI, emissions allowances and waste disposal costs. The NPV of the increased operational costs associated with the East Range IGCC Power Station is approximately $205 Million. Additional coal and natural gas transportation costs and lost revenues are the main drivers in the additional operating cost for the Alternate Site.

Table 2.8-1
Site Development Capital Cost Comparisons for
Mesaba One and Mesaba Two (2005 $)

Development Element	Preferred Site (West Range)	Alternate Site (East Range)	Cost Difference Driver
Site Preparation	Base Case Plus $10.1 Million	Base Case	Less fill for Alternate Site
Rail	Base Case Plus $5.5 Million	Base Case	Less distance and less cut on Alternate Site
Site Access	Base Case Plus $12.2 Million	Base Case	Less cut and fill on Alternate Site
Process Water Supply	Base Case Plus $2.1 Million	Base Case	
Process Water Disposal	Base Case	Base Case Plus $11.9 Million	Zero liquid discharge system on Alternate Site
Potable Water and Domestic Wastewater Treatment	Base Case Plus $1.2 Million	Base Case	Longer distance to and from Municipal source
GO HVLT	Base Case	Base Case $59.2 Million	Additional Generator Outlet Transmission Interconnection Costs for Alternate Site
Natural Gas Pipeline	Base Case	Base Case $22.9 Million	Longer pipeline and compressor station upgrades
Noise	Base Case $15 Million	Base Case	Additional noise attenuation enhancements

Table 2.8-2
Operations and Maintenance Cost Differential (2005 $)

	Preferred Site (West Range)	Alternate Site (East Range)	Cost Difference Driver
Net Present Value of Operational and Capital cost differences	BASE	$260 Million	Additional costs related to delivery of primary feedstocks to the site, disposal of ZLD solids, higher losses over HVTLs, and increased auxiliary power use on Alternate Site as well as additional capital costs associated with longer generator outlet HVTLs and natural gas pipeline facilities, and need to eliminate East Range process water discharge.