CHAPTER 11. ENVIRONMENTAL INFORMATION AND ALTERNATIVE SITES

7855.0630 ENVIRONMENTAL INFORMATION REQUIRED.

Each applicant shall provide environmental data for the proposed facility and for each alternative facility described in response to part 7855.0610. The information in parts 7855.0640 to 7855.0670 relating to construction and operation of each of these facilities shall be provided to the extent that such information is reasonably available to the applicant and applicable to the particular alternative.

7855.0640 ALTERNATIVE SITES; DESCRIPTION.

The applicant shall provide a description of each alternative site, including:

A. the nature of the terrain at the site;
B. the general soil types at the site;
C. the types and depths of bedrock underlying the site;
D. the depth to groundwater at the site;
E. the types of vegetation (forest, brush, marsh, pasture, and cropland) on the site, and the approximate percentage of each;
F. the predominant types of land use (such as residential, forest, agricultural, commercial, and industrial) within five miles of the site, and the approximate percentage of each;
G. lakes, streams, wetlands, or drainage ditches within five miles of the site, and any other lakes, streams, wetlands, drainage ditches, wells, or storm drains into which liquid contaminants from the site could flow;
H. trunk highways, airports, and air traffic corridors within five miles of the site;
I. national natural landmarks, national wilderness areas, national wildlife refuges, national wild and scenic rivers, national parks, national forests, national trails, and national waterfowl production areas within five miles of the site, as mapped on the inventory of significant resources by the State Planning Agency;
J. state critical areas, state wildlife management areas, state scientific and natural areas, state wild, scenic, and recreational rivers, state parks, state scenic wayside parks, state recreational areas, state forests, state trails, state canoe and boating rivers, state zoo, designated trout streams, and designated trout lakes within five miles of the site, as mapped on the inventory of significant resources by the State Planning Agency;
K. national historic sites and landmarks, national monuments, national register historic districts, registered state historic or archaeological sites,

state historical districts, sites listed on the National Register of Historic Places, and any other cultural resources within five miles of the site, as indicated by the Minnesota Historical Society;

L. areas within five miles of the site designated by regional or local authorities as having recreational, cultural, historical, or scientific significance, as indicated by local units of government; and

M. the estimated total population within 50 miles of the site, and a map showing the distribution of the population within 50 miles of the site.

11.0 ALTERNATIVE SITES

Minnesota law requires that spent nuclear fuel storage be limited to the site at which the fuel is used, which in this case is at the Monticello Plant.[1] Therefore, to extend the operation of the Monticello Plant, additional dry cask storage must be established on the Monticello Plant property. Xcel Energy previously undertook a study to identify locations on the Monticello Plant site suitable for cask storage as part of the Application for a Certificate of Need for the original Independent Spent Fuel Storage Installation (ISFSI) dated January 18, 2005 (Docket No. E002/CN-05-123). As part of that study, Xcel Energy identified five preliminary locations for the ISFSI, two of which were identified as the most suitable. These two locations were referred to as the preferred site (which was approved and constructed) and the alternative site. Ultimately, the preferred site was chosen because it was closer to the Monticello Plant reactor building. In addition, the alternative site would have required additional support infrastructure, such as diesel generators as a back-up power supply for lighting and monitoring.[2] Because there is sufficient room within the footprint of the existing ISFSI to provide the needed storage, and because any alternative site outside of the footprint of the existing ISFSI would result in either the same or slightly greater environmental impacts than placing additional casks at the existing site, Xcel Energy has not provided a separate evaluation of alternative sites in this application.

11.1 TOPOGRAPHY AND TERRAIN

The Monticello Plant ISFSI is situated on an outwash terrace above the Mississippi River at an approximate elevation of 943 mean sea level (msl), about 35 to 40 feet above the Mississippi River. The northeast corner of the ISFSI slopes slightly to the northeast into the perimeter swale that slopes to the north, wraps around the site, and eventually discharges into the Mississippi. Other than the slight sloping for drainage, the

[1] Minn. Stat. § 116C.83, subd. 4.

[2] Xcel Application to the Minnesota Public Utilities Commission for a Certificate of Need to Establish an Independent Spent Fuel Storage Installation at the Monticello Generating Plant. January 18, 2005. Docket # E002/CN-05-123. Available online at https://www.lrl.mn.gov/webcontent.

immediate area is relatively flat with no steep slopes present. Figure 11.1-1 presents the topography of the expansion site area and Figures 11.1-2 and 11.1-3 depict aerial views of the area within one and two miles of Project, respectively. The Project is located entirely within the existing ISFSI footprint on the Monticello Plant property and is not located within floodplain, shoreland, or agricultural areas. Figure 11.1-4 below depicts floodplain locations within 5 miles of the proposed Project site.

The Project will involve removing the upper 30 inches of gravel surfacing within the existing ISFSI where the new pad will be placed. A 25-foot-wide asphalt drive surface would also be located on either side of the pad, which would abut concrete approach aprons. Xcel Energy would remove the upper 15 inches of gravel surfacing in the areas where the concrete approach aprons and asphalt drive will be placed. Excavation will be limited to removal of sub-grade materials that were previously placed as part of the original ISFSI construction; no native materials will be impacted by the excavation. The Project will not modify the topography within the ISFSI. Upon completion, those areas not covered by concrete or asphalt will be regraded to preconstruction contours and recovered with Class 6 gravel. No site stabilization measures will be required during regular ISFSI operations and no changes to topography will occur because of the Project.

Figure 11.1-1 Topo Map and Property Boundaries

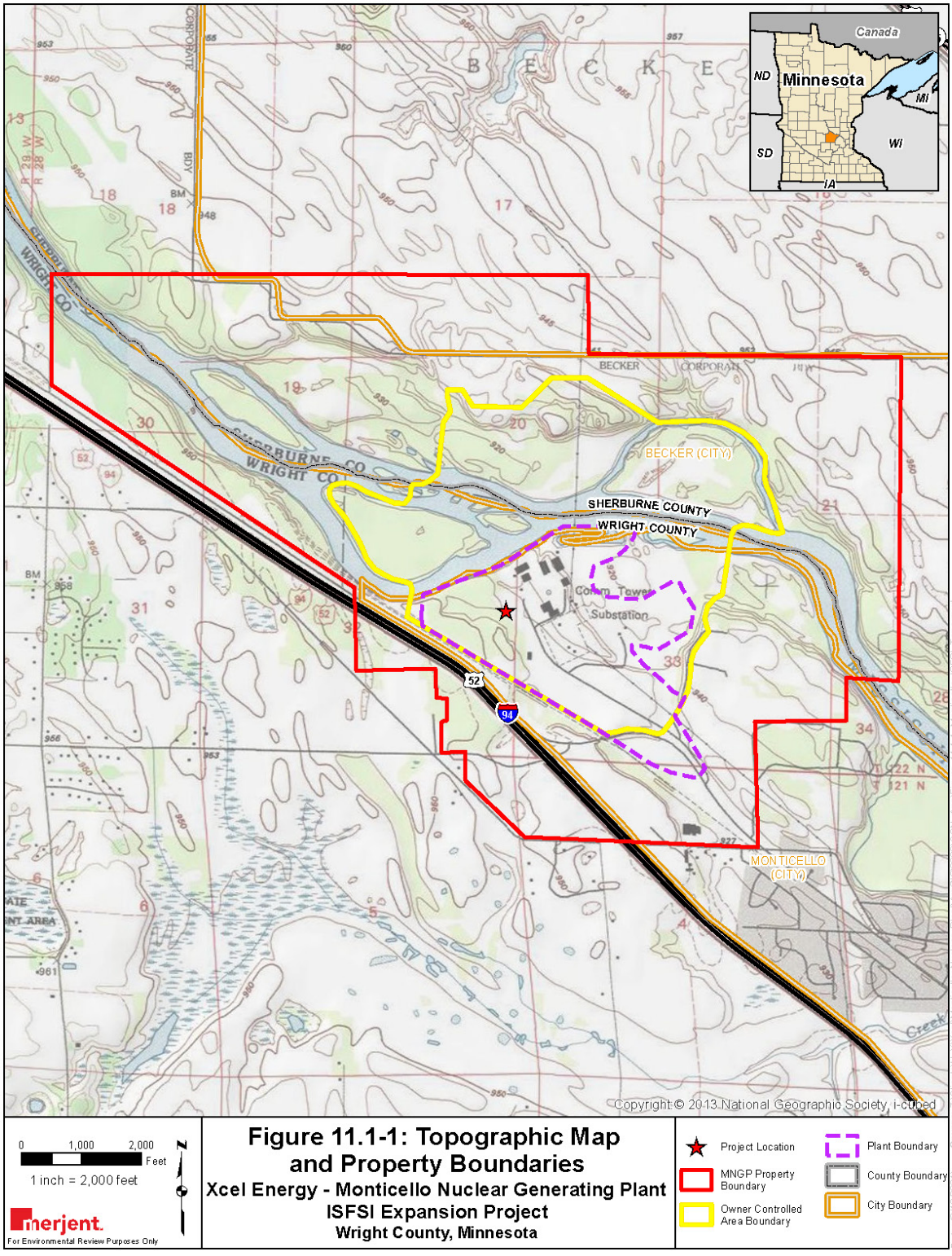


Figure 11.1-2 Aerial Map – 1-Mile Buffer

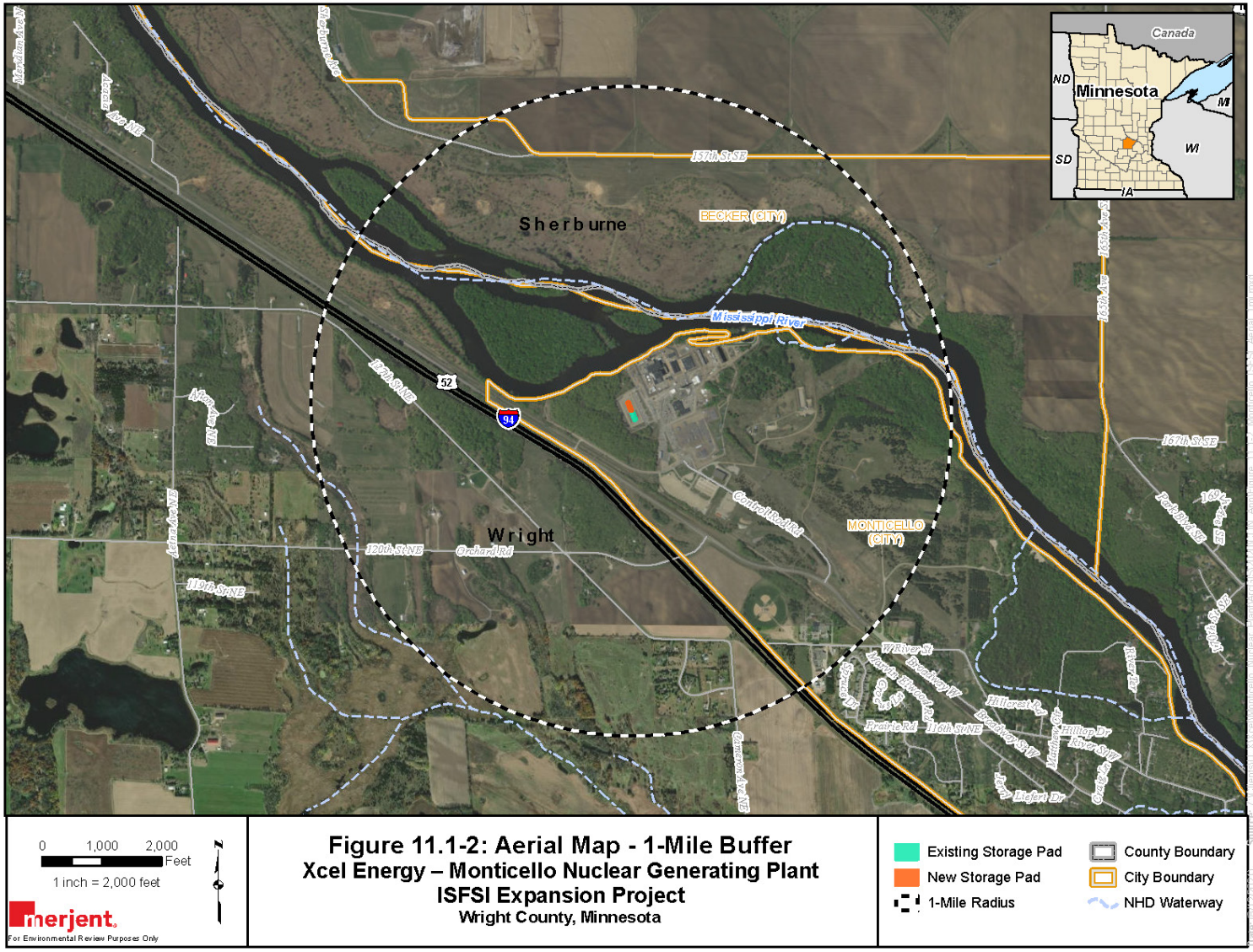


Figure 11.1-3 Aerial Map with 2-Mile Buffer

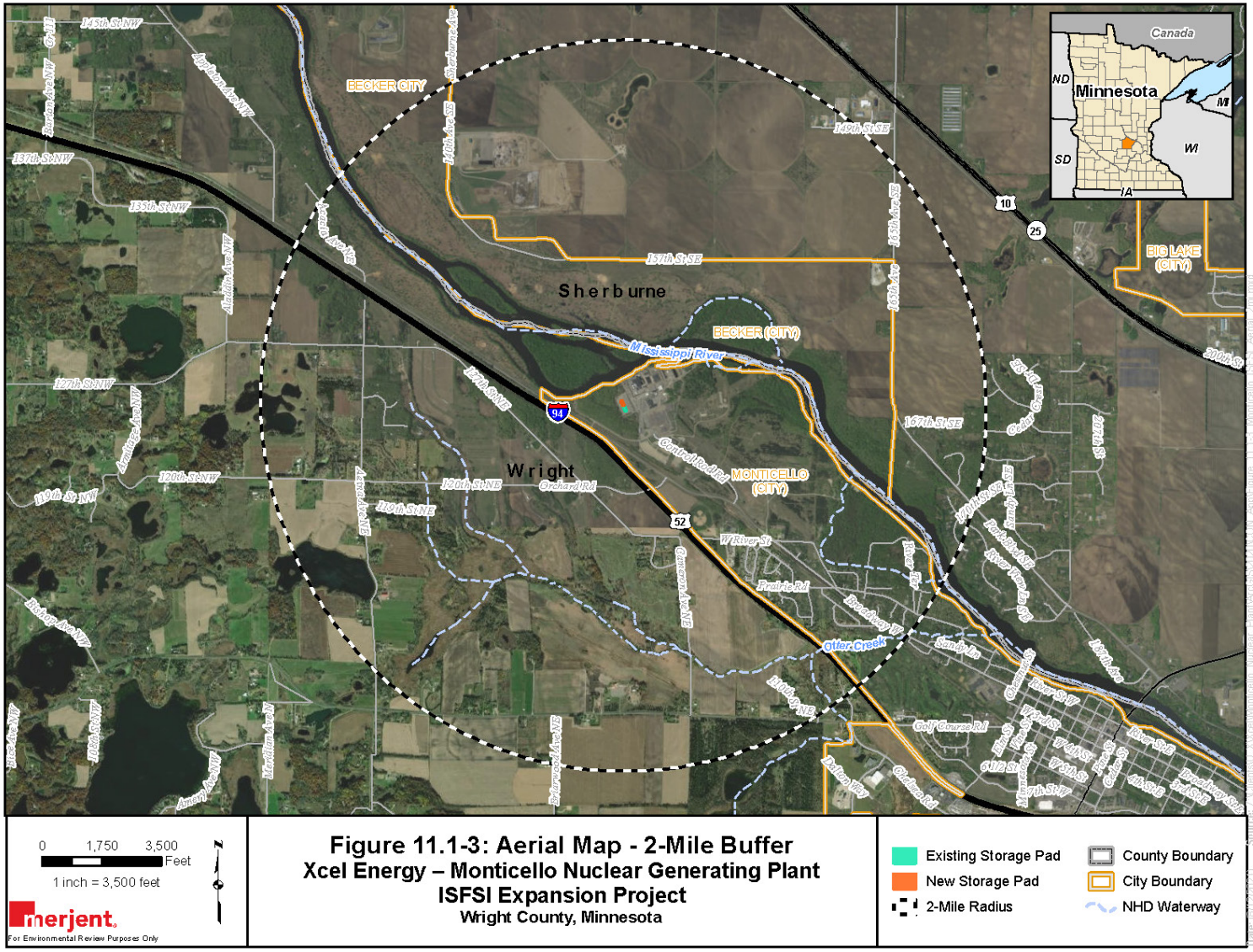
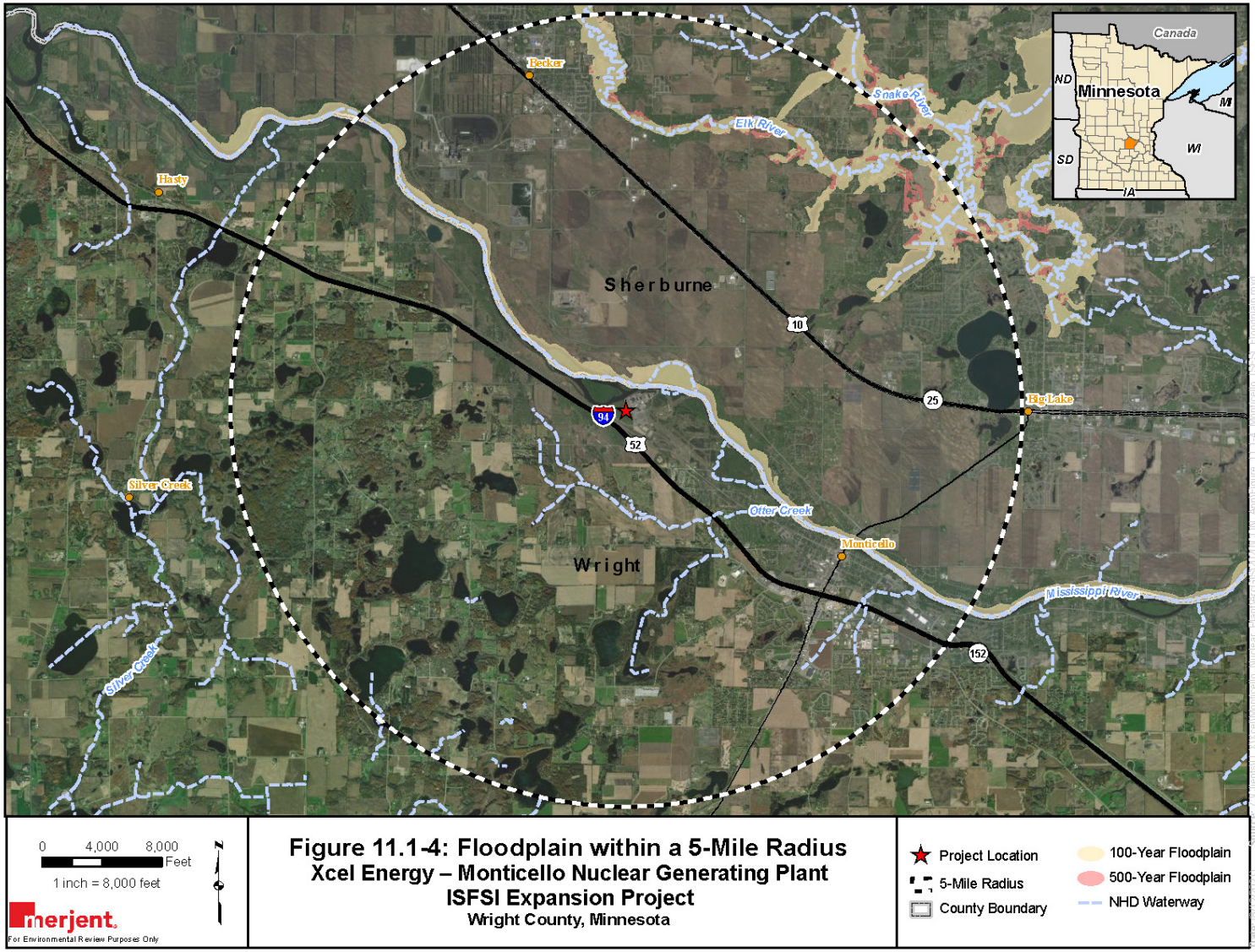


Figure 11.1-4 Floodplains within a 5-Mile Radius



11.2 SOILS

The soils at the Monticello Plant are primarily Hubbards, which are sandy mixed, frigid Entic Hapludolls. These soils are excessively permeable with limited available water capacity. They readily convey rainwater or any surface water to groundwater and are easily eroded by wind. Table 11.2-1 identifies the soils within the Monticello Plant property boundary and Figure 11.2-1 identifies soils in the general area and a soil description of the soils at the ISFSI Project site. Soils were mapped using the Natural Resources Conservation Service (NRCS) Web Soil Survey mapping application.[3]

Table 11.2-1
Monticello ISFSI Project – Soils Within the Monticello Plant Property

Map Unit	Map Unit Name	Slopes	Erosion Hazard	Hydrologic Group	K Factor
1356	Water, miscellaneous	Not rated	Not rated	N/A	N/A
1377E	Dorset-Two Inlets complex	20 - 35%	Severe	A	0.2
258C	Sandberg loamy sand	2 - 12%	Slight	A	0.1
258E	Sandberg loamy coarse sand	6 - 30%	Moderate	A	0.2
771	Elkriver fine sandy loam, rarely flooded	0 - 2%	Slight	B	0.3
D62A *	Hubbard-Mosford complex, Mississippi River Valley	0 - 3%	Slight	A	<0.1
D67A	Hubbard loamy sand	0 - 2%	Slight	A	<0.01
D67C	Hubbard loamy sand	2 - 12%	Slight	A	<0.01
W	Water	Not rated	Not rated	N/A	N/A

*Soil description at ISFSI Project site location; refer to Figure 11-5 for soil description locations.

Xcel Energy completed 12 borings at the existing ISFSI site during August and September of 2004, prior to construction of the ISFSI. Subsurface conditions encountered during Xcel Energy's 2004 geotechnical investigations to support ISFSI construction found eight general strata below a thin veneer (generally less than 12 inches) of vegetation, topsoil, and decomposed vegetation. The top stratum consisted of a 17-foot-thick mixture of mostly coarse-grained soils (i.e., silty sand, sand, and sand

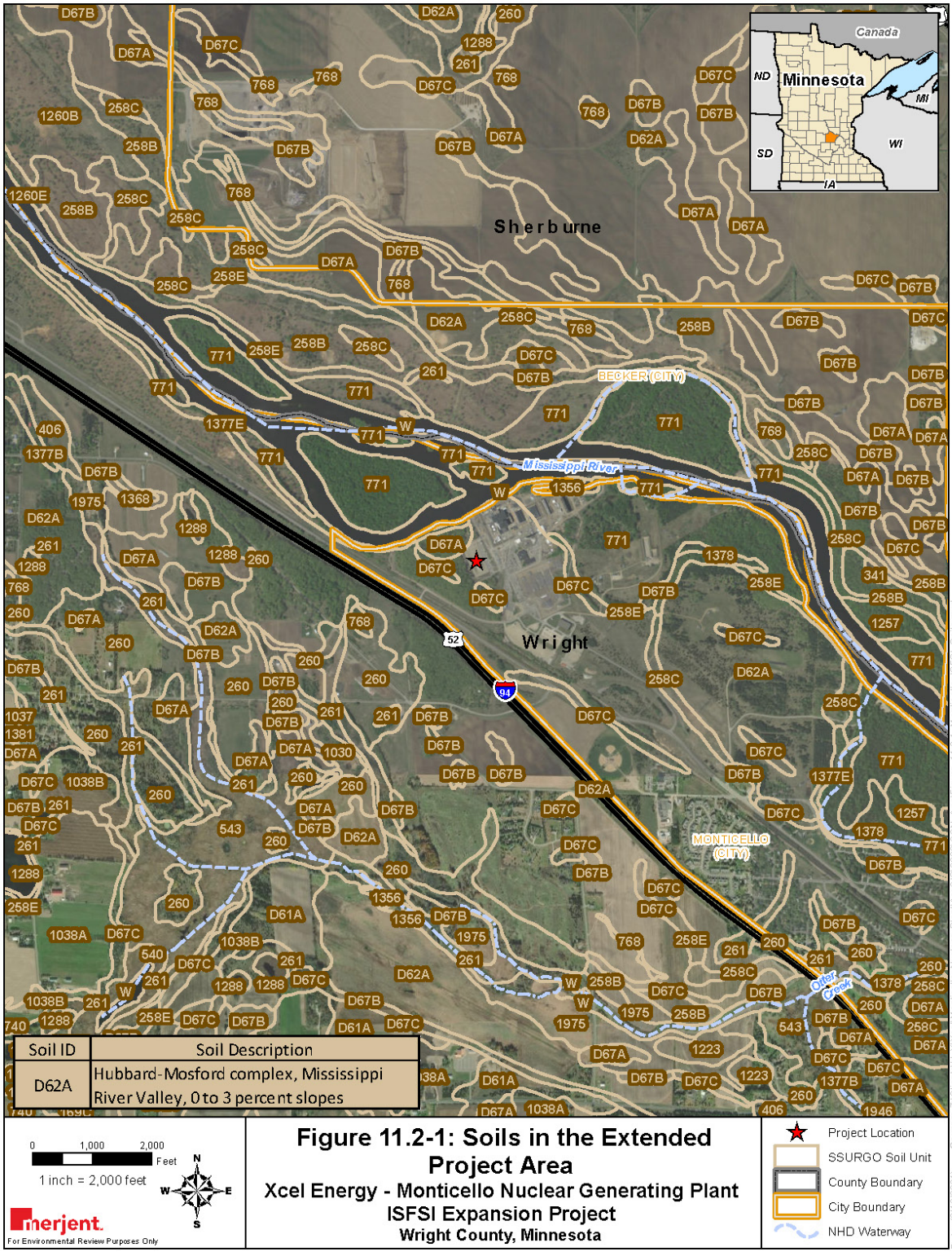
[3] U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Web Soil Survey. Available online at https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx. Accessed January 25, 2021.

with gravel); however, occasional beds of sandy silt, with some boulders and cobbles on the ground surface were also found. The constituents of the first stratum were consistent with what is expected in a terminal moraine deposit. The second stratum consisted of a 19-foot layer of medium to fine sand that was representative of a fluvial deposition. The third stratum consisted of a 7-foot-thick layer of well graded sand, followed by a 16-foot layer of till-like silty clay (stratum 4); an eight-foot layer of sand and silty sand (stratum 5); and a 15-foot layer of very dense sand and gravel (stratum 6). Stratums 7 and 8 consisted of a 21-foot layer of decomposed granite and a final layer of competent granite at the end of the borings, respectively.

It was determined the soils beneath the existing, and thus proposed, ISFSI facility consist of sands and gravels with some clay layers that support near surface mat and spread foundations designed for the moderate bearing pressures (about 2,500 pounds per square foot) typical of ISFSI facilities.[4] The current ISFSI facility has had no structural issues since its construction. The casks, which store spent fuel, are properly sealed and thus do not release any contaminants. There are no other sources of contamination associated with the ISFSI that could contaminate the surrounding soils.

[4] Minnesota Department of Commerce. 2006. Final Environmental Impact Statement to Establish an Independent Spent Fuel Storage Installation at the Monticello Generating Plant. Docket No. E002/CN-05-123. March 20, 2005.

Figure 11.2-1 Soils in the Extended Project Area



The Project would result in impacts to non-native gravel materials placed during construction of the original ISFSI, within the areas to be excavated within the ISFSI fence line. Excavations for the expansion facilities would be limited to removing no more than the top 30 inches of previously placed gravel. The Company would then pour the concrete pads and approach aprons. The area of the pad would be 182 feet by 42 feet, 4 inches with a typical thickness of 30 inches. The approach pads would be 182 feet by 25 feet with a typical thickness of 15 inches. Assuming three feet, the volume of gravel fill removed is expected to be approximately 67,425 cubic feet or approximately 2,500 cubic yards, which is equivalent to the area disturbed for the first pad.[5] A 25-foot-wide asphalt drive surface would also be located on either side of the pad, which would abut the approach aprons. No soil corrections are anticipated to be needed during construction or operation of the proposed Project. There would be no impacts to non-native soils associated with the Project.

During construction, soil stabilization measures will consist of erosion and sediment structural controls and best management practices (BMPs), refer to Section 11.3.5 for additional details. Upon Project completion, those areas not covered by pavement will be regraded to preconstruction contours and recovered with Class 6 gravel. No additional stabilization measures will be required during regular ISFSI operations.

11.3 GEOLOGY AND HYDROGEOLOGY

In general, Wright County is in the Central Lowland province of the Western Young Drift section of the Interior Plains. Depth of the drift over bedrock ranges from 100 to more than 400 feet and is thickest in the central and southwestern parts of the county. Most areas in south-central Wright County are rolling to hilly terminal moraine or gently undulating ground moraine. The only large, nearly level areas in the county are on outwash plains and steam terraces along the Clearwater and Mississippi Rivers, like that upon which the Monticello Plant sits. Wright County was glaciated repeatedly during the past 23 million years; however, little is known about most of these early glacial advances as deposits have either been eroded or are deeply buried by younger sediments. The current landscape was formed about 35,000 to 10,000 years ago by sediment depositions during multiple glacial advances during the late Wisconsinan substage of the Pleistocene Epoch.[6]

[5] Minnesota Department of Commerce. 2006. Final Environmental Impact Statement to Establish an Independent Spent Fuel Storage Installation at the Monticello Generating Plant. Docket No. E002/CN-05-123. March 20, 2005.

[6] Xcel Application to the Minnesota Public Utilities Commission for a Certificate of Need to Establish an Independent Spent Fuel Storage Installation at the Monticello Generating Plant. January 18, 2005. Docket # E002/CN-05-123. Available online at https://www.lrl.mn.gov/webcontent.

The Monticello Plant and ISFSI are situated upon a low bluff on the southwest bank of the Mississippi River.[7] The bluff consists of a series of three relatively flat alluvial terraces rising in elevation away from the Mississippi River. Elevations of the ground surface on the first, second, and third terraces are about 917, 930, and 945 feet above msl, respectively. All the Monticello Plant facilities, including the ISFSI, are located on the second terrace.[8]

Boring efforts recorded as part of the original Monticello Plant construction effort found partially to moderately cemented, quartz sandstone of Paleozoic age beneath alluvium at depths ranging from 75 to 122 feet below ground surface (feet bgs). The top of the bedrock is located between approximate elevations of 810 to 855 feet msl. Sandstone was not reported in all borings. At these locations, decomposed granite bedrock of Precambrian age is in contact with the overlying alluvium, an about 50-foot-thick series of alluvial strata consisting primarily of clean sands with gravel, with a few layers of clay and glacial till. This series represents successive depositions of glacial outwash, moraine, and sediment from the Mississippi River.[9]

Penetration tests conducted during soil borings for the Monticello Plant construction recorded resistances ranging from 15 to greater than 58 blows per foot (bpf) in the granular alluvial material. Some fairly low penetration resistances were recorded at varying depths; however, penetration test results from the granular and lean clayey materials indicated these materials generally possess good to very good load-bearing characteristics.[10] No shallow limestone formations or karst was found, and borings

[7] Xcel Application to the Minnesota Public Utilities Commission for a Certificate of Need to Establish an Independent Spent Fuel Storage Installation at the Monticello Generating Plant. January 18, 2005. Docket # E002/CN-05-123. Available online at https://www.lrl.mn.gov/webcontent.

[8] Minnesota Department of Commerce. 2006. Final Environmental Impact Statement to Establish an Independent Spent Fuel Storage Installation at the Monticello Generating Plant. Docket No. E002/CN-05-123. March 20, 2005.

[9] Xcel Application to the Minnesota Public Utilities Commission for a Certificate of Need to Establish an Independent Spent Fuel Storage Installation at the Monticello Generating Plant. January 18, 2005. Docket # E002/CN-05-123. Available online at https://www.lrl.mn.gov/webcontent.

[10] Xcel Application to the Minnesota Public Utilities Commission for a Certificate of Need to Establish an Independent Spent Fuel Storage Installation at the Monticello Generating Plant. January 18, 2005. Docket # E002/CN-05-123. Available online at https://www.lrl.mn.gov/webcontent.

provided no indication of any irregular geologic conditions.[11] Figure 11.3-1 below depicts general geological features within 5 miles of the Project location.[12]

The current ISFSI location was previously examined for any geotechnical issues that might limit the location of an ISFSI; no limiting soils or geological conditions were found. The Company completed 12 borings at the existing ISFSI site during August and September of 2004, prior to construction of the ISFSI. The borings were drilled to depths at which bedrock was suspected to have been encountered; depths ranged from 78 feet to 125 feet below ground surface (bgs). Xcel Energy's 2004 geotechnical investigations to support ISFSI construction found eight general strata below a thin veneer (generally less than 12 inches) of vegetation, topsoil, and decomposed vegetation. Stratums 7 and 8 consisted of a 21-foot layer of decomposed granite and a final layer of competent granite at the end of the borings, respectively.

No sinkholes, shallow limestone formations, unconfined/shallow aquifers, or karst. No sinkholes, shallow limestone formations, unconfined/shallow aquifers, or karst conditions were noted as part of the prior environmental review of the ISFSI. Investigational borings at the ISFSI site in 2004 did not encounter any solution cavities or soft soil-filled zones while drilling into the bedrock. Borings reviewed as part of the prior environmental review effort provided no indication of any irregular geologic conditions.[13]

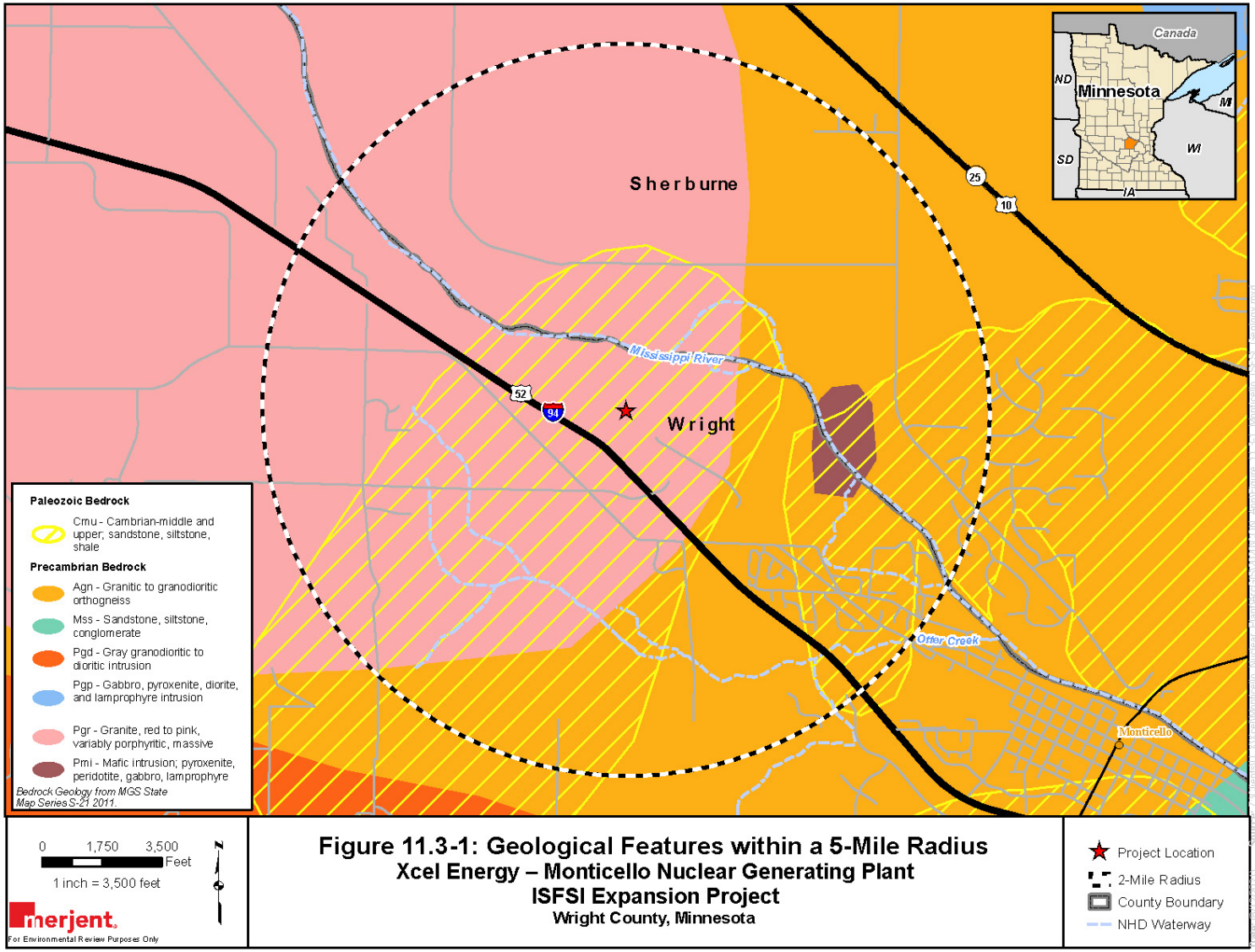
The groundwater table beneath the terraces that border the Mississippi River is usually controlled by the river elevation. The water table slopes slightly toward the river during periods of normal stream flow. The Company completed 12 borings at the existing ISFSI site during August and September of 2004, prior to construction of the ISFSI. The Company installed piezometers adjacent to 3 of the 12 boring locations for the purposes of monitoring the groundwater surface elevation at the ISFSI between September and October 2004. During the period of investigation, the water table was found to be at approximately 908 feet above mean sea level (amsl) at the ISFSI

[11] Minnesota Department of Commerce. 2006. Final Environmental Impact Statement to Establish an Independent Spent Fuel Storage Installation at the Monticello Generating Plant. Docket No. E002/CN-05-123. March 20, 2005.
[12] Xcel Application to the Minnesota Public Utilities Commission for a Certificate of Need to Establish an Independent Spent Fuel Storage Installation at the Monticello Generating Plant. January 18, 2005. Docket # E002/CN-05-123. Available online at https://www.lrl.mn.gov/webcontent.
[13] Minnesota Department of Commerce. 2006. Final Environmental Impact Statement to Establish an Independent Spent Fuel Storage Installation at the Monticello Generating Plant. Docket No. E002/CN-05-123. March 20, 2005.

locations. This is approximately 35 feet below the ground surface at the ISFSI (approximately 943 amsl).

As the excavations for the expansion facilities would be limited to removing no more than the top 30 inches of previously-placed gravel, the excavations would not extend beyond the unconsolidated soil deposits and there would be no impact to subsurface geology, nor would construction activities encounter groundwater.

Figure 11.3-1 Geological Features within a 5-Mile Radius



11.4 VEGETATION

The Project site is located within a previously disturbed area that contains no vegetation and provides no terrestrial habitat. However, it overlaps with one Minnesota County Biological Survey (MCBS) Native Plant Community (NPC, FDs37b). The NPC is characterized as a fire-dependent pin oak – bur oak woodland system. The canopy is dominated by pin oak and bur oak, while the subcanopy is not well differentiated. This NPC may provide habitat for forest-dwelling species; however, since the Project site was previously developed, vegetation and suitable habit for forest-dwelling species is not present on the Project site and no NPC impacts will occur. Figure 11.4-1 identifies MCBS NPC data within a 2-mile radius of the expansion site and Table 11.4-1 depicts current cover types within the immediate Project area.

Table 11.4-1
Monticello ISFSI Project – Cover Type

	Before (acre)	After (acre)		Before (acre)	After (acre)
Wetlands	0.0	0.0	Lawn/landscaping	0.0	0.0
Deep water/streams	0.0	0.0	Stormwater Pond	0.0	0.0
Wooded/forest	0.0	0.0	Impervious Surfaces:		
Brush/Grassland	0.0	0.0	Concrete pad and approach pads	0.0	0.6
Cropland	0.0	0.0	Asphalt drive surface	0.0	0.2
			Class 6 gravel*	0.8	0.0
			TOTAL	0.8	0.8

*Class 6 gravel is considered an impervious surface.[14]

[14] Wilson, C.B. Gravel roads, pads, and infiltration characteristics. April 7, 2014. Available online at 7-28-14_attachment_2-eor_gravel_road_pad_imperviousness.pdf (mncompostingcouncil.org). Accessed February 3, 2021.

Figure 11.4-1 MCBS Native Plant Community