8.4 Mississippi River Crossing at Kellogg

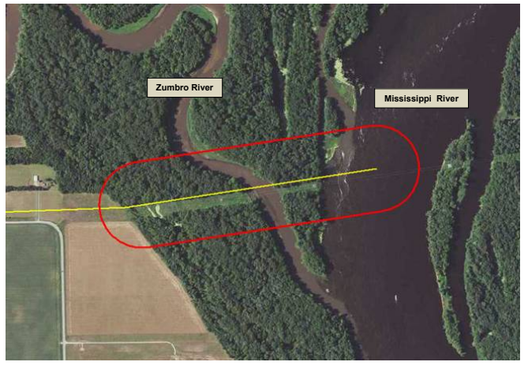
8.4.1 Description of Crossing and Structure Options

This section describes resources and impacts at the Mississippi River Crossing within the proposed route of the 345 kilovolt (kV) transmission line. All 345 kV route alternatives converge west of Kellogg and follow an existing utility corridor to the river crossing. Unlike the previous segment descriptions in Section 8, which compared impacts of various route alternatives, Section 8.4 evaluates several different aerial transmission line configurations, along the same route, that avoid or reduce impacts at the river crossing. Options for an underground crossing are discussed in Section 6.3.2.

The specific crossing area discussed in this section begins about 3.2 miles east-southeast of Kellogg, MN, at a point east of Wabasha County Road 84 where the road makes a 90 degree turn to the south. The route enters the United States Fish & Wildlife Service (USFWS)-managed Upper Mississippi River National Wildlife and Fish Refuge (Refuge) and proceeds east to the Zumbro River, which flows into the Mississippi River approximately 1,500 feet south of the route (see Figure 8.4.1-1).

The 345 kV transmission line would cross the Refuge following an existing 161 kV route located within a 180-foot transmission line right-of-way (ROW) previously approved by USFWS in 1956. Currently, 125 feet of this ROW is cleared.

Figure 8.4.1-1 Aerial photograph of Mississippi River crossing and route analysis area



The applicant **is continuing to coordinate** with USFWS **and the Minnesota and Wisconsin DNRs** to evaluate **structure configurations that would minimize the potential for avian collisions. The consensus from the coordination between the applicant and the agencies is to select a configuration of structures that reduces height and minimizes the number of horizontal planes in which the conductors are strung. Five** different options **have been proposed** for configurations of structures and lines. Depending on the option selected for erecting and configuring structures to carry the 345 kV and 161 kV transmission lines, additional clearing of the ROW may be required. The five options are diagrammed in Figures 8.4.1-2 through 8.4.1-6.

The crossing of the Mississippi River will require nine structures carrying the conductors. Four of these would be on the Minnesota side of the river, with the remainder on the Wisconsin side. In all five options, the general locations of the four Minnesota structures would be the same. The first (westernmost) structure would be on private property. The second and third structures would be west of the Zumbro River on Refuge property. The fourth structure on the Minnesota side would be east of the Zumbro on Refuge property near the Mississippi River.

Under all five options, the two structures closest to the river on either side must be at least 195 feet tall in order to span the approximately 1600-foot river width and maintain the 90-foot minimum conductor clearance above the river required by the U.S. Army Corps of Engineers (USACE). The heights of the remaining structures vary depending on the selected ROW width and the number of horizontal planes in which the conductors are strung.

The configuration options vary in the heights of structures and the width of ROW clearing, and are summarized below (please refer to Figures 8.4.1-2 through 8.4.1-6 as well):

- Option A – This is the "tall and narrow" option. This option utilizes the existing 125-foot clearing with no additional clearing. In order to stay within the existing cleared area, the structures range from 105 feet to 275 feet tall, with the tallest structures closest to the river's edge. The Federal Aviation Administration (FAA) requires all structures over 200 feet in height to be lighted. Therefore, under this option, the two structures on either side of the river would have lighting, and may also be painted alternating red and white. Under this option, conductors would be carried across the river in three separate horizontal planes separated by 25 feet to 30 feet.
- Option B – This is the "short and wide" option. This option would require expanding the existing clearing from the existing 125 feet to up to 280 feet. The expanded cleared area allows this option to use the shorter structures, ranging from 60 feet to 199 feet. Three of the four structures on the Minnesota side would be under 100 feet tall. No lighting would be required by FAA, as the structures are under 200 feet tall. The wider cleared ROW would allow all conductors to be carried across Refuge land in one horizontal plane. This reduces the potential for avian impacts by reducing the airspace occupied by conductors.
- Option C – Options C and D combine elements of Options A and B. Under Option C, the two central structures would be 195 feet tall. No lighting would be required by FAA, as the structures are less than 200 feet tall. The first three structures on the Minnesota side would range in height from 100 feet to 130 feet. These first three structures would be erected in the existing 125-foot cleared ROW west of the Zumbro River. The cleared ROW would expand to 280 feet between the Zumbro River and the Mississippi River, leading up to the 195-foot fourth structure at the river's edge. The conductors would be carried across the river in three horizontal planes separated by 20 feet to 25 feet.
- Option D – Option D is nearly identical to Option C on the Minnesota side of the river crossing. Differences between the Options C and D are primarily on the Wisconsin side, and are not discussed in detail here. The difference between Options C and D on the Minnesota side is ROW width on Refuge property between the Zumbro and Mississippi Rivers. As with Option C, the first three structures on the Minnesota side would range in height from 100 feet to 130 feet. These first three structures would be erected in the existing 125-foot cleared ROW west of the Zumbro River. Under Option D, the cleared ROW would expand to 180 feet between the Zumbro River and the Mississippi River, compared to 280 feet under Option C. Under Option D, the

Table 8.4.1-1. Comparison of structure heights and required ROW widths for the five configuration options for the crossing of the Mississippi River

State	Structure	Option A		Option B		Option C		Option D		Option E	
		Height	ROW	Height	ROW	Height	ROW	Height	ROW	Height	ROW
Minnesota	1	105	125	60	270	105	125	105	125	85	180
	2	130	125	85	270	130	125	130	125	95	180
	3	130	125	80	270	130	125	130	125	95	180
	4	275	125	199	280	199	280	196	180	199	270
Wisconsin	5	275	125	199	280	199	280	196	180	199	270
	6	135	125	80	280	80	280	130	125	80	270
	7	195	125	140	280	140	280	195	125	140	270
	8	195	125	140	280	140	280	195	125	140	270
	9	100	125	60	270	80	270	100	125	60	270

two central structures on either side of the Mississippi River would be 195 feet tall. This is also under the FAA minimum height for lighting. The conductors would be carried across the river in three horizontal planes separated by 20 feet to 25 feet.

- Option E – Under Option E, the first three structures on the Minnesota side would be 85 to 95 feet tall. The existing 125-foot cleared ROW west of the Zumbro River would be cleared an additional 55 feet to 180 feet for these first three structures. The fourth structure, at the Mississippi River, would be 199 feet tall. The ROW between the third and fourth structure would expand to 270 feet. This ROW width would be maintained through the Wisconsin side of the river crossing.

Table 8.4.1-1 summarizes the structure heights and ROW widths for the five structure configurations.

The applicant is coordinating with USFWS, Minnesota Department of Natural Resources (DNR) and Wisconsin DNR to determine the option that minimizes the potential for avian impacts. Avian impacts are discussed further in Section 8.4.4.

8.4.2 Environmental Setting

The route width at the river crossing site comprises approximately 82 acres. Approximately 65 acres of the route lies within the Refuge.

System (ECS), the Mississippi River crossing is located within the Blufflands subsection of the Eastern Broadleaf Forest Province. The Blufflands subsection consists of loess-capped plateau deeply dissected by river valleys (DNR 2010g). Topography is controlled by underlying glacial till along the western edge of the subsection, where loess is several feet thick (DNR 2010g).

According to the DNR Ecological Classification Based on the dominance of floodplain forest in the area, soils are very moist and are influenced by annual flooding. Parent material for local soils is deep, complexly stratified sandy alluvium with a silty cap (DNR 2005).

8.4.3 Socioeconomic Setting

The route at the river crossing site is located in an unpopulated part of eastern Wabasha County dominated by floodplain forest in the Refuge. A small portion of the route in this area includes agricultural land.

8.4.4 Analysis of Alternatives

The following discussion focuses on the resources that are present within the route for the proposed 345 kV transmission line as it crosses the Upper Mississippi National Wildlife and Fish Refuge land at the river crossing. See Section 7 for a general overview of the potential impacts to the resources discussed below and a summary of the mitigation measures that could be utilized to minimize impacts to these resources. General overview maps in Section 8.3 include resources in the vicinity of the river crossing; more detailed maps of the area are provided in Appendix A.

Public Health and Safety

Discussion of potential public health and safety impacts associated with this project are discussed in Section 7.1. Primary public health and safety concerns are associated with:

- Electric and Magnetic Fields (EMFs);
- Implantable Medical Devices; and
- Stray Voltage;

All proposed route alternatives utilize the same crossing point at the Mississippi River crossing. Therefore, potential impacts related to public health and safety are identical for all route alternatives. Moreover, any perceived risks to health and safety from EMFs, stray voltage or impacts to implantable medical devices are likely to be correlated with the proximity of human dwellings to the proposed line. Since there are no human dwellings in the route at the river crossing site, the level of potential risk, if any, is negligible.

Property Values

There are no residences or commercial buildings in the route at the river crossing site. Most of the land is owned by the USFWS. Therefore, there would be no reduction in residential or commercial property values associated with construction and operation of the 345 kV transmission line at the river crossing. An existing transmission line corridor at the crossing site would be expanded from the existing 125 feet to 180 feet to accommodate the proposed 345 kV transmission line. The 180-foot ROW width across the Refuge was approved by the USFWS in 1956. Expansion of the existing transmission line corridor is not expected to diminish the value of the property.

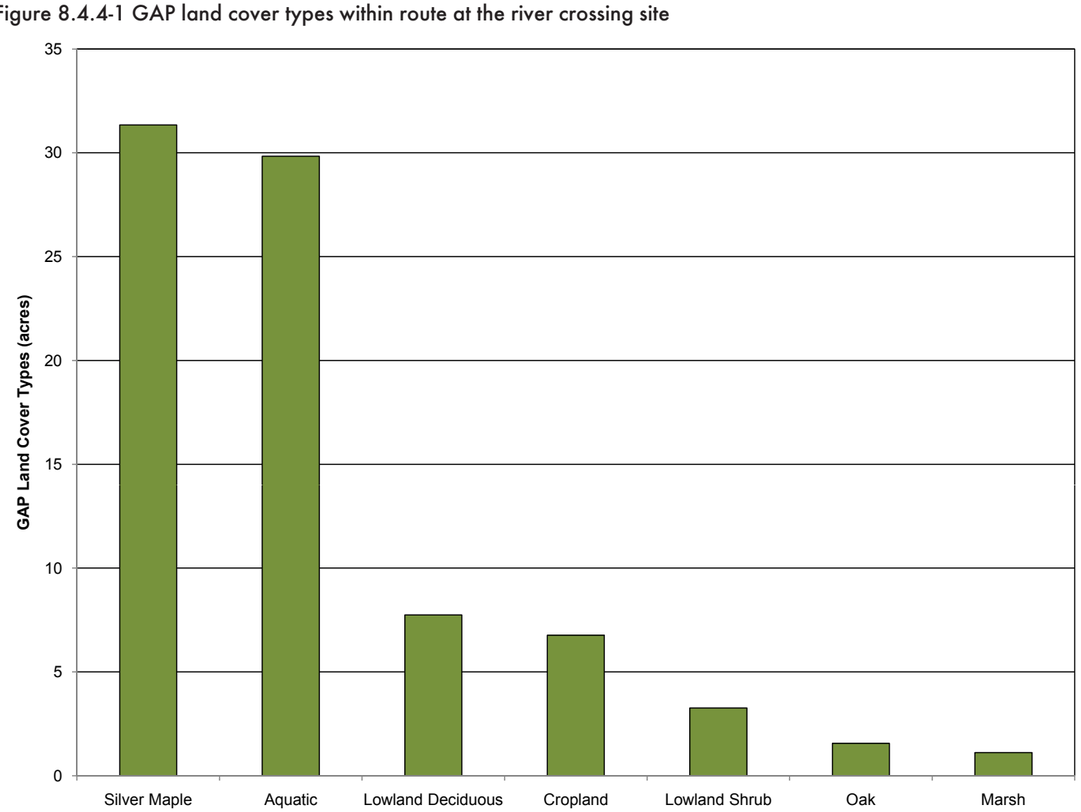
Human Settlement

No residences are located within the route at the river crossing site. Therefore, no displacements would be required. There are no hospitals, nursing homes, schools, churches or cemeteries within the route at the river crossing site.

Land Use Compatibility

Most of the land cover within the route at the river crossing site is floodplain forest or aquatic habitat. Figure 8.4.4-1 shows the acreages of GAP land cover types at the crossing site.

Figure 8.4.4-1 GAP land cover types within route at the river crossing site



The highest GAP land cover acreage is silver maple forest at over 31 acres or 38 percent of the river crossing site. Silver maple forest is typically found in floodplains. The lowland deciduous forest type also indicates floodplain forest. Oak forest, the only upland forest type, is a minor component of the area, representing less than 2 acres of the total forested cover. As a result, the GAP data indicate that most of the approximately 82-acre area is floodplain forest. The dominance of silver maple forest corresponds to the DNR ECS type "FFs68, Southern Floodplain Forest" (DNR 2005). Details on typical vegetation and wildlife utilization of this ECS cover type are provided under "Flora & Fauna".

The existing cleared 125-foot transmission line corridor was cut through forested cover, and does not appear in the GAP data as a distinct cover type. The proposed expansion of the transmission line corridor to the full approved 180-foot width would remove approximately 2.8 acres of forested cover.

Land-Based Economies

A small portion of the route at the river crossing site is on agricultural land. This area covers 6.8 acres or 8.3 percent of the river crossing site. None of the agricultural land is rated as prime farmland, and there are no center pivot irrigation facilities present. This agricultural land is crossed by an existing 161 kV transmission line in the existing 125-foot transmission line ROW. Expansion of the existing 125-foot ROW width to the permitted 180 feet would increase the area under which farming activities occur by 44 percent. Permanent impacts would occur as a result of multiple structure placements within the corridor. It is estimated that the permanent impacts in agricultural fields would be 55 square feet per pole. During construction, temporary impacts, such as soil compaction and crop damage within the ROW, may occur. Temporary impacts in agricultural fields are estimated to be one acre per pole for construction activities.

As discussed in Section 7.5, the applicant has worked with the Minnesota Department of Agriculture (MDA) to develop an Agricultural Impact Mitigation Plan (AIMP) for this Project. The overall objective of the AIMP is to identify measures that utilities must take to avoid, mitigate, repair and/or provide compensation for impacts that may result from transmission line construction on agricultural land in Minnesota. The AIMP includes an appendix that outlines mitigation measures and procedures specific to organic agricultural land as described in the National Organic Program Rules, 7 CFR Parts 205.100, 205.202, and 205.101. By following the procedures outlined in the AIMP, impacts to agricultural land based economies can be minimized and mitigated.

There are no aggregate mining, logging or other resource-extraction industries present within the route at the river crossing site.

Rare and Unique Resources

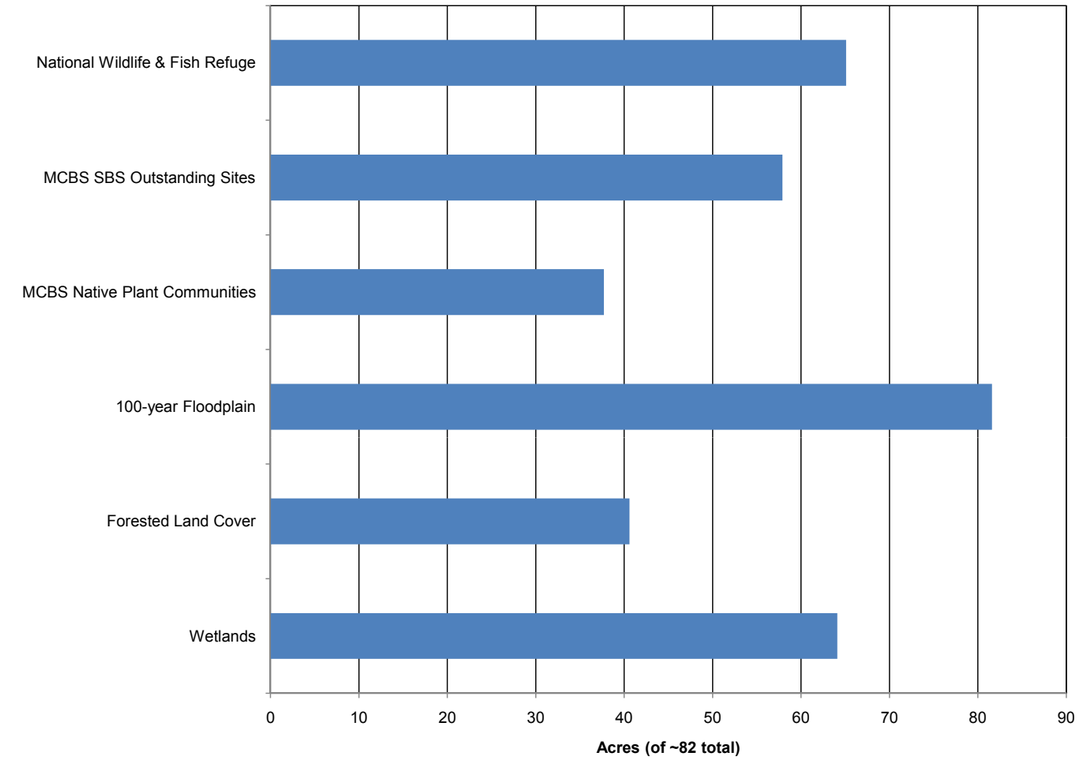
Rare and unique resources were identified within the route at the river crossing site using the DNR Natural Heritage Information System (NHIS) database and the DNR Minnesota County Biological Survey (MCBS) database (see Appendix B). The discussion here is focused on federally-listed and state-listed threatened and endangered species. State species of special concern and non-status species within Minnesota are not discussed; however, data on these species are available in Appendix F.

Data on native plant communities, animal assemblages, and MCBS sites are discussed generally in this section; however, additional, more detailed data are also provided in Appendix F.

No federally or state-listed threatened or endangered species have been documented within the route at the river crossing site. The route at the river crossing site intercepts at least part of the NHIS potential occurrence areas for the following state-listed species:

- Rock pocketbook (*Arcidens confragosus*) and Sheepnose (*Plethobasus cyphyus*), both endangered freshwater mussels;
- Blanding's turtle (*Emydoidea blandingii*), a threatened reptile, and
- Paddlefish (*Polyodon spathula*), a threatened fish.

Figure 8.4.4-2 Summary of the acreage of various resources within the route at the river crossing site.



Potential impacts to freshwater fish and mussel species would be negligible, since the Mississippi River and associated wetlands would be spanned. Impacts from potential sediment runoff into freshwater habitats during construction of the transmission line could be avoided through proper implementation of Best Management Practices (BMPs) required in the Minnesota Pollution Control Agency (PCA) National Pollutant Discharge Elimination System (NPDES) permit.

One DNR MCBS Site of Biodiversity Significance (SBS) referred to as the Finger Lakes site covers 57.9 acres (~71 percent) of the crossing site. MCBS rates this SBS as "outstanding". The existing 125-foot 161 kV transmission line route cuts across this SBS. Expansion of the cleared area to accommodate the 345 kV line would clear up to eight acres of forested cover in the Finger Lakes SBS, depending on the configuration option selected. The additional clearing would move the existing forested edge, but would not create additional edge habitat. Under configuration Option A, no additional forested cover would be removed from the Finger Lakes SBS, and the existing forested edge would remain in place.

Figure 8.4.4-2 summarizes the acreage of various resources within the route at the river crossing site.

Flora and Fauna

Flora

The area around the river crossing site is dominated by relatively undisturbed natural resources including wetlands, floodplain forest and unique native plant communities. The area is also almost entirely within the jurisdiction of the Refuge. The dominant vegetation community, following the DNR ECS, is southern Minnesota floodplain forest. This community, according to its ECS description, is "often the dominant vegetation on active floodplains of medium to large rivers." (DNR 2005)

The forest canopy in this floodplain forest community is dominated by silver maple (*Acer saccharinum*) with occasional green ash (*Fraxinus pennsylvanica*), cottonwood (*Populus deltoides*) and American elm (*Ulmus americana*). The shrub layer is typically sparse and dominated by tree seedlings and climbing poison ivy (*Toxicodendron radicans var. negundo*) and wild grape (*Vitis riparia*) vines. Ground layer cover is generally sparse in the spring due to inundation and scouring by floodwaters, but increase to up to 50 percent cover of annual or flood-tolerant perennial species by midsummer. Common herbaceous plant species include false nettle (*Boehmeria cylindrica*), clearweeds (*Pilea* sp.), Virginia wild rye (*Elymus virginicus*), cut grasses (*Leersia* sp.), various sedges (*Carex* sp.) and wood nettle (*Laportea canadensis*). Invasive species are often present and sometimes abundant, and include kidney-leaved buttercup (*Ranunculus abortivus*), creeping Charlie (*Glechoma hederacea*), moneywort (*Lysimachia nummularia*), motherwort (*Leonurus cardiaca*), garlic mustard (*Alliaria petiolata*) and reed canary grass (*Phalaris arundinacea*) (DNR 2005).

As noted above in 8.4.1, there is currently a 125-foot cleared ROW that lies within a 180-foot ROW width permitted by USFWS in 1956. Of the four options under consideration for configuring the transmission lines through the crossing area, only Option A requires no additional ROW clearing. Option B requires an additional 155 feet of clearing, for a 280-foot total cleared width. Options C and D retain the 125 feet cleared ROW on Refuge property west of the Zumbro River. On Refuge property between the Zumbro and Mississippi Rivers, Option C expands to a 280-foot ROW, and Option D expands to a 180-foot ROW.

The potential expansion of cleared ROW for the four options ranges from 0 to 125 percent of the existing 125-foot cleared width. The current uncleared ROW width is dominated by floodplain forest species. Clearing and maintaining the ROW will permanently remove tree species from the ROW, and will likely reduce or exclude most existing floodplain shrub and herbaceous species from the ROW as well. This is because the existing plant species in the uncleared ROW are predominantly shade-tolerant species that are unlikely to reestablish in the more open cleared ROW.

Native plant species more tolerant of full to part sun conditions may colonize the newly cleared areas. However, transmission line ROWs, as with any disturbed site, are susceptible to colonization by invasive plant species. The applicant has a vegetation management plan designed to reduce introduction of invasive species during construction and maintenance activities. In addition, the applicant could reseed disturbed areas with a native seed mix appropriate to the site conditions.

Fauna

The Refuge provides habitat for 305 species of birds, 57 species of mammals, 45 species of amphibians and reptiles, and 134 species of fish (NAS 2011). Mammals utilizing floodplain forest habitat include common species such as raccoon (*Procyon lotor*), beaver (*Castor canadensis*), muskrat (*Ondantra zibethicus*), various mice, vole and squirrel species, and bats such as the northern myotis (*Myotis septentrionalis*). Less common mammal species including fisher (*Martes pennanti*), red fox (*Vulpes vulpes*), mink (*Neovison vison*) and river otter (*Lontra canadensis*) also utilize floodplain forest habitat.

Amphibians and reptiles likely present in the vicinity of the river crossing site include frogs, snakes, salamanders, lizards and turtles. Nine species of turtles are potentially present in the area (Moriarty 2004).

A wide variety of bird species utilize habitat in the vicinity of the river crossing, including waterfowl, wading birds, small and medium perching birds, owls, and larger species such as hawks and eagles. Birds found in the area can be residential or migratory. It has been estimated that up to 40 percent of the nation's waterfowl and shorebirds use the Mississippi River valley during spring and fall migration (NAS 2011).

In addition to the forested vegetation cover, a small portion of the area at the river crossing is agricultural land and edge habitat along roads and fields. These areas may be utilized by species such as deer, coyote, opossum and small mammals such as mice, voles and ground squirrels. Birds more commonly encountered in open fields and/or adapted to human activity may also be present.

The principal permanent construction impacts to wildlife include are removal of forested habitat and installation of new structures and foundations. Forested habitat will be removed to expand the existing 125-foot transmission line ROW for most crossing configurations. Option A will remove no additional forested habitat. Options B-D will require removal of 2.8 to 8.0 acres of forested habitat.

While some species may continue to use the newly-cleared area for forage or movement, most species that prefer forested habitat will not use the cleared area. The existing ROW edge would be moved to the north or south, depending on final design; however, clearing to expand the ROW would not create additional edge habitat. Installation of structures will permanently remove approximately 55 square feet per structure from currently available habitat.

Temporary construction impacts may include abandonment of adjacent habitat due to disturbance from construction noise and activity, potential construction sediment runoff into aquatic habitats and streams, and temporary loss of habitat during installation of structures. It is anticipated that most species would return to use abandoned adjacent habitats once construction of the transmission line is complete and disturbance from construction activities ends. Construction sediment could be controlled through proper use and maintenance of BMPs. Installation of structures will temporarily remove approximately one acre per structure from currently available habitat. All but approximately 55 square feet would be available for wildlife use when construction ends.

Potential impacts associated with the operation of the line include electrocution of birds and avian collisions with the transmission structures and lines. The effect of the existing 161 kV line on avian species is unknown. **However, the existing line has three sets of wires stacked vertically, along with an unmarked shield wire, resulting in four horizontal planes of wires. (Shield wires are wires located above the transmission conductors that are grounded and designed to protect the transmission line from lightning strikes.)** The configuration of the structures carrying the proposed 345 kV and the existing 161 kV transmission lines over the river may influence the frequency of avian collisions and electrocutions. The applicant is coordinating with USFWS and the Minnesota and Wisconsin DNRs to identify a structure configuration that would minimize avian impacts, as described above in Section 8.4.1 and in Figures 8.4.1-2 through 8.4.1-6.

Selection of the configuration option that minimizes avian impacts requires consideration of how birds move through the space around the transmission lines and structures. Birds migrating past the crossing would need to fly above the conductors and structures, or navigate the space between conductors. Birds making more local flights may also need to fly above the lines or between conductors. Conductors hung in multiple horizontal planes present a deeper vertical barrier to bird movements than those hung in a single plane.

Option A can be built within the existing 125-foot cleared ROW. It presents the shortest distance to fly across. However, it requires the tallest towers, and the conductors would occupy a deeper

vertical space. Option B minimizes the height of structures as well as the vertical space occupied by conductors. This option presents the shortest height to fly over. However, it requires a 280-foot cleared ROW, which is more than twice the existing cleared area. Options C and D combine elements of Options A and B. Options C and D are the same on the Minnesota side of the river, using structures shorter than Option A but taller than Option B, and remaining within the 125-foot cleared ROW west of the Mississippi River. Option D uses taller structures and a wider ROW on the Wisconsin side of the Mississippi River. Option E also combines elements of Options A and B. It uses shorter structures, though not as short as Option A. The ROW width is narrower than Option A, but wider than Option B. Conductors are strung in two horizontal planes for the first three structures, and one plane for the **remainder** of the crossing

Electrocutions of birds are most often associated with low-voltage distribution lines (less than 69 kV) and can largely be attributed to insufficient separation between the energized portion of the line and other conductive elements. Electrocution occurs when birds with large wingspans come in contact with either two conductors or a conductor and a grounding device. Higher voltage lines require larger clearances around energized conductors, clearances that exceed the wingspans of most bird species. A 345 kV transmission line structure has a minimum spacing between an energized conductor and a grounded surface of 11 feet while a 161 kV structure has a minimum spacing of approximately 6 feet. Spacing between conductors is at least 14 feet for 161 kV lines and 25 feet for 345 kV lines. Based on these required clearances, the likelihood of bird electrocutions from 161 kV and 345 kV transmission lines is extremely low.

Avian interactions with transmission and distribution lines also include collisions. When a bird collides with a power line, it is believed to be caused by a vision issue; conductors can be difficult for some species of birds to see at a distance where they are capable of avoiding a collision. In addition, most avian collisions occur with shield wires. **Shield wires** are smaller diameter wires, and are therefore less visible to birds.

One of the most effective ways to reduce avian mortality is to mark wires to increase the line profile and make them more visible. Studies have shown that where special equipment, such as swan flight diverters, are installed at locations identified as flyways (over waterways or in areas of known concentrations), avian collisions of particularly vulnerable species have been reduced.

The existing 161 kV transmission line uses unmarked shield wires. The applicant has indicated that, along with a reduction in the overall number of horizontal planes carrying wires across the river, the shield wires would be marked with bird diverter markers, making the shield wires more visible and reducing collisions.

Regardless of the configuration option chosen, the applicant has an existing Avian Protection Plan (APP), developed in consultation with USFWS, that would be implemented to further reduce avian impacts resulting from operation of the transmission line. The applicant is also a member of the Avian Power Line Interaction Committee (APLIC). APLIC was formed in the 1980s, and comprises a group of over 30 utilities, the Edison Electric Institute, the National Rural Electric Cooperative Association and the USFWS. APLIC's mission, in part, is to develop cost-effective management options to reduce avian collisions and electrocutions (APLIC 2011). The group publishes "Suggested Practices for Avian Protection on Power Lines: The State of the Art" every ten years, with the most recent edition published in 2006. The applicant's APP is based in part on conservation practices outlined in the APLIC publication.

Water Resources

There are no shallow lakes, designated trout streams or state conservation easements within the route at the river crossing site. Therefore, no impacts to these resources are anticipated in the vicinity of the river crossing.

The Mississippi River is listed in the Minnesota Public Water Inventory (PWI) and USGS National Hydrologic Database (NHD) streams databases, and is impaired for its entire length passing through the route at the river crossing. The river would be spanned by the transmission line, avoiding direct impacts to the bank and stream bed of the river. Potential temporary impacts to streams and mitigation strategies are identified in Section 7.8.

There are 41.8 acres of forested wetland and 22.3 acres of open water wetland within the route at the river crossing site. The entire river crossing site lies within the Federal Emergency Management Agency (FEMA)-mapped 100-year floodplain.

General mitigation measures that would be employed to minimize impacts to water resources are discussed in Section 7.8. Because all wetlands would likely be spanned, no structures would be placed within these features and direct impacts to wetlands are anticipated to be minimal. Potential indirect impacts to water resources, such as increases in turbidity, could be minimized through use of BMPs.

Temporary impacts to wetlands may occur if they need to be crossed during construction. Proper installation and maintenance of BMPs could minimize temporary impacts to wetlands. Forested wetlands under the transmission line would undergo a conversion to non-forested wetlands because vegetation maintenance procedures under the lines prohibit trees from growing in the ROW.

Electronic Interference

Impacts related to electronic interference would not vary between the route alternatives at the river crossing, since all route alternatives are identical in the approach to the crossing. Electronic interference impacts in addition to those generated by the existing 161 kV transmission line may increase and would be greatest very close to the line for AM radio reception and minor for all other types of reception. The placement of new structures for the 345 kV transmission line may result in line-of-sight interference. There are no microwave communication towers within the route at the river crossing site.

Cultural Resources

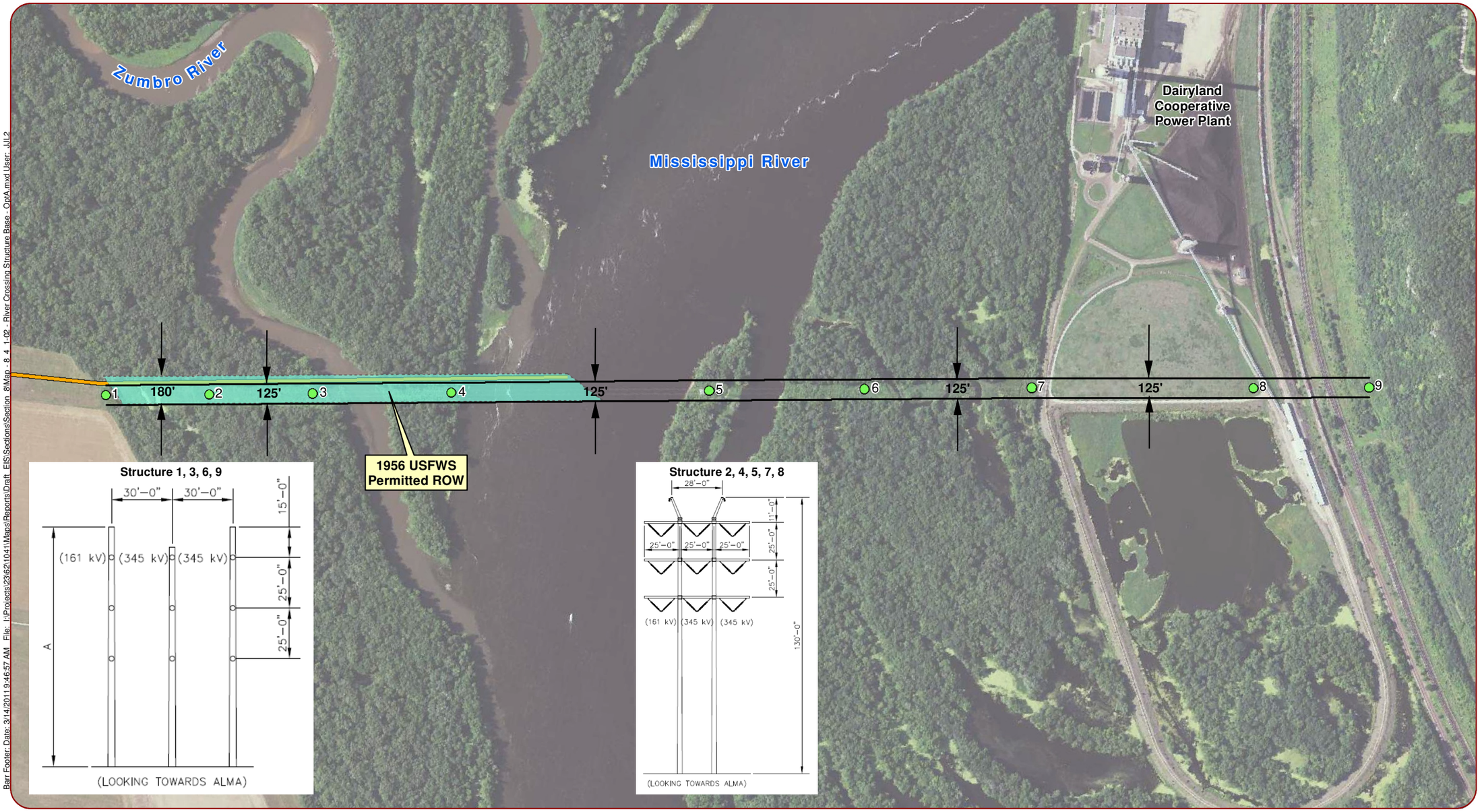
There are no recorded State Historic Preservation Office (SHPO) historical or archaeological sites within the route at the river crossing site.

Recreation Resources

There are no state, county or local parks, state forest lands, DNR or state park trails, or boat accesses within the route at the river crossing site. The Refuge is open for recreation opportunities; however, there are no trails within the route at the river crossing site. **The crossing of the Zumbro River northeast of its confluence with the Mississippi River is within the Minnesota State Recreational Water Trail. Crossings of the State Recreation Water Trail are discussed in Section 7.12.6.**

Air Quality

Discussion of potential air quality impacts is provided in Section 7.13. Potential air quality impacts from operation are primarily associated with the production of small amounts of ozone and oxides of nitrogen in the air surrounding transmission line conductors and the potential release of small amounts of SF6 during operation and maintenance of certain electrical substation equipment. These potential impacts do not vary between the proposed route alternatives, since they all share the same crossing point. Operation of the proposed transmission line is not expected to create any potential for the concentration of these pollutants to exceed existing air quality standards. Minor short-term emissions associated with construction will also occur.



0 150300 600 900 Feet

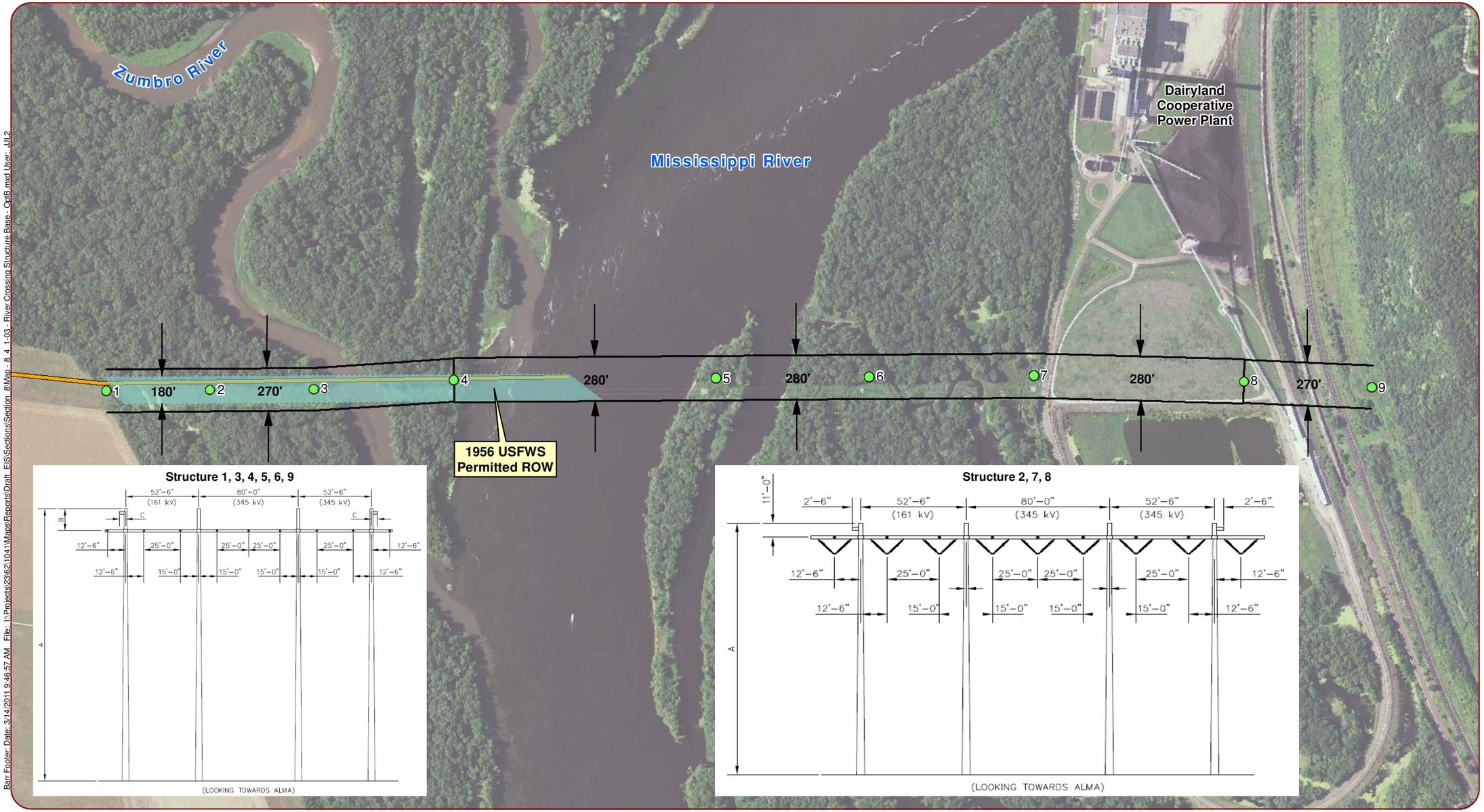
0 50 100 200 300 Meters

- Proposed Crossing Route*
- Right of Way
- Structure Location
- 1956 USFWS Permitted ROW

*All route alternatives follow the same crossing route

Structure	Option A		Structure	Option A	
	Height	ROW		Height	ROW
1	105	125	6	135	125
2	130	125	7	195	125
3	130	125	8	195	125
4	275	125	9	100	125
5	275	125			

Map 8.4.1-02
Detailed River Crossing Map
Row Plan View - Option A



0 150300 600 900 Feet

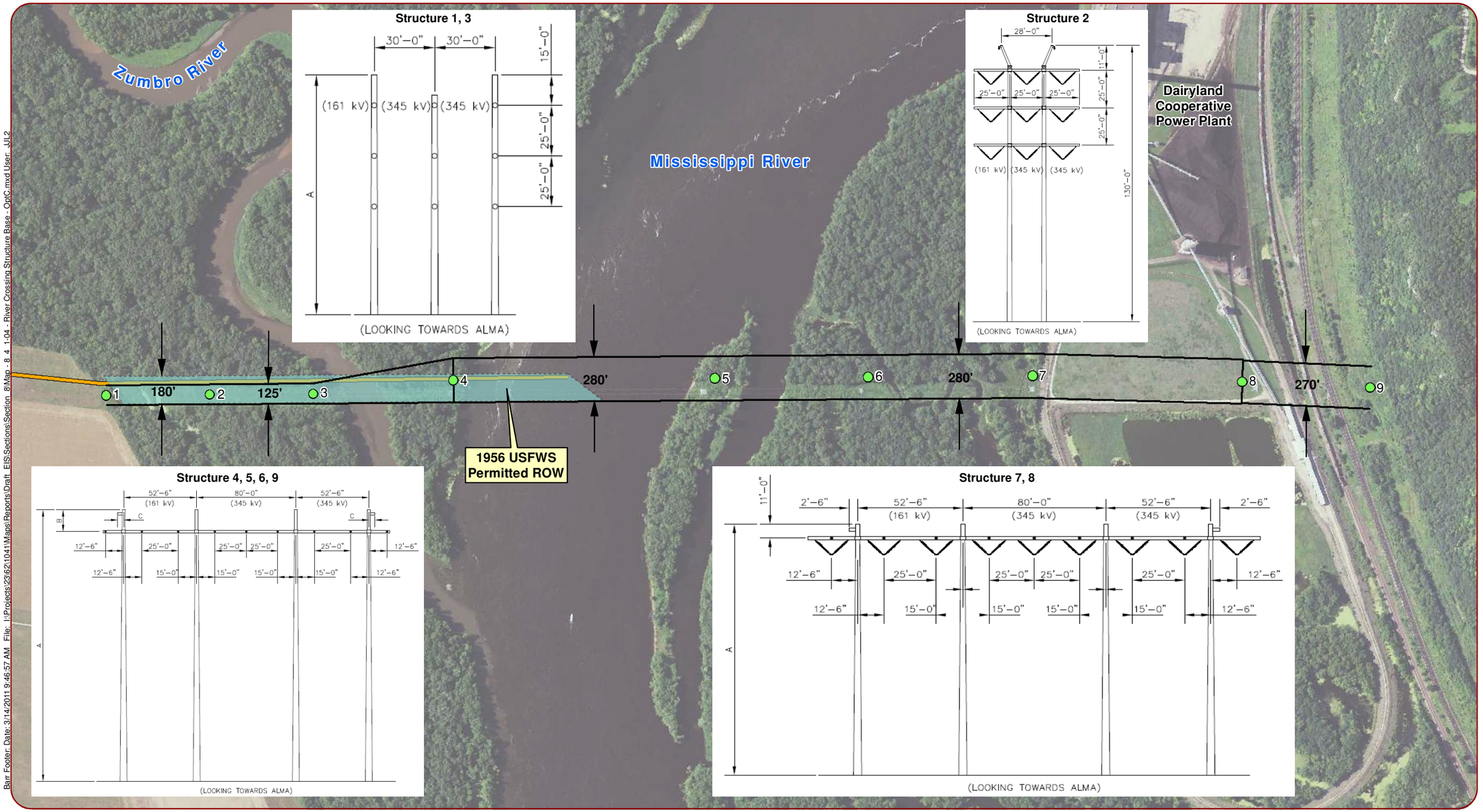
0 50 100 200 300 Meters

Proposed Crossing Route*
Right of Way
Structure Location
1956 USFWS Permitted ROW

*All route alternatives follow the same crossing route

Structure	Option B		Structure	Option B	
	Height	ROW		Height	ROW
1	60	270	6	80	280
2	85	270	7	140	280
3	80	270	8	140	280
4	199	280	9	60	270
5	199	280			

Map 8.4.1-03
Detailed River Crossing Map
Plan and Profile - Option B



Barr Footer: Date: 3/14/2011 9:46:57 AM File: I:\Projects\23\62\1041\Maps\Reports\Draft_EIS\Sections\Section_8\Map - 8_4_1-04 - River Crossing Structure Base - OptC.mxd User: JJL2

0 150300 600 900 Feet

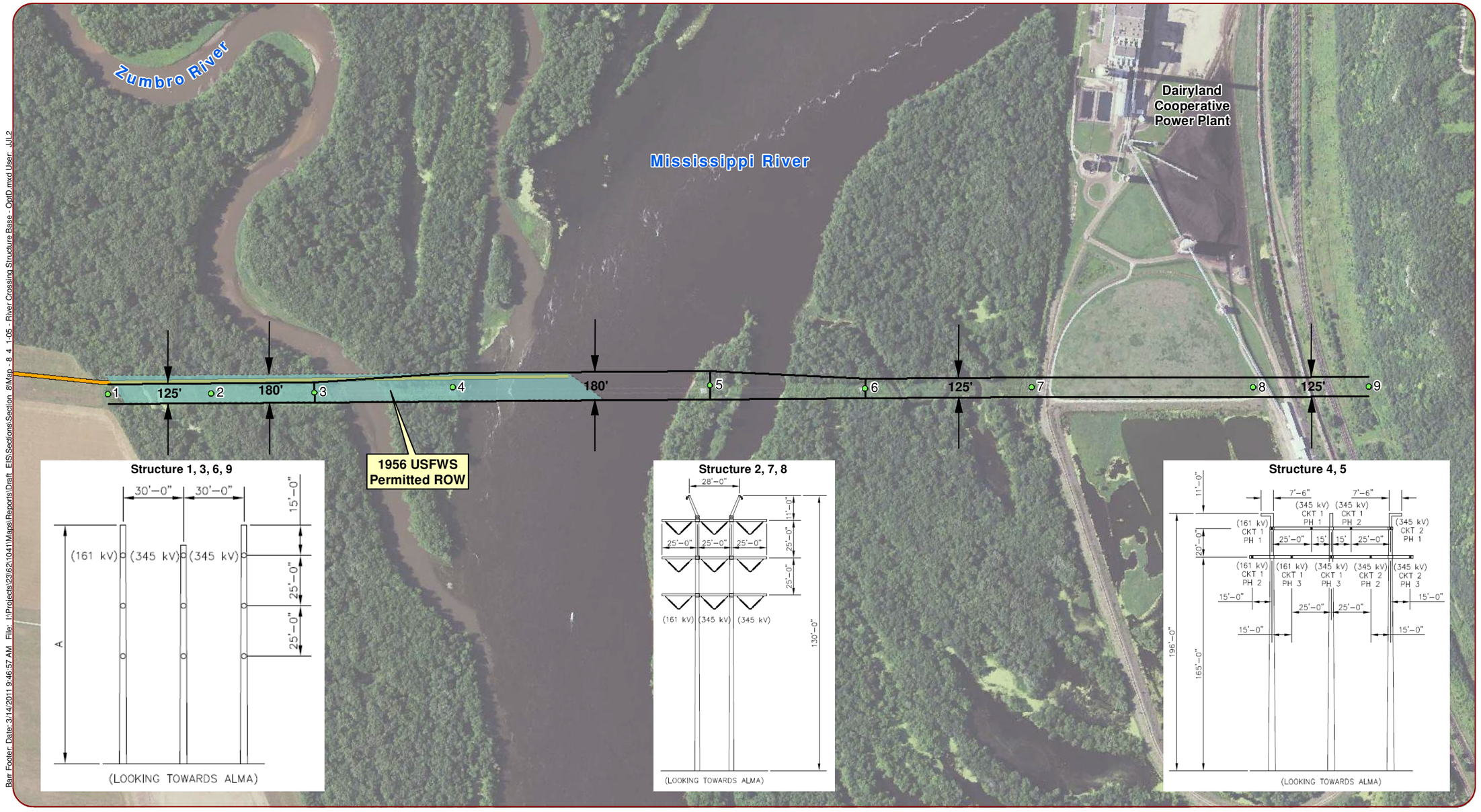
0 50 100 200 300 Meters

Proposed Crossing Route*
Right of Way
Structure Location
1956 USFWS Permitted ROW

*All route alternatives follow the same crossing route

Structure	Option C		Structure	Option C	
	Height	ROW		Height	ROW
1	105	125	6	80	280
2	130	125	7	140	280
3	130	125	8	140	280
4	199	280	9	80	270
5	199	280			

Map 8.4.1-04
Detailed River Crossing Map
Plan and Profile - Option C



Barr Footer: Date: 3/14/2011 9:46:57 AM File: I:\Projects\23\62\10411\Maps\Reports\Draft_EIS\Sections\Section_8\Map - 8_4_1-05 - River Crossing Structure Base - OptD.mxd User: JJL2

0 150300 600 900 Feet

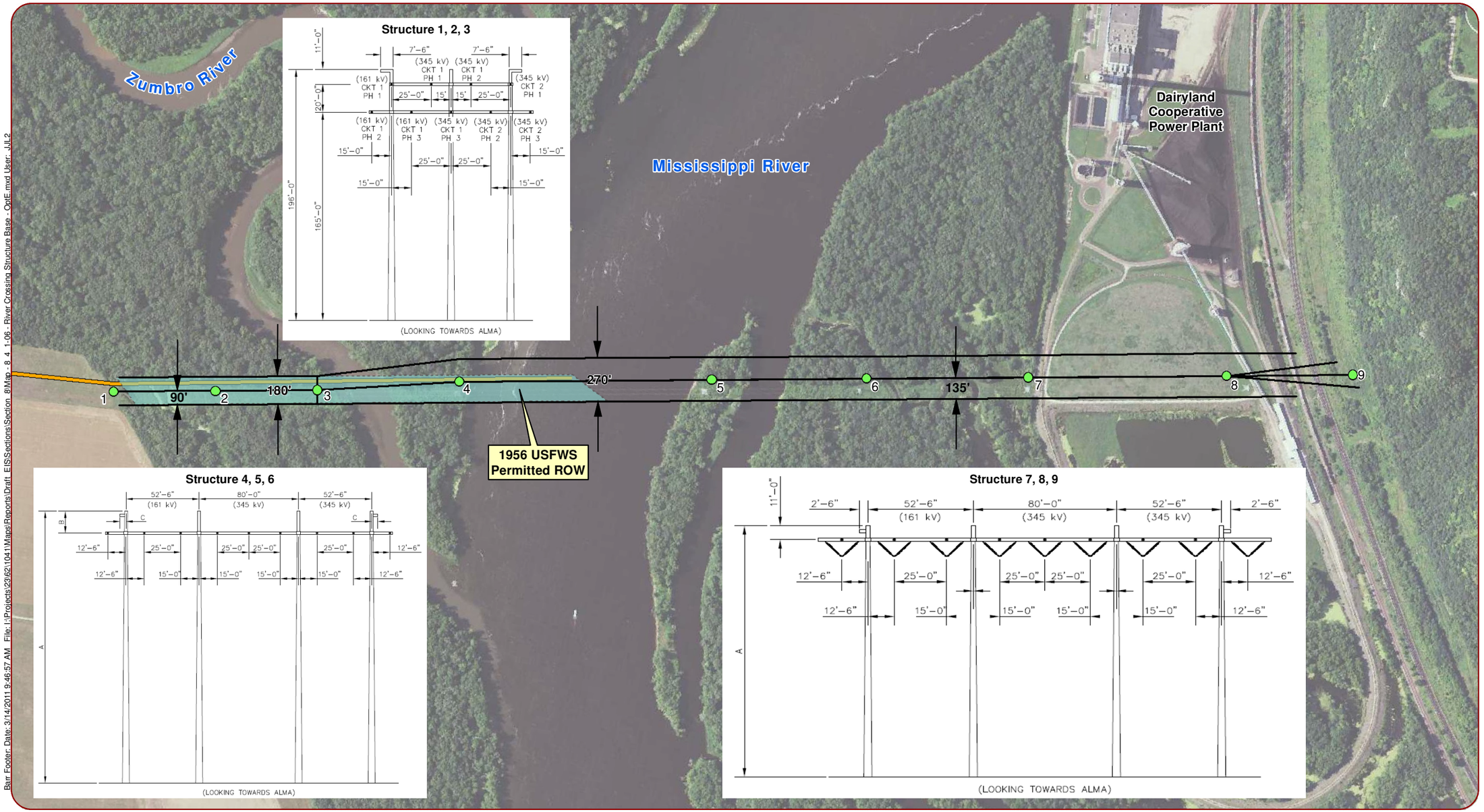
0 50 100 200 300 Meters

- Proposed Crossing Route*
- Right of Way
- Structure Location
- 1956 USFWS Permitted ROW

*All route alternatives follow the same crossing route

Structure	Option D		Structure	Option D	
	Height	ROW		Height	ROW
1	105	125	6	130	125
2	130	125	7	195	125
3	130	125	8	195	125
4	196	180	9	100	125
5	196	180			

Map 8.4.1-05
Detailed River Crossing Map
ROW Plan View - Option D



0 150300 600 900 Feet

0 50 100 200 300 Meters

Proposed Crossing Route*
Right of Way
Structure Location
1956 USFWS Permitted ROW

*All route alternatives follow the same crossing route

Structure	Option E		Structure	Option E	
	Height	ROW		Height	ROW
1	85	180	6	80	270
2	95	180	7	140	270
3	95	180	8	140	270
4	199	270	9	60	270
5	199	270			

Map 8.4.1-06
Detailed River Crossing Map
ROW Plan View - Option E