Joint Application For

PSCW Certificate of Public Convenience and Necessity

and

WDNR Utility Permit Application

Badger Coulee 345 kV Transmission Line Project

PSCW Docket No. 05-CE-142

October 2013

Alliant	Alliant Energy – Wisconsin Power and Light Company
ASNRI	Areas of Special Natural Resource Interest
ATC	American Transmission Company
BMPs	Best Management Practices
BNHC	Bureau of Natural Heritage Conservation (WDNR)
CPCN	Certificate of Public Convenience and Necessity
Commission	Public Service Commission of Wisconsin
CTH	County Trunk Highway
CWA	Clean Water Act
DPC	Dairyland Power Cooperative
DATCP	Wisconsin Department of Agriculture, Trade and Consumer Protection
EMF	Electromagnetic Field
ER	Endangered Resource
FAA	Federal Aviation Administration
FERC	Federal Energy Regulatory Commission
FPP	Farmland Preservation Program
GIS	Geographic Information Systems
I-[Number]	United States Interstate Highway
kV	Kilovolt
MF	Magnetic field
MGE	Madison Gas and Electric
mG	MilliGauss
MISO	Midcontinent Independent System Operator, Inc.
MTEP	MISO Transmission Expansion Plan
MVAR	Megavolt amperes reactive
MW	Megawatt
NERC	North American Electric Reliability Corporation
NHI	Wisconsin Natural Heritage Inventory
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NSPW	Northern States Power Company Wisconsin doing business as Xcel Energy
OHWM	Ordinary high water mark
OPGW	Optical ground wire
PSCW	Public Service Commission of Wisconsin (Commission)
ROW	Right-of-way

SCADA	Supervisory control and data acquisition
SNA	State Natural Area
STH	State Trunk Highway
TCSB	Temporary clear span bridge
UNT	Unnamed tributary
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
USH	United States Highway
WDNR	Wisconsin Department of Natural Resources
WHS	Wisconsin Historical Society
WisDOT	Wisconsin Department of Transportation
WPDES	Wisconsin Pollution Discharge Elimination System
WROC	Wisconsin Regional Orthophotography Consortium
WWI	Wisconsin Wetland Inventory

EXECUTIVE SUMMARY

A. Introduction

American Transmission LLC, by its corporate manager, ATC Management Inc., (collectively ATC), and Northern States Power Company, a Wisconsin corporation (NSPW), together the Applicants, are proposing to construct a new 345 kV transmission line from the Briggs Road Substation in La Crosse County, Wisconsin to the North Madison Substation in Dane County, Wisconsin and continuing to the Cardinal Substation, also in Dane County, Wisconsin. The project, known as the Badger Coulee 345 kV Transmission Line Project (Project), will provide substantial net economic, reliability, and policy benefits to Wisconsin customers.

The Project requires a Certificate of Public Convenience and Necessity from the Public Service Commission of Wisconsin (PSCW or Commission) and a Utility Permit from the Wisconsin Department of Natural Resources (WDNR). In this joint application to the PSCW and WDNR (Joint Application), the Applicants seek approval from the PSCW and the WDNR to construct the new 345 kV facilities beginning on the west end at the Briggs Road Substation in Onalaska to the North Madison Substation in Vienna and the Cardinal Substation in Middleton on the east end. The 345 kV line will be approximately 159 to 182 miles long depending on the final route selected and is expected to be in service in 2018, with construction commencing in 2016.

The Joint Application contains two proposed routes (the Northern Route and the Southern Route) that are located in the following counties: La Crosse, Trempealeau, Jackson, Monroe, Juneau, Sauk, Columbia, Vernon and Dane. This summary provides an overview of the proposal and identifies where detailed information can be found in the Application.

B. Facilities to be Constructed

The Applicants propose constructing and placing in operation the following facilities:

- A new 345 kV terminal within the existing Briggs Road Substation in Onalaska, Wisconsin;
- A new 136 to 162 mile (depending on the final route) 345 kV transmission line between the existing Briggs Road Substation and the existing North Madison Substation;
- Two new 345 kV terminals within the existing North Madison Substation;
- A new 20 to 23 mile (depending on the final route) 345 kV transmission line between the existing North Madison Substation and the existing Cardinal Substation; and
- A new 345 kV terminal within the existing Cardinal Substation.

The majority of the transmission line poles will be self-supporting steel monopole structures. The heights of the structures will typically range from 80 to 180 feet with the spans between the structures being approximately 500 to 2300 feet depending on the specific location. The typical right-of-way (ROW) will be 120-feet wide but the width will depend on the specific location. Detailed information regarding structure types and ROW width is located in Section 5.3 and Appendix B.

C. Purpose and Necessity

In December 2011, the Midcontinent Independent System Operator, Inc.'s (MISO) Board of Directors approved a portfolio of projects under their Multi Value Project (MVP) Tariff that provides for cost-sharing of projects that meet the MVP standards after a comprehensive planning analysis. The board's approval of the portfolio required "transmission owners to use due diligence to construct the facilities approved in the plan." This Project is part of those facilities that were approved.

The Applicants evaluated this Project and, based on their own independent planning analyses, the Applicants concluded that the Project provides substantial net economic, reliability, and policy benefits to Wisconsin customers. These benefits include:

- Lower energy costs for end-users;
- Reduced losses on the transmission system creating a more efficient transmission system and reducing the need for new generation resources;
- Avoiding the need for and cost of reliability projects that would otherwise have to be built in Wisconsin;
- Facilitating the transfer of additional, lower-cost wind energy into Wisconsin;
- Supporting the reliability of the transmission system by increasing transfer capability between Minnesota and Wisconsin; and
- Enhancing reliability and load serving support in western Wisconsin by interconnecting an additional 345 kV source into the La Crosse area.

The Applicants' detailed need analyses are contained in Section 2 and Appendix D.

D. Proposed Routes

The Applicants developed two routes for the proposed project, both of which begin at Briggs Road Substation in Onalaska, interconnect at North Madison Substation in Vienna and terminate at Cardinal Substation in Middleton. Detailed maps are included in Appendix A.

a. Route Segments

The two proposed routes are comprised of the following specific segments:

- The "Northern Route" is approximately 182 miles in length and goes through eight counties – Dane, Columbia, Sauk, Juneau, Monroe, Jackson, Trempealeau and La Crosse. The Northern Route is comprised of Segments A, D, E, G, H, J, K, M, N and P. Segment P also includes option P-East.
- The "Southern Route" is approximately 159 miles in length and goes through seven counties – Dane, Columbia, Sauk, Juneau, Vernon, Monroe and La Crosse. The Southern Route is comprised of Segments B, C, F, G, I, J, L, M and O. Segment B also includes option B-North.

Segments G, J and M are common to both the Northern and Southern routes.

b. Route Preference

The two proposed routes are superior to all other route alternatives evaluated. Overall, the Northern Route is longer [181.7 miles vs. 159.4 miles], but utilizes existing corridors to a greater extent than the Southern Route [91 percent vs. 59 percent by length and 62 percent vs. 35 percent by shared ROW area].

On the east end of the Project, between the Cardinal Substation and the North Madison Substation, the Applicants prefer the Northern Route (Segments A and D) over the Southern Route (Segments B and C). The Northern Route utilizes existing corridors to a much greater extent – 79 percent vs. 42 percent. Of these existing corridors, 76 percent of the Northern Route and 22 percent of the Southern Route utilize existing transmission corridors, the highest priority of corridor set forth in Wis. Stat. § 1.12(6). Additionally, comments from the public advocated for minimizing impacts to residential developments and agricultural practices, and encouraged the use of existing transmission corridors when practical. Furthermore, the Northern Route segments are shorter and less expensive than the Southern Route segments.

Between the North Madison Substation and the northwest end of Segment M (the point near Lyndon Station, Wisconsin where Segment N continues north and Segment O heads west), the Applicants prefer the Northern Route (Segments E, G, H, J, K and M) over the Southern Route (Segments F, G, I, J, L and M). These Northern Route segments utilize existing transmission and highway/railroad corridors to a greater extent, are shorter in length and will cost approximately 15 percent less than the Southern Route segments. Although Segment I (Southern Route) requires less new ROW than Segment H (Northern Route), the Applicants prefer Segment H because Segment I crosses the Wisconsin River twice, has more residences within 300 feet of the Project's centerline, crosses three conservation properties, and comes in close proximity to a number of archaeological and burial sites along the Wisconsin River.

Between the northwest end of Segment M and the Briggs Road Substation, the Applicants do not have a route preference. Choosing between the Northern Route (Segments N and P or P-East) or the Southern Route (Segment O) depends on the weight given to different aspects of the routes. The Northern Route is longer and more costly, but shares existing corridors to a greater extent than the Southern Route. The Southern Route is shorter and lower cost, but has more cross country miles and traverses more challenging terrain than the Northern Route. Both routes cross varying topography and landscapes while traversing through the Coulee section of southwestern Wisconsin to the south central part of the state. The Northern Route, from Segment M to Briggs Road, crosses more forested and non-forested wetland acres (existing plus new). The Southern Route, between Segment M and the Briggs Road Substation, crosses more agricultural lands. The Northern Route has fewer residences within 300 feet of the ROW than the Southern Route. The Northern Route crosses a greater number of waterways. Comparisons of impacts between the two routes are described throughout Section 5 of this Application and in Appendix B.

c. Route Development Process

To identify the routes proposed in this Joint Application, the Applicants used a multi-stage process that involved consulting with the PSCW, the WDNR, and Wisconsin Department of Transportation (WisDOT), and conducting an extensive public participation process following the transmission line siting priorities established by the state of Wisconsin.

The siting priorities law is set forth in Wis. Stat. § 1.12(6) and provides that when siting new transmission lines, routing priorities are to be used consistent with economic and engineering considerations, reliability of the electric transmission system, and protection of the environment. The routing priorities in order of priority are:

a. Existing utility corridors.

b. Highway and railroad corridors.

c. Recreational trails to the extent the facilities may be constructed below ground and do not significantly impact environmentally sensitive areas.

d. New corridors.

E. Project Cost

The estimated total Project cost for the Northern Route is approximately $548 million to $552 million. For the Southern Route, the estimated total project cost is $514 million. The estimates are based on a projected 2018 in-service year. Project costs are provided in more detail in Section 4.

F. Regulatory Approvals

In addition to the CPCN and the Utility Permit, the Project will require a number of approvals and permits from federal and state agencies and units of government. A list of these permits is contained in Section 1.6.

G. Construction Schedule

The Applicants anticipate beginning construction on the transmission line in July 2016 and to commence substation construction in April 2017. Construction is expected to be complete in December 2018.

H. Conclusion

The PSCW and WDNR will determine whether this Joint Application is complete and, if so, begin the public review process. An administrative law judge will preside at a contested case hearing, which will include public and technical hearings. If the Project is approved, the PSCW will select the final route.

As part of the CPCN process, the PSCW, WDNR and Department of Agriculture, Trade and Consumer Protection (DATCP) will conduct an environmental and agricultural review. As part of that process, a public scoping meeting will be held and the PSCW will prepare a state

Environmental Impact Statement (EIS) that will be considered by the PSCW in making its decision. Public participation is encouraged during all of these proceedings.

Based on the material contained and referenced in this Joint Application and any subsequent material requested by the PSCW or WDNR related to this Joint Application, the Applicants request that the PSCW issue a CPCN and any other approvals necessary, authorizing the construction of the transmission facilities as described herein and in the manner set forth. The Applicants also request that WDNR issue all the permits and authorizations that may be required to construct the transmission facilities in the manner described in this Joint Application within 30 days after PSCW issues its decision on the CPCN Application.

JOINT APPLICATION FOR PSCW CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY AND WDNR UTILITY PERMIT

This Joint Application has been prepared in accordance with the Public Service Commission of Wisconsin (PSCW or Commission) and Wisconsin Department of Natural Resources (WDNR) *Application Filing Requirements for Transmission Line Projects in Wisconsin*, Version August 2013 (Transmission Application Filing Requirements), and the *Application Filing Requirements for Substation Projects in Wisconsin*, Version August 2013 (Substation Application Filing Requirements) (collectively referred to as the Application Filing Requirements).

1.0 PROJECT OVERVIEW

In December 2010 and October 2011, the Federal Energy Regulatory Commission (FERC) approved the Midcontinent Independent System Operator, Inc.'s (MISO's) proposed Multi Value Project (MVP) Tariff that defines MVP standards and provides for cost-sharing of projects that meet these standards after a comprehensive planning analysis. MISO staff subsequently analyzed and recommended a set of MVP projects, including the project known as the Badger Coulee 345 kV Transmission Line Project (Project) proposed in this Joint Application, for inclusion in Appendix A of the MISO Transmission Expansion Plan (MTEP) 2011 analysis. These MVP projects were approved by the MISO Board of Directors (BOD) on December 8, 2011 with the BOD directing "transmission owners to use due diligence to construct the facilities approved in the plan."

As discussed in Section 2 below and in detail in Appendix D, the Applicants further evaluated this Project and based on their own independent planning analyses the Applicants concluded that the Project provides substantial net economic, reliability, and policy benefits to Wisconsin customers.

1.1 Owners and Investors of the Proposed Project

American Transmission LLC and ATC Management Inc., its corporate manager, known collectively as American Transmission Company (ATC), W234 N2000 Ridgeview Parkway Court, Waukesha, Wisconsin 53188, and Northern States Power Company, a Wisconsin corporation (NSPW), 1414 West Hamilton Avenue, Eau Claire, Wisconsin 54702, together the Applicants, are proposing to construct a 345 kV transmission line from the Briggs Road Substation in La Crosse County, Wisconsin to the North Madison Substation in Dane County, Wisconsin and continuing to the Cardinal Substation, also in Dane County, as set forth in further detail below. The Badger Coulee 345 kV Transmission Line Project is a MISO-approved MVP that is needed and would deliver benefits to Wisconsin and the Midwest region in three important ways. The proposed Project will: 1) improve electric system reliability locally and regionally; 2) deliver economic savings for Wisconsin utilities and electric consumers; and 3) expand infrastructure to support the public policy of greater use of renewables.

ATC owns and operates transmission facilities and transacts business as a transmission company with the sole purpose of planning, constructing, operating and maintaining the transmission facilities to provide electric transmission service.

NSPW is a Wisconsin corporation and a vertically integrated public utility that provides electric generation, transmission and distribution services in Western Wisconsin (including the La Crosse area) and the Upper Peninsula of Michigan.

The Applicants are obligated to provide adequate and reliable energy transmission service that meets the needs of all transmission users in the areas they serve and supports effective competition in energy markets without favoring any market participant.

The facilities proposed for construction will be jointly owned by ATC and NSPW. The day-to-day operation of the facilities will be performed by ATC and NSPW.

It is anticipated that Dairyland Power Cooperative (DPC), WPPI Energy (WPPI), and Southern Minnesota Municipal Power Agency (SMMPA) will become passive investors in the transmission line between the Briggs Road Substation and the North Madison Substation. As passive investors, DPC, WPPI and SMMPA will not be involved in Project management responsibilities or have any operational control of facilities and therefore are not included as applicants in this application. Precise investment arrangements are still being determined, but it is expected that the combined ownership level of all three utilities will be approximately 13 percent of the total costs for the transmission line between the Briggs Road Substation and the North Madison Substation. Once final investment levels for these three passive investors are determined, NSPW and ATC, as owners and developers of the Project, will provide an update to the PSCW upon request.

DPC is a not-for-profit generation and transmission electric cooperative headquartered in La Crosse, Wisconsin. DPC is owned by and provides the wholesale power requirements for 25 separate distribution cooperatives in southern Minnesota, western Wisconsin, northern Iowa, and northern Illinois. DPC's headquarters is located at 3251 East Avenue South in La Crosse, Wisconsin.

WPPI is a not-for-profit regional municipal power company serving 51 customer-owned electric utilities in Wisconsin, Iowa and the Upper Peninsula of Michigan. WPPI develops and owns generation, negotiates and holds power purchase agreements and arranges transmission service and congestion protection on behalf of its member utilities. WPPI's headquarters is located at 1425 Corporate Center Drive in Sun Prairie, Wisconsin.

SMMPA is a nonprofit political subdivision of the State of Minnesota and a joint action agency comprised of 18 member municipalities in Minnesota that own and operate municipal electric systems. SMMPA's headquarters is located at 500 First Avenue Southwest in Rochester, Minnesota.

These passive investors are also part owners of the Hampton-Rochester-La Crosse 345 kV Transmission Project. Any such agreement by which these passive investors acquire a financial interest in the Project will be subject to all necessary regulatory approvals.

1.2 Contractual Agreements

The Applicants have not entered into any contracts with any developer to construct, finance, lease, use or own transmission facilities.

1.3 Project Location

The Project proposed in this Joint Application is the construction of a new, predominantly single-circuit 345 kV transmission line from northern La Crosse County to northern Dane County. In the La Crosse area, the line will interconnect with the Hampton-Rochester-La Crosse 345 kV transmission line at the Briggs Road Substation in the Town of Onalaska. From there, the line will extend to the North Madison Substation in the Town of Vienna and continue to its termination at the Cardinal Substation in the Town of Middleton. The total length of the line will be approximately 159 to 182 miles depending on the route chosen by the Commission.

1.4 PSCW and WDNR Review

Pursuant to the requirements of Wis. Stat. §§ 1.11, 1.12, 196.025, 196.49 and 196.491, and Wis. Admin. Code chs. PSC 4, 111 and 112, the Applicants hereby apply to the Commission for a Certificate of Public Convenience and Necessity (CPCN) together with any other authorizations needed to construct the proposed Project. The Project is categorized as a Type I action pursuant to Wis. Admin. Code § PSC 4.10(1). Information necessary for the initial preparation of an Environment Impact Statement (EIS) is provided as part of this Joint Application.

Through this Joint Application and pursuant to Wis. Stat. ch. 283 and §§ 30.025(1s), 30.19, 30.123 and 281.36, and Wis. Admin. Code chs. NR 103, 216, 299, and 320, the Applicants hereby apply to the WDNR for a Utility Permit covering the permits and authorizations necessary to construct the proposed Project listed in section 8.0.

By this filing, the Applicants confirm their understanding that through the pre-application process provided for in Wis. Stat. § 30.025(1m), the WDNR, the PSCW and the Applicants have conferred and made a preliminary assessment of the Project's scope and alternatives and have identified potentially interested persons in accordance with Wis. Stat. §§ 30.025(1m)(b) & (c). The Applicants have also been made aware of the information that they are required to submit as part of this Joint Application and the timing for submitting the information.

The Project is not contingent upon or part of a project under another docket number.

1.5 Project Overview and Project Area Information

1.5.1 Location of Routes and Associated Facilities

The Applicants propose constructing and placing in operation the following facilities:

- A new 345 kV terminal within the existing Briggs Road Substation. The Briggs Road Substation is owned by NSPW.
- A new 136 to 162 mile (depending on the route chosen by the Commission) 345 kV transmission line between the existing Briggs Road Substation and the existing North Madison Substation. This new 345 kV transmission line between the Briggs Road and North Madison Substations will be jointly owned by ATC and NSPW. There is also a possibility that DPC, WPPI and SMMPA will invest passively in the transmission line between the Briggs Road and North Madison Substations.

- Two new 345 kV terminals within the existing North Madison Substation. The North Madison Substation is owned by ATC.
- A new 20 to 23 mile (depending on the route chosen by the Commission) 345 kV transmission line between the existing North Madison Substation and the existing Cardinal Substation. The new 345 kV transmission line between the North Madison and Cardinal Substations will be owned by ATC.
- A new 345 kV terminal within the existing Cardinal Substation. The Cardinal Substation is owned by ATC.

The Applicants developed two routes for the proposed Project, both of which begin at the Briggs Road Substation in Onalaska, interconnect at the North Madison Substation in Vienna, and terminate at the Cardinal Substation in Middleton. The two routes, as shown on Appendix A, Figure 1, are generally described below:

- The "Northern Route" is approximately 182 miles in length and goes through eight counties – Dane, Columbia, Sauk, Juneau, Monroe, Jackson, Trempealeau and La Crosse. The Northern Route is comprised of Segments A, D, E, G, H, J, K, M, N and P. Segment P also includes option P-East.
- The "Southern Route" is approximately 159 miles in length and goes through seven counties – Dane, Columbia, Sauk, Juneau, Vernon, Monroe and La Crosse. The Southern Route is comprised of Segments B, C, F, G, I, J, L, M and O. Segment B also includes option B-North.

Segments G, J and M are common to both the Northern and Southern routes.

1.5.2 Footprints of Associated Facilities

The Briggs Road Substation is located on Briggs Road in the Town of Onalaska, La Crosse County. The substation is owned and operated by NSPW. It is located on 36.2 acres with a fenced-in area of 10.8 acres. No additional property is needed for the Project. A fence expansion of either 0.9 acres or 1.5 acres will be required, depending on the route chosen by the Commission. See Appendix C, Figures 2 and 4 for the location and size of the proposed fence expansion.

The North Madison Substation is located on Patton Road in the Town of Vienna, Dane County. The substation is owned and operated by ATC. No additional property or fenced-in area expansion is needed for the Project.

The Cardinal Substation is located on Willow Lane in the Town of Middleton, Dane County. The substation is owned and operated by ATC. No additional property or fenced-in area expansion is needed for the Project.

1.5.3 Generalized Geology, Topography, Land Cover and Land use

Geology and Topography. Wisconsin has been divided into five natural geological regions, with three considered to be upland areas, and two being lowland. The general boundaries of the areas were predominantly established based upon the type of the underlying bedrock. The

Western Upland region encompasses most of the potential Project corridor area. The Central Plain region extends into the eastern portions of Jackson, Monroe, Juneau, Sauk, Columbia and Dane County.

The Western Upland region is characterized by high ridges and steep valleys. It is part of the "Driftless" or unglaciated area of Wisconsin. Average ridge surface elevations are up to a few hundred feet higher than those of the adjacent Central Plain areas. The region is also characterized by the relatively deep gorges of the Mississippi and Wisconsin Rivers. The area between the Chippewa and La Crosse Rivers contains large uplands, with higher regions separated into ridges and valleys. Valley areas, called coulees after the French name, occupy all of Trempealeau County and parts of La Crosse, Monroe, Jackson and Eau Claire County. Bedrock within most of the Western Upland consists of Silurian Dolomite Limestone and Cambrian Sandstone. Surface depths to the bedrock within most portions are estimated at up to about 50 feet below the surface, although there are isolated regions with surface depths of up to about 300 feet.

The west and south portions of the Central Plain region are comparatively level land set against bluffs and steep slopes of the adjacent Western Uplands. However, the region is nonetheless characterized by the presence of many areas of low hills. The lower lands were generally formed by glacial drift, the erosion of sandstone and the deposition of overburden soils by wind (loess) and water (alluvium). There are several hundred feet of elevation change over the course of the approximately 65 mile long region; however, the slope is gradual, with only about four feet of relief per mile. Most of the Central Plain was covered by glacier. While parts of Juneau, Monroe and Jackson County (which are within the potential Project corridor area) were spared by the glacial advance, the melting glaciers deposited sand, gravel and clay within both glaciated regions and within the "Driftless" areas. Erratic boulder conditions as a result of glaciation are known to occur in portions of Juneau and Sauk County. As with the Western Upland region, surface depths to bedrock within most portions of the Central Plain area are estimated at up to about 50 feet below the surface, although there are isolated regions to the east with surface depths of up to about 300 feet. Most of the bedrock in the potential Project corridor area of the Central Plain has been mapped as Cambrian Sandstone, with smaller areas of Silurian Limestone, and even more isolated zones of quartzite and slate.

Land Cover and Land Use. The Project area crosses several ecoregions. These regions, which are defined by similarities in ecosystems, landforms and natural resources, include the Driftless Area (Coulee Section), Glacial Lake Wisconsin Sand Plain, Central Sand Ridges, and the Southeastern Wisconsin Savanna and Till Plain ecoregions.

The Coulee Section of the Driftless Area ecoregion occurs in the northwestern portion of the Project area Land use within this region is predominantly a mixture of agriculture and woodland. The potential natural vegetation of this region is prairie, and large stands of mixed deciduous forests with oaks, sugar maple (*Acer saccharum*) and basswood (*Tilia americana*) common. Many of the flatter valley and lowland areas have been converted to agricultural uses.

The central portion of the Project area occurs primarily along the western edge of the Glacial Lake Wisconsin Sand Plain and, to a lesser extent, the Central Sand Ridges ecoregions. The potential natural vegetation of the Glacial Lake Wisconsin Sand Plain is jack pine (*Pinus banksiana*) and scrub-oak forests and barrens, as well as sedge meadow and conifer swamp wetlands. Much of this area has been converted to agriculture. The potential natural vegetation of the Central Sand Ridges is primarily oak savanna with areas of sedge meadow.

The southern portion of the Project area occurs in the Southeastern Wisconsin Savanna and Till Plain ecoregion, which primarily traverses agricultural areas and, to a lesser extent, woodland. The potential natural vegetation of this area is oak forests, oak savanna, prairie and sedge meadows. Most of the original vegetation has been cleared in this region, with forest fragments remaining in small, scattered woodlots on steeper end moraines and in wetlands.

1.5.4 Special or Unique Natural or Cultural Resources

The following summarizes special or unique natural resources that each route crosses. Most of these features are addressed in more detail in other sections of this Joint Application such as Sections 5.4 (Impact Tables), 6.4 (Wetlands), 6.5 (Waterways) and 8.0 (Wetland/Waterway Permitting).

Northern Route

The Northern Route crosses several special or unique natural resources including:

- The New Amsterdam Grassland property, which is owned by the Mississippi Valley Conservancy, Inc. (MVC) (Segment P);
- Black River State Forest and Jackson County forest land along United States Interstate Highway 94 (I-[Number]) (Segment N);
- Mirror Lake State Park and Pine Island State Wildlife Area along I-90/94 (Segment H);
- United States Fish and Wildlife Service (USFWS) Fairfield Marsh Waterfowl Production Area along I-90/94 (Segment H);
- The Wisconsin River, and associated wetlands, along I-90/94 (Segment G, which is common to both routes);
- The Lemonweir River, and associated wetlands, along I-90/94 near New Lisbon and Mauston (Segment N);
- Important Bird Areas (IBAs), which are designated by the National Audubon Society, Inc. and managed in partnership with the WDNR and other stakeholders. These sites are of ornithological importance because they provide essential habitat to species of breeding or non-breeding birds of conservation concern. IBAs along the Northern Route include: the Van Loon Bottoms (Segments P and N), the Leopold-Pine Island (Segment H) and the Northern Empire Prairie (Segments E and D); and
- Several Exceptional Resource Waters (ERW) and trout streams as identified in Section 6.5 (Waterways).

Southern Route

The Southern Route crosses several special or unique natural resources, including:

- The Pine Island State Wildlife Area (Segment I);
- The Dells of the Wisconsin River State Natural Area (SNA) (Segment I);
- The Wisconsin River in Wisconsin Dells and along I-39 near Portage (including associated wetlands) (Segment I), and along I-90/94 (Segment G, which is common to both routes);
- The Sunnyside Unit of the Black Earth Creek Wildlife Area (Segment B);
- Several IBAs including the Kickapoo-Wildcat (Segment O), Leopold-Pine Island (Segment I) and Northern Empire Prairie (Segments F and C) IBAs; and
- Several ERWs and Outstanding Resource Waters (ORW), and trout streams as identified in Section 6.5 (Waterways).

Additionally, sensitive cultural resources, such as archaeological and burial sites, can be found throughout the Project area. Areas of high cultural sensitivity include portions of La Crosse County near Segment O on the Southern Route and the Wisconsin River, near Segment I on the Southern Route.

1.5.5 Areas of Residential Concentrations and Urban Centers

Residential concentrations and urban centers within the northwestern portion of the Project area include the cities of Holmen, Onalaska, La Crosse and Black River Falls. Residential concentrations and urban centers within the central portion of the Project area include the cities of Tomah, New Lisbon, Mauston and Elroy. Residential concentrations and urban centers in the southeastern portion of the Project area include the cities of Wisconsin Dells, Baraboo, Portage and Middleton.

1.5.6 Transmission Configuration

The proposed Project is the construction of a new, predominantly single-circuit 345 kV transmission line from northern La Crosse County to northern Dane County. There are several existing 161 kV, 138 kV and 69 kV transmission lines along the proposed alignments for both the Northern and Southern Routes that would require removal and rebuild along the selected route. Likewise, there are a number of distribution lines along the proposed alignments for both the Northern and Southern Routes that would be removed and relocated along the selected route. The details are provided in Section 5.3.

1.5.7 Proposed Project Right-of-Way

Both the Northern and Southern Routes share existing rights-of-way (ROW) with transmission lines, highways, railroads and pipelines, and include new ROW where appropriate to connect existing linear corridors. The proposed Northern Route shares existing ROW over 91 percent of its length. If the Northern Route were selected by the Commission, approximately 62 percent of the ROW acreage required for the Project would be shared with existing ROW, reducing the

amount of new ROW needed. The proposed Southern Route shares existing ROW over 59 percent of its length. If the Southern Route were selected by the Commission, approximately 35 percent of the ROW acreage required for the Project would be shared with existing ROW, reducing the amount of new ROW needed.

1.5.8 Substation Information

As requested in Section 1.6 of the Substation Application Filing Requirements, modifications will be required at the existing Briggs Road, North Madison and Cardinal Substations. All substation construction activities will be conducted within existing NSPW (Briggs Road Substation) and ATC (North Madison and Cardinal Substations) property boundaries. A small fence expansion will be required at the Briggs Road Substation. All work at the North Madison and Cardinal Substations will be within the existing substation fences. Work at each of the substations is described below. Substation drawings are provided in Appendix C.

Briggs Road Substation

Two layouts are proposed for the Briggs Road Substation depending on the route chosen by the Commission for the Project's new transmission line. For the Northern Route Segment P option, the line will exit Briggs Road Substation to the north. For the Northern Route Segment P-East option or either of the Southern Route options, the line will exit Briggs Road Substation to the south. The scope of work is similar for the two layouts:

- Install two 345 kV breakers, foundations and control cables to convert the existing 2-position straight bus to a 3-position ring bus.
- Install one 345 kV line steel dead-end structure with foundations to terminate the Briggs Road to North Madison line.
- Install one 345 kV 80 MVAR oil filled shunt reactor with foundation, secondary oil containment and control cables connected to the Briggs Road to North Madison line.
- Install one 345 kV breaker, foundation and control cables for shunt reactor switching.
- Install two additional static masts for lightning shielding.
- Install disconnect switches, bus work, instrument transformers, surge arresters and all appurtenances for a complete substation installation. All ring bus components will have a minimum capacity of 3000 amps continuous.
- Install protection and control panels for the new circuit breakers, shunt reactor, and transmission line.
- Install fiber-optic communications and supervisory control and data acquisition (SCADA) equipment for system protection, remote control and monitoring of the substation.

The Northern Route Segment P option would require a 1.5 acre fence expansion along the west side and southwest corner of the existing fenced-in area. The Northern Route Segment P-East

option or either of the Southern Route options would require a 0.9 acre fence expansion along the west side and southwest corner of the existing fenced-in area.

- Minor changes to the topography in the immediate vicinity of the fence expansion will be needed. Contour and grading layouts for the two options are shown in Appendix C, Figures 2 and 4.
- No changes to the access road or detention pond will be needed.
- No changes in zoning or land use will be needed.

The one-line diagrams for the Briggs Road Substation are shown in Appendix C, Figures 1 and 3. Layouts of the Briggs Road Substation are shown in Appendix C, Figures 2 and 4.

North Madison Substation

Two layouts are proposed for the North Madison Substation depending on the route chosen by the Commission for the Project's new transmission line. For the Northern Route option, the line will enter North Madison Substation from the east. For the Southern Route option, the line will enter North Madison Substation from the west. The scope of work is similar for the two layouts:

- Install two 345 kV breakers, foundations and control cables to expand the existing 4-position ring bus to a 6-position ring bus.
- Install one 345 kV line steel dead-end structure with foundations to terminate the Briggs Road to North Madison line.
- Install one 345 kV line steel dead-end structure with foundations to terminate the North Madison to Cardinal line.
- Install one 345 kV 80 MVAR oil filled shunt reactor with foundation, secondary oil containment and control cables connected to the Briggs Road to North Madison line.
- Install one 345 kV breaker, foundation and control cables for shunt reactor switching.
- Install one additional static mast for lightning shielding.
- Install disconnect switches, bus work, instrument transformers, surge arresters and all appurtenances for a complete substation installation. All ring bus components will have a minimum capacity of 3000 amps continuous.
- Install protection and control panels for the new circuit breakers, shunt reactor, and transmission lines.
- Install fiber-optic communications and SCADA equipment for system protection, remote control and monitoring of the substation.

All of this work will occur within the existing fenced-in area of the substation and no changes to the access road or detention pond will be needed. No changes in zoning or land use will be needed. The one-line diagram for the North Madison Substation is shown in Appendix C, Figure 5. Layouts of the North Madison Substation are shown in Appendix C, Figures 6 and 7.

Cardinal Substation

The scope of work for the Cardinal Substation does not vary with the route chosen by the Commission for the Project's new transmission line. The scope of work includes the following:

- Install two 345 kV breakers, foundations and control cables to expand the existing 3-position straight bus to a 4-position ring bus.
- Install two 345 kV line steel dead-end structures with foundations to terminate the North Madison to Cardinal line.
- Install disconnect switches, bus work, instrument transformers, surge arresters and all appurtenances for a complete substation installation. All ring bus components will have a minimum capacity of 3000 amps continuous.
- Install protection and control panels for the new circuit breakers and transmission line.
- Install fiber-optic communications and SCADA equipment for system protection, remote control and monitoring of the substation.

All of this work will occur within the existing fenced-in area of the substation and no changes to the access road or detention pond will be needed. No changes in zoning or land use will be needed. The one-line diagram for the Cardinal Substation is shown in Appendix C, Figure 8. The layout of the Cardinal Substation is shown in Appendix C, Figure 9.

1.6 Other Agency Correspondence/Permits/Approvals

1.6.1 Agency Correspondence

Copies of the Applicants' correspondence with governmental agencies concerning the Project are included in Appendix H. The governmental agencies include the WDNR, Wisconsin Department of Transportation (WisDOT), United States Army Corps of Engineers (USACE), USFWS, and the Federal Aviation Administration (FAA).

1.6.2 State and Federal Permits/Approvals Required

All state and federal permits and approvals required for this Project and their status are listed in the tables below or in Section 8.0. WDNR permits and approvals are discussed in Section 8.0.

Table 1.6.2-1 – Federal Agencies

Agency	Activity	Permit Type	Status
USACE	Wetland Impacts	Section 404 of Clean Water Act (CWA)	Applicants will apply for the permit on the ordered route.
	Archaeological Review	Section 106 National Historic Preservation Act	A Cultural Resources assessment has been prepared as part of this Joint Application. Applicants will submit information to USACE once a route has been ordered.
	Navigable Waterways	Section 10 of Rivers and Harbors Act	Applicants will apply for the permit on the ordered route.
FAA	Construction of Electric Transmission Lines Near Airports	FAA 7460 (Notification)	See Section 7.7.
USFWS	Easement on federal land	Right-Of-Way request	Applicants filed an application September 2013.
USFWS	Federally listed rare species review and activities near eagles nests	Endangered Species Act; Bald and Golden Eagle Protection Act	Applicants have conducted a review of rare species and eagle nests in the Project area and will continue to coordinate with the agency as applicable.
National Park Service (NPS)	Easement on land that has been funded in part by federal grants	Land and Water Conservation Act	Applicants will apply with WDNR and NPS first quarter 2014.

Table 1.6.2-2 – State Agencies

Agency	Activity	Permit Type	Status
Department of Agriculture, Trade and Consumer Protection (DATCP)	Potential use of eminent domain on more than 5 acres of any farm operation	Agricultural Impact Statement	Requirement will be satisfied by DATCP input to the Environmental Impact Statement per Wis. Stat. § 32.035(2).
WisDOT	Road Crossing	Design Approval	A preliminary constructability report has been submitted to WisDOT. Applicants will apply for necessary permits on the ordered route.
	Construction adjacent to, with-in, or co-located with the ROW of State Highways and Roads	Utility Permit DT 1553	
	Oversize Loads or Excessive Weights on Highways	Wis. Stat. ch. 348 Vehicles – Size, Weight and Load; Wis. Stat. § 348.25 – Vehicle Weight and or Load Permit	
Natural Resources Conservation Service (NRCS)	Conservation Easements	See Section 6.2	See Section 6.2.
Wisconsin Historical Society (WHS)	Site Preparation and Grading	Approval of Archaeological Surveys (Wis. Stat. § 44.40 and Section 106 of National Historic Preservation Act)	A cultural resources assessment has been prepared for this Joint Application.
WDNR	See Section 8.0	See Section 8.0	See Section 8.0.

1.6.3 Local Permits

In addition to the approvals and permits issued by state agencies, the necessity of seeking local approvals for this utility construction Project is governed by Wis. Stat. §§ 196.491(3)(i) and 196.491(4)(c). The Applicants work with all local units of government to ensure that the representatives of those units of government affected by the Project are informed regarding the Applicants' proposed construction activities.

The Applicants will apply for those permits and other authorizations governed by local ordinances (county, town, village or city) that involve matters of public welfare and safety. Because the ordinances of the local units of government vary, each construction project may involve different local permits or authorizations. The public safety-related permits or

authorizations that the Applicants apply for generally include road crossing permits, road weight limits, noise abatement ordinances (usually involving hours or times of construction), building permits (for such construction as control houses), and other similar public safety concerns for which permits or authorizations may be required by local ordinance.

Local ordinances also often address siting and location issues for the construction of utility facilities, land use issues including recreational uses and aesthetics, or natural resource protection issues associated with ground-disturbing activities. These types of authorizations would require conditional use permits, zoning permits or variances, which often involve quasi-judicial proceedings and the exercise of discretion on the part of the local unit of government on whether the authorization or permit may be granted. Because the Commission's statutory obligation is to address the siting of proposed utility facilities, and to address land use, recreational use and aesthetics in the siting and route selection for transmission lines, the Applicants do not apply for these types of permits or authorizations. However, the Applicants will supply the involved local governments with information about the Project and requests the various units of local government to provide the PSCW and Applicants with their comments or concerns regarding the siting and location of the proposed Project.

Similarly, at the county level, local permits and ordinances might otherwise apply to ground disturbing activities associated with the proposed Project routes absent the provisions of Wis. Stat. § 196.491(3)(i).

Six counties (La Crosse, Jackson, Monroe, Juneau, Columbia, Sauk) crossed by the Northern Route regulate ground disturbing activities under their shoreland ordinances. Dane County and Trempealeau County have erosion control and stormwater management ordinances that apply to certain ground disturbing activities. In addition to a shoreland zoning ordinance, Trempealeau County also has a Comprehensive Zoning Ordinance that addresses a number of other resources of environmental significance.

Both options of the Southern Route cross through the same counties as the Northern Route (except for Jackson and Trempealeau), therefore, shoreland zoning ordinances would apply to activities in wetlands, and erosion control and stormwater management standards exist for ground-disturbing activities in these counties. In addition, a portion of Sub-segment O19 on the Southern Route falls within Vernon County, which also regulates ground disturbing activities under its shoreland ordinance.

1.6.4 Railroad ROWs

Route segments on the proposed route alternatives cross or share railroad ROW along all or parts of their length as shown in Tables 1.6.4-1 and 1.6.4-2 below.

Table 1.6.4-1 – Proposed Northern Route Railroad ROW

Segment	Share ROW	Cross ROW
N	None	Canadian National, Canadian Pacific, Union Pacific
J	None	Canadian Pacific
D and A	None	Wisconsin & Southern

Table 1.6.4-2 – Proposed Southern Route Railroad ROW

Segment	Share ROW	Cross ROW
O	None	Canadian Pacific
L	Canadian Pacific	None
J	None	Canadian Pacific
I	Canadian Pacific	Canadian Pacific
C and B	None	Wisconsin & Southern

In the Applicants' communications with the railroad companies, and consistent with the Applicants' previous project experiences, the railroad companies desire to only review final alignments once a transmission line route is ordered. Upon selection of a route by the Commission, the Applicants will follow standard permit application procedures for utility crossings and installations. Where the transmission line parallels a railroad, the Applicants will work with the railroad companies to determine if installation of the new line would create objectionable induction in their facilities and provide mitigation if necessary. Where the transmission line crosses a railroad, the Applicants will comply with National Electrical Safety Code (NESC) Sections 231 and 232, as adopted in Wis. Admin. Code ch. PSC 114, or the railroad company's reasonable clearance requirements, whichever is greater.

1.6.5 Pipeline ROWs

Route segments on the proposed route alternatives cross or share pipeline ROW along all or parts of their length as shown in Tables 1.6.5-1 and 1.6.5-2 below.

Table 1.6.5-1 – Proposed Northern Route Pipeline ROW

Segment	Share ROW	Cross ROW
N	Northern Natural Gas	Northern Natural Gas
H	None	Northern Natural Gas

Table 1.6.5-2 – Proposed Southern Route Pipeline ROW

Segment	Share ROW	Cross ROW
O	Northern Natural Gas	Northern Natural Gas
I	None	Northern Natural Gas

The Applicants have consulted with Northern Natural Gas. Upon selection of a route by the Commission, the Applicants will work with the pipeline company to ensure the approved route alignment will not adversely impact pipeline operation. Where the transmission line parallels a pipeline, the Applicants will work with Northern Natural Gas to determine if installation of the new line would create objectionable induction in their facilities and provide mitigation if necessary. Where the transmission line crosses a pipeline, the Applicants will work with Northern Natural Gas on clearances from the pipeline to the Applicants' structures or foundations.

1.6.6 Wisconsin Department of Transportation ROWs

Northern and Southern Route segments share Interstate (I) and/or United States Highway (USH) along all or parts of their length as indicated below.

Table 1.6.6-1 – Proposed Northern Route Highway Corridor Sharing

Northern Route		
Segment	**Highway**	**Length (miles)**
P	USH 53	4.5
P-East	USH 53	7.1
N	I-94	34.0
	I-90/94	22.2
K	I-90/94	4.2
J	I-90/94	2.3
H	I-90/94	20.5
G	I-39/90/94	4.2
E	I-39/90/94	10.7
Total w/P		**102.5**
Total w/P-East		**105.1**

Table 1.6.6-2 – Proposed Southern Route Highway Corridor Sharing

Southern Route		
Segment	**Highway**	**Length (miles)**
O	USH 53	4.8
	i-90	17.6
J	I-90/94	2.3
I	I-39	4.8
G	I-39/90/94	4.2
Total w/B		**33.6**
Total w/B-North		**33.6**

The construction of a new transmission line along highway corridors in Wisconsin presented many issues that needed to be addressed as part of the coordination process with WisDOT. The Applicants and their consultants met with WisDOT representatives on multiple occasions to discuss the Project and to give WisDOT an opportunity to provide early input during the routing and siting process. A general overview of the Project was provided to WisDOT staff at these meetings and ideas about the Project were shared. It was agreed that the preparation of a preliminary constructability report to formally document issues associated with the Project along highway corridors would help WisDOT in its effort to prepare a letter of understanding regarding the Project, as requested by the Applicants. The preliminary constructability report should expedite the WisDOT permitting process once a route is selected by the Commission.

In addition to reviewing constructability issues associated with existing highway facilities, consideration was given to WisDOT's future highway expansion plans. Early coordination with WisDOT ensured that the Applicants were aware of WisDOT highway expansion projects near the proposed routes. This information was used to help develop the location of alternative alignments with respect to WisDOT corridors.

The preliminary constructability report was submitted to WisDOT for review and comment. The text of this report is provided in Appendix H, Exhibit 4. WisDOT has indicated that it expects to complete their review in October, 2013. From the Applicants' numerous consultations with the WisDOT, it is expected that WisDOT will provide overall acceptance of the shared corridor, which already incorporates adjustments made to respond to future WisDOT expansion plans and the routing through selected interchanges. Following the review of the preliminary constructability report and, in particular, after the Project's route is selected by the Commission, the Applicants will meet with WisDOT, discuss any remaining concerns, and incorporate the resolutions to these concerns in the Project's detailed engineering. Once detailed engineering is completed, the Applicants' will submit a final constructability report to WisDOT.

WisDOT holds several scenic easements along I-94 in Jackson County, south of Black River Falls. Three of these easements restrict the Applicants' ability to use the land for this Project within varying distances from the highway corridor. These scenic easements exist because, as remnant properties were sold off after I-94 was developed, WisDOT retained rights to minimize future development and vegetation clearing. The Applicants worked with WisDOT to determine how to route the transmission line through these areas.

To clarify the impacts of a preferred centerline and plausible alternative centerlines that avoid the scenic easements, the Applicants provided additional information and data for three scenarios. After delineating the scenic easements, the Applicants met with WisDOT on May 17, 2013 and provided maps and construction data for each of the following three options.

- Option A (preferred option): Locate the Project on WisDOT ROW and, where necessary due to the WisDOT ROW not being wide enough, have the transmission line ROW overlap the scenic easement areas. WisDOT and the Applicants agree that WisDOT would need to modify or release its rights in the scenic easements for this option.
- Option B: Locate the Project entirely on WisDOT ROW such that the transmission line ROW is entirely outside the scenic easement areas. In some cases, this resulted in the route being very close to the roadway or in the median.
- Option C: Locate the Project entirely outside of WisDOT ROW and entirely outside the scenic easement areas, with related impacts to trees and scenic vistas.

These options were reviewed and WisDOT agreed with the Applicants' preferred option (Option A above). The minutes of that meeting, as reviewed by WisDOT, are attached in Appendix H, Exhibit 5. As a result of the meeting, WisDOT requested more detailed maps of the scenic easement areas and the Project's routes. These maps are also included in Appendix H, Exhibit 5.

If the Northern Route were selected by the Commission, WisDOT and the Applicants would work together to determine the appropriate process for modifying or releasing the scenic easements and identifying any compensation that may be due to WisDOT.

1.7 Construction Schedule

The Applicants anticipate constructing the Project according to the following schedule:

Project Activity	**Preliminary Date**
Joint PSCW CPCN and WDNR Utility Permit Application Submittal	October 2013
PSCW CPCN Approval - Anticipated	April 2015
WDNR Utility Permit Issuance - Anticipated	May 2015
Start Transmission Line Construction	July 2016
Start Substation Construction	April 2017
Project In-Service	December 2018

The Applicants have not identified any specific seasonal construction constraints at this time. However, some specific construction activities are dependent on obtaining required line outages on transmission and distribution lines that are owned by multiple entities or may only be accomplished during specific generating unit outages. Therefore, these schedules are dependent on the availability of outages.

1.8 Project Maps

Consistent with the Application Filing Requirements and consultation with state agencies, a set of Project maps is provided in Appendix A, Figures 1 through 10. The maps showing the proposed routes and other Project data are provided on aerial photographs and include Environmental, Parcel, Land Use and Existing Utility/Infrastructure data. Appendix A also contains environmental information required to support WDNR permitting activities. The Applicants are providing separately to the Commission, in electronic format, Geographic Information System (GIS) data files supporting the mapping.

1.9 ESRI ArcGIS Data Files

All Project maps were created using ESRI ArcGIS 10.1. A spreadsheet of each GIS file, including a description of the data, the data source, and the date when the data was generated or collected will be provided to the Commission on a disc.

1.10 Mailing Lists

Mailing lists of all affected private and public landowners located within 300 feet of the proposed transmission centerlines and properties on both sides of a street, labeled Appendix I, List 1 and List 2, respectively, are provided separately on disc. The lists include adjacent riparian landowners where temporary bridges are proposed for access. A list of the owners of the Project's substation sites and the owners of properties adjacent to the proposed substation

sites, as requested in Section 1.3 of the Commission's Substation Application Filing Requirements, is also provided in Appendix I, List 1 and List 2. In addition, mailing lists of all the below-listed entities affected by the proposed Project are provided in Appendix I, Lists 3 through 7:

- County, town and municipal clerks;
- Chief executive officers of counties, towns, villages and cities in which the Project is proposed;
- The appropriate Regional Planning Commission;
- Applicable state and federal agencies; and
- Local print and broadcast media that have been informed about the Project.

Project communications with landowners was initially based on tax roll and spatial data acquired from relevant counties and, in some cases, municipalities. The Applicants' requested data through the county's land information office and/or tax assessor. Some of the data was supplied in a spatial format that allowed the Applicants to query parcels in certain proximity to the proposed routes. Some counties do not have parcel spatial data available. In these cases, the Applicants acquired the assessor's tax roll for each municipality potentially affected by the proposed routes and used the legal description (when available) to determine which parcels are potentially affected.

Each county in the state performs parcel updates differently and with varying regularity. Some county data will be quite current upon delivery, while other counties may only update their information quarterly or annually. The parcel updates performed by local governments include, but are not limited to, parcel splits, annexations and newly created parcels, which may result in new right-of-way impacts on landowners. While this variability of data from government sources raises the possibility that the data could be slightly incomplete or inaccurate, there are no databases that are more complete. To address any possible short-comings in the government databases, whenever possible, returned mail from open house invitations or other communications are tracked and the affected parcel records for these individuals are searched for more current information. Parcel information is also updated when feedback is provided to the Applicants from landowners or from another third party.

New parcel data was requested strategically (and data records were refreshed) throughout the life of the Project in an attempt to utilize the latest information that is publicly available for project outreach. It is important to keep in mind that parcel ownership continually changes, thus no data set can ever be considered 100 percent accurate.

2.0 PROJECT NEED AND ENGINEERING

2.1 Area Load Information

Badger Coulee is a Multi-Value Project (MVP) under the MISO Tariff, with multiple reliability, economic and policy impacts for Wisconsin and regional customers. To evaluate these impacts, the Applicants relied upon different sources for historical and projected load information.

The historical and projected load information ATC used for its comprehensive PROMOD analysis of project impact on energy costs and losses is described in Section 5.0 of the Planning Analysis, which is provided as Appendix D, Exhibit 1 of this Joint Application. ATC developed low, mid and high growth rates for load and energy, both within ATC and within MISO, and included these values as appropriate in its six Futures found in Appendix D, Tables 12 and 13 (2020 and 2026 Futures Matrices). Detailed information on the load projections for this PROMOD Futures analysis is included in Addendum C of the Planning Analysis. Historical detail of US Peak, Energy and Load Factor Data dating back to 1990 along with ATC Peak, Energy and Load Factor Data dating to 2001 is included in Addendum E of the Planning Analysis. Total Electric Industry Sales dating back to 2000 is provided for the states in the Midwest in Addendum E of the Planning Analysis.

For its subsequent PROMOD sensitivity analysis, ATC used the Mid-Low Demand and Energy Forecast from the Business as Usual (BAU) Future in the 2011 MTEP (MTEP 11). Further details about this forecast are set forth in Addendum F of the Planning Analysis.

For its analysis of the reliability impacts of the project in Sections 5.9 through 6.1 of the Planning Analysis, the Applicants relied primarily upon the Western Wisconsin Transmission Reliability Study (Addendum A to the Planning Analysis). The base models for the steady-state power flow analyses in this study were the 2018 summer peak and off-peak models developed for the 2008 MTEP (MTEP 08). The base model for the transient stability analysis in this study was the 2014 Light Load model from the 2009 MTEP (MTEP 09).

Load information for the NSPW and DPC service areas in the La Crosse, Wisconsin and Winona, Minnesota areas from 2002 to 2012 is contained in the NSPW Need Study (Appendix D, Exhibit 2). Substations serving these areas reached a peak non-coincident load of 481 Megawatt (MW) in 2012.

2.2 Modeling Information

PSS®E models were used for reliability analysis and transfer analysis calculations in the Planning Analysis, which have been submitted confidentially. PROMOD and PowerBase models and databases were used for the economic evaluation and have also been submitted confidentially.

In the NSPW Need Study (Appendix D, Exhibit 2), the 2017 summer peak load conditions models were used from the 2012 series of models created by Midwest Reliability Organization ("MRO") as the base models for the steady-state (powerflow) analysis. The program used for this powerflow analysis was PSS®E Version 32.

2.3 Transmission System Alternative Studies

Numerous transmission system alternatives were considered as a part of this analysis. These included four Extra High Voltage (EHV) alternatives (345 kV and 765 kV) along with a Low Voltage Alternative. Details of the alternatives evaluated are included in Section 3.0 of the Planning Analysis (Appendix D, Exhibit 1). The results of this evaluation and comparisons of the performance of the alternatives are included throughout the Planning Analysis. A full summary and comparison of the transmission alternatives are presented in Section 11.0 of the Planning Analysis. Further detail pertaining to the reliability analysis performed is presented in the Western Wisconsin Transmission Reliability Study in Addendum A of the Planning Analysis.

In addition, the MISO evaluated a system alternative comprised of rebuilding overloaded 138 and 161 kV lines, along with upgrading existing transformers and adding others. The alternative was not carried forward because the costs exceeded that of the Project and provide less benefit to the transmission grid.[1]

2.4 No-Build Options

The no-build option is the base case in the economic evaluations of the Project and the other project alternatives in the Planning Analysis (Appendix D, Exhibit 1). In these evaluations, the transmission system is analyzed with and without the project alternative that is being analyzed. If the analysis produces less favorable results without the project than with the project (for example, higher net energy costs), the no-build option would have negative reliability and electrical supply impacts compared to the alternative under consideration.

The Badger Coulee Project produces substantial net benefits in all future scenarios compared to the no-build option (Appendix D, Figure 1, Table 1 of the Planning Analysis). As noted above in Section 2.1, this Project is a MISO MVP that provides a combination of economic, public policy and reliability benefits. The Project provides significant economic benefits that would not be realized under a no-build alternative. Public policy benefits and renewable energy goals and mandates would be more difficult to achieve without this Project under a no-build alternative. This Project also alleviates the need for certain lower voltage projects and fixes that would be required to maintain system reliability without the Badger Coulee Project. These benefits are detailed further throughout the Planning Analysis.

2.5 Energy Conservation and Efficiency, and Load Response

2.5.1 Programs and Services for Customers

Focus on Energy is the statewide energy efficiency and load response program in Wisconsin. Detailed descriptions of the energy conservation, efficiency and load response programs available to customers in the project area, including the historical and potential future results of such programs, are included in Section 10.4 and Addendum H of the Planning Analysis (Appendix D, Exhibit 1).

[1] MISO Multi Value Project Portfolio Results and Analyses (Jan. 10, 2012), p. 28

2.5.2 Efficiency/Demand Response Needed to Eliminate or Alter Project Need

It is difficult to determine the total amount of energy efficiency and load reduction that could provide the same benefits as the Project because the Project is an MVP that provides multiple benefits. For example, high levels of persistent, targeted load reduction would have to occur to reduce, alter or eliminate the reliability needs that the Project fulfills. With respect to energy costs, it is hard to evaluate energy efficiency as a substitute for lower energy costs because energy efficiency would not reduce the cost of electricity that is actually consumed. As a rough proxy for one of the benefits of the Project (the Renewable Investment Benefit), ATC selected the overall estimated increase in transfer capacity provided by the Project. This is estimated to be between 273 MW on peak and 606 MW off peak. The NSPW Need Study indicates an increase of approximately 360 MW of thermal capacity. In order to serve as a viable substitute for this benefit, energy efficiency and load reduction would have to achieve these levels of load reduction. Further information regarding this analysis is included in Section 10.5 of the Planning Analysis (Appendix D, Exhibit 1) and in the NSPW Need Study (Appendix D, Exhibit 2).

2.5.3 Feasibility of Achieving Levels that Eliminate or Alter Project Need

Fundamental changes in legislative policy, programs and budgets would be required to achieve substantially higher levels of energy efficiency and demand response. Not only would such measures have to be installed on a timely basis and at the right locations, they would also have to function as continuous, firm resources persistently into the future. Most energy efficiency and load reduction programs are voluntary, and thus lack the firmness of a specific infrastructure project like the Badger Coulee Project. Additionally, ATC does not provide such programs to retail electric customers nor does it have the ability to curtail retail load (except through actions of load-serving entities under emergency conditions).

Substantially increased levels of energy efficiency and load reduction would also have to be shown to be technically feasible and cost-effective compared to the Project. Based on its review of publicly available data, the Applicants cannot conclude that any combination of energy efficiency and load reduction could feasibly and cost-effectively provide the same package of diverse benefits as the Project. These benefits include increases in transfer capability, system reliability, load serving capacity in western Wisconsin, the ability to integrate new generation resources, and economic benefits, among others.

2.6 Non-Transmission Alternatives

The non-transmission alternatives include, in a specific order of priority, energy efficiency and load reduction as well as renewable and conventional generation. From the outset, the Planning Analysis (Appendix D, Exhibit 1) considered these priorities and included a wide variety of such non-transmission alternatives at the distribution level, within its own transmission system, and MISO-wide.

Numerous variations of load levels and generation types are incorporated into the future scenarios developed by ATC for its economic evaluation. Several of these scenarios include increased levels of energy efficiency and renewable resources. Also, for this Planning Analysis, ATC developed and applied a planning technique that models “Distributed Resources” within

the ATC system (Appendix D, Section 10.3). This technique incorporates demand response and distributed-generation technologies that may serve to offset load in the future. Further details of how these priority resources fit into ATC's analysis is included in Sections 5.0 and 10.0 and Addenda C through E of the Planning Analysis (Appendix D, Exhibit 1).

2.6.1 Noncombustible Renewable Energy Resources

Hydro, wind, and solar powered renewable energy resources were modeled and analyzed as a part of this evaluation. Varying levels of wind energy were included within the economic evaluation. The low, middle and high levels of this driver vary by both the location of the wind power within the region and the states to which this wind power is allocated for the renewable portfolio standard compliance purposes. Photovoltaic capacity within ATC was added in the 2026 Carbon Constrained Future (Appendix D, Planning Analysis, Tables 12 and 13). Further details of the inclusion of these noncombustible renewable energy resources can be found in Sections 5.0 and 10.2 and Addenda C through E of the Planning Analysis (Appendix D, Exhibit 1).

2.6.2 Combustible Renewable Energy Resources

Combustible renewable energy resources in the form of biogas or biomass generation were modeled as a part of the economic futures. For example, a 200 MW biomass unit within ATC was added in the 2026 Carbon Constrained Future (Appendix D, Exhibit 1, Tables 12 and 13). Further details of the inclusion of these combustible renewable energy resources can be found in Sections 5.0, 10.2 and 10.3 and Addenda C through E of the Planning Analysis (Appendix D, Exhibit 1).

2.6.3 Nonrenewable Combustible Energy Resources

2.6.3.1 Natural Gas

Generation portfolios consisting of varying levels of natural gas-fired generation expansion were analyzed as a part of this evaluation, based on different natural gas price forecasts and MISO gas-only generation expansion scenarios (Appendix D, Planning Analysis, Tables 12 and 13). Further details of the inclusion of these natural gas-fired resources can be found in Sections 5.0 and 10.2 and Addenda C through E of the Planning Analysis (Appendix D, Exhibit 1).

2.6.3.2 Oil or Coal with a Sulphur Content of Less Than 1%

Generation portfolios consisting of varying levels of oil or coal-fired generation expansion were analyzed as a part of this evaluation. Further details of the inclusion of these oil and coal-fired resources can be found in Sections 5.0 and 10.2 and Addenda C through E of the Planning Analysis (Appendix D, Exhibit 1).

2.6.3.3 All Other Carbon-Based Fuels

Generation portfolios consisting of conventional carbon-based fuels were analyzed as a part of this evaluation, based on different coal-price forecasts, levels of environmental regulation and MISO generation expansion scenarios (Appendix D, Planning Analysis, Tables 12 and 13). Further details of the inclusion of these generation resources can be found in Sections 5.0 and 10.2 and Addenda C through E of the Planning Analysis (Appendix D, Exhibit 1).

2.7 Market Efficiency Projects

The economic benefits of the Projects and its alternatives were analyzed and calculated over the 40-year economic life of the Project. These benefits consist of the Avoided Cost of Reliability Projects, Insurance Value, Energy-Cost Savings, Loss Savings, and Renewable Investment Benefit. Summaries of these benefits for the Project and its alternatives are set forth in Section 5.6 through 5.9 of the Planning Analysis (Appendix D, Exhibit 1), and details of the methodology utilized to calculate these benefits are included throughout the Planning Analysis. A full summary and comparison of the costs and benefits of the transmission alternatives are presented in Section 11.0 of the Planning Analysis. Spreadsheets containing the present value analysis with cumulative tables for the life of the Project have been submitted confidentially as part of Addendum G of the Planning Analysis.

2.8 Transmission Network Alternatives

2.8.1 Relevant Regional Studies

Numerous regional studies have been referenced as a part of this evaluation. These include the Upper Midwest Transmission Development Initiative, the Strategic Midwest Area Renewable Transmission Study, the Minnesota Capacity Validation Study, the Minnesota Renewable Energy Standard Study, the MISO Regional Generation Outlet Study, the MISO MVP Study, and various MTEP studies. Further details of these studies are included in Sections 2.1, 2.2 and 8.0 of the Planning Analysis (Appendix D, Exhibit 1).

2.8.2 Reliability and Performance Benefits

Numerous transmission system alternatives were considered as a part of this analysis. These included various Extra High Voltage (EHV) alternatives along with a Low Voltage Alternative. Details of the alternatives evaluated are included in Section 3.0 of the Planning Analysis (Appendix D, Exhibit 1). Summaries of the results for each alternative are set forth in Sections 5.6 through 5.9. Results of this evaluation and comparisons of the performance of the alternatives are included throughout the Planning Analysis. A full summary and comparison of the costs and benefits of the transmission alternatives is presented in Section 11.0 of the Planning Analysis. Further detail pertaining to the reliability analysis performed is presented in the Western Wisconsin Transmission Reliability Study in Addendum A of the Planning Analysis.

Further, in MISO's MVP Analysis, MISO concluded that the Project would provide a vital link between Wisconsin's two 345 kV systems in the east and the west. This connection would provide an additional wind outlet path across the state, allowing lower cost wind into Wisconsin. MISO further determined that the project would mitigate twelve bulk electric system North American Electric Reliability Corporation (NERC) Category B thermal constraints and eight NERC Category C constraints that would otherwise need to be addressed separately.

2.8.3 Electrical Losses

Details of the electrical loss evaluation methodology and results for each of the alternatives analyzed are presented in Sections 5.4.9 and 5.7 of the Planning Analysis (Appendix D, Exhibit

1). Details of the loss analysis performed as a part of the Western Wisconsin Transmission Reliability Study are presented in Addendum A of the Planning Analysis.

2.8.4 Generator Interconnection Studies

This Joint Application does not include a generator interconnection. Therefore, these studies are not applicable.

2.8.5 New Distribution Substations

This Joint Application does not include a new distribution substation. Therefore, these studies are not applicable.

2.8.6 Files

As stated in Section 2.2, data files for PSS®E reliability analysis and PROMOD / PowerBase economic analysis along with the associated output files and summaries supporting the Planning Analysis contained in Appendix D, Exhibit 1 were provided separately with a request for confidentiality.

2.9 Local Transmission Level Alternatives

2.9.1 Studied Alternatives

A Low Voltage Alternative was developed and analyzed as a part of this local transmission level alternative evaluation. This alternative consists of a combination of new, rebuilt and uprated construction of 161 kV, 138 kV, 115 kV and 69 kV transmission facilities. This alternative also includes reactive compensation devices such as static VAR compensators (SVCs) and capacitors. Additional details of this alternative are presented in Section 3.2 of the Planning Analysis (Appendix D, Exhibit 1).

2.9.2 Reason for Rejecting Local Transmission Level Alternative

The Low Voltage Alternative was evaluated in the same manner as the other EHV alternatives, including this Project. Through this evaluation, the Applicants rejected this option because the Low Voltage Alternative did not provide the same level or diversity of benefits as this Project. A full comparison of the results of this evaluation can be found in Sections 1.0 and 11.0 of the Planning Analysis (Appendix D, Exhibit 1).

2.9.3 Substation Facilities That Would Be Added or Altered

Each of the project alternatives analyzed are described in detail in Section 3.0 of the Planning Analysis (Appendix D, Exhibit 1), including the endpoint substations that they would connect to. System one-line diagrams of the alternatives are included in Addendum B of the Planning Analysis. Additionally, the Project's substations facility modifications are described in Section 1.5.8 of this Joint Application.

2.10 Regional Transmission Organization Information

2.10.1 Cost Benefit Analysis and Cost Allocation

In December 2010 and October 2011, FERC approved MISO's MVP Tariff that defines MVP standards and provides for cost-sharing of projects that meet these standards after a comprehensive planning analysis. MISO staff subsequently analyzed and recommended a set of MVP projects, including this Project, for inclusion in Appendix A of the 2011 MTEP. These MVP projects were approved by the MISO Board of Directors (BOD) on December 8, 2011 with the BOD directing "transmission owners to use due diligence to construct the facilities approved in the plan." The Applicants used the MISO Tariff (including the MVP tariff and the network-service tariff) to calculate the costs of the Project that will be included in the revenue requirements of Wisconsin customers.

Comprehensive details of the cost benefit analysis and cost allocation per the MISO Tariff is contained throughout the Planning Analysis (Appendix D, Exhibit 1). A complete summary of the costs and benefits of the various alternatives are included in Section 11.0 of the Planning Analysis. Details pertaining to the calculation of the net revenue requirement for the Project based on the MISO Tariff are contained in Addendum G of the Planning Analysis.

2.10.2 Applicable Transmission Tariffs

The Applicants used the MISO Tariff (including the MVP Tariff and the Network Service Tariff) to calculate the costs of the Project; such costs would be included in the revenue requirement of customers in the State of Wisconsin. Details pertaining to the calculation of the net revenue requirement for the Project based on the MISO MVP Tariff are contained in Addendum G of the Planning Analysis (Appendix D).

2.10.3 Transmission Service Agreements

This provision is not applicable to this proceeding.

3.0 MAGNETIC FIELDS

The term EMF refers to electric and magnetic fields that are associated with all electrical devices. For the lower frequencies associated with power lines, EMF should be separated into electric fields and magnetic fields.

Electric and magnetic fields arise from the flow of electricity, are dependent on the voltage and current carried by a transmission line, and are measured in kilovolts per meter (kV/m) and milliGauss (mG), respectively. The intensity of the electric field is proportional to the voltage of the line and the intensity of the magnetic field (MF) is proportional to the current flow through the line conductors. Transmission lines operate at a power frequency of 60 hertz (cycles per second).

Current passing through any conductor produces a MF in the area surrounding the conductor. The MF decreases rapidly with increasing distance from the conductor. The MF associated with a transmission line is expressed in units of magnetic flux density, or mG.

Considerable research has been conducted throughout the past three decades to determine whether exposure to power-frequency (60 Hz) MFs cause biological responses and health effects. These epidemiological and toxicological studies have shown no statistically significant association between MF exposure and health risks. The most recent reviews of research regarding health effects from power-frequency MFs conclude that the evidence of health risk is weak. The PSCW has also concluded that there is no scientific link between MFs and health effects.

The National Institute of Environmental Health Sciences (NIEHS) issued its final report on June 15, 1999 following six years of investigation. NIEHS concluded that there is little scientific evidence linking extra low frequency (ELF) MF exposures with health risks. In 2007, the World Health Organization (WHO) concluded a review of the health implications of MFs and also noted that "virtually all of the laboratory evidence and the mechanistic evidence fail to support a relationship between low-level ELF magnetic fields and changes in biological function or disease status." (Environmental Health Criteria Volume No. 238 on Extremely Low Frequency Fields at p. 12, WHO [2007]).

WHO concluded that:

> Given both the weakness of the evidence for a link between exposure to ELF magnetic fields and childhood leukemia, and the limited impact on public health if there is a link, the benefits of exposure reduction on health are unclear. Thus, the costs of precautionary measures should be very low.

(Id. at p. 13).

Since 1989, the PSCW has periodically reviewed the science on EMF, and has held hearings to consider the topic of EMF and human health effects. The most recent hearings on EMF were held in July 1998. In January 2008, the PSCW published a fact sheet regarding EMF. In it, PSCW noted that:

> Many scientists believe the potential for health risks for exposure to EMF is very small. This is supported, in part, by weak epidemiological evidence and the lack of a plausible biological mechanism that explains how exposure to EMF could cause disease. The magnetic fields produced by electricity are weak and do not have enough energy to break chemical bonds or to cause mutations in DNA. Without a mechanism, scientists have no idea what kind of exposure, if any, might be harmful. In addition, whole animal studies investigating long-term exposure to power-frequency EMF have shown no connection between exposure and cancer of any kind.

(EMF-Electric & Magnetic Fields, Public Service Commission of Wisconsin [January 2008]).

In a March 2013 CPCN Order, the Commission affirmed the conclusions in the fact sheet, noting that "A 'perception of harm' from electromagnetic fields (EMF) emanating from overhead transmission lines is not rationally founded and cannot be the basis of a Commission decision that must be based upon fact." Western Milwaukee County Electric Reliability Project, Final Decision at 32, PSCW Docket No. 5-CE-139 (March 20, 2013; as modified March 27, 2013).

Under the Applicants' direction, a magnetic field study was performed and the study report is provided in Appendix G, Exhibit 1. The report documents magnetic field calculations for the proposed transmission line, and magnetic field measurements taken at the Cardinal and North Madison Substations. The report provides the magnetic field calculations for all of the proposed line configurations on the proposed route segments and alternatives and was prepared following the guidance set forth in the Commission's Application Filing Requirements for both transmission lines and substations. Calculations were performed using the EPRI ENVIRO module of the EPRI EMF Workstation. All figures and tables referenced in Sections 3.1 through 3.6 below are contained in appendices to the report.

3.1 Magnetic Field Profiles

The configuration of the transmission line within any route segment may vary depending on the transmission line route and segment alternatives chosen, the presence or absence of existing transmission and distribution facilities, and other constraints. The EMF Segment Map in Appendix D of the report provides the location of each unique facility configuration and profile developed. The tables in Appendix E provide a cross reference identifying the locations, the figures in Appendix I identify the existing (if any) configuration of transmission and distribution facilities and the final facility configurations at each location, and the tables in Appendix H provide calculated magnetic field profiles for each facility configuration.

3.2 Routes with Existing Electric Lines

Pre- and post-construction magnetic field profiles are provided for the existing (if any) and final configuration of electric facilities along the proposed route alternatives. The location and configuration of existing facilities and final facility configurations are identified in the report.

3.3 Routes with Multiple Adjacent Underground Circuits

Pre- and post-construction magnetic field profiles account for the presence of single and multiple adjacent underground electric circuits.

3.4 Magnetic Field Data Tables

The tables provided in the report follow the format and content of Table 1 of the Commission's Application Filing Requirements and provide the estimated magnetic field levels at 80% and 100% of peak load for one- and ten-years post construction out to 300 feet from the configuration centerline. As applicable, the tables have been modified to account for estimated present magnetic field levels for existing facilities.

3.5 Magnetic Field Model Assumptions

The figures identifying the facility configuration along the line segments contain the modeling assumptions including: the conductor Phase ID and phase angles; a pole design diagram identifying the dimensions of pole arms and conductor locations, the horizontal distance from the conductors to the poles and the height of all conductors above ground at mid-span. Where underground electric lines exist, the distance below the ground surface is provided.

The figures also provide the estimated current levels for the year of estimated in service (2018) and 10 years-post construction, and pre-construction current levels for existing electric facilities where applicable.

3.6 Existing Substations

As required by Section 4.0 of the Commission's Substation Application Filing Requirements, magnetic field measurements at the existing North Madison and Cardinal Substations were taken around the perimeter and within the substation. The measurements are provided on diagrams of the substations included as Appendices F and G, respectively, of the report. The date, time and conditions at the time the measurements were taken are noted in the diagrams.

Note, the Briggs Road Substation is assumed to be an existing substation for the purposes of this application. However, it is currently under construction and therefore magnetic field measurements cannot be taken.

4.0 PROJECT COSTS

4.1 Transmission Route Cost Estimates

Total Project cost estimates for each route alternative are provided in Table 4.1-1 below. Costs are based on the projected in-service year (2018).

Table 4.1-1 – Total Project Cost Estimates

	Cost Categories	Proposed Route			
		Northern	Northern w/P-East	Southern	Southern w/B-North
Briggs Road to North Madison Transmission Line	Material	116,040,000	115,190,000	100,360,000	100,360,000
	Construction Labor	212,230,000	211,560,000	194,810,000	194,810,000
	Real Estate	47,470,000	47,100,000	48,780,000	48,780,000
	Environmental	6,800,000	6,800,000	5,050,000	5,050,000
	Other Labor	46,790,000	46,710,000	41,790,000	41,790,000
	Distribution Modifications	1,600,000	1,050,000	3,720,000	3,720,000
	Subtotal	**430,930,000**	**428,410,000**	**394,510,000**	**394,510,000**
North Madison to Cardinal Transmission Line	Material	18,680,000	18,680,000	17,590,000	17,420,000
	Construction Labor	30,240,000	30,240,000	29,960,000	29,660,000
	Real Estate	5,870,000	5,870,000	8,770,000	8,730,000
	Environmental	900,000	900,000	950,000	950,000
	Other Labor	6,910,000	6,910,000	7,480,000	7,470,000
	Distribution Modifications	1,800,000	1,800,000	810,000	1,140,000
	Subtotal	**64,400,000**	**64,400,000**	**65,560,000**	**65,370,000**
	Subtotal Line Costs	**495,330,000**	**492,810,000**	**460,070,000**	**459,880,000**
	Subtotal Substation Costs	**19,280,000**	**18,450,000**	**18,450,000**	**18,450,000**
	Subtotal Line and SS Cost	**514,610,000**	**511,260,000**	**478,520,000**	**478,330,000**
Other Project Costs	Precertification	14,500,000	14,500,000	14,500,000	14,500,000
	One-Time 5.0% Environmental Impact Fee	20,378,000	20,292,000	19,120,000	19,106,000
	Annual 0.3% Environmental Impact Fee (During Construction)	2,445,400	2,435,000	2,294,400	2,292,700
	Subtotal Other Project Costs	**37,323,400**	**37,227,000**	**35,914,400**	**35,898,700**
	Total Project Cost	**551,933,400**	**548,487,000**	**514,434,400**	**514,228,700**

Line construction cost estimates for each route alternative broken down by segment are provided in Table 4.1-2 below. Costs are based on the projected in-service year (2018). These cost estimates are provided to allow discreet analysis by the Commission for transmission line siting purposes.

Table 4.1-2 – Line Construction Cost Estimates

Segment	Proposed Route			
	Northern	Northern w/P-East	Southern	Southern w/B-North
P	28,700,000			
P-East		26,180,000		
O			254,340,000	254,340,000
N	282,460,000	282,460,000		
M	9,710,000	9,710,000	9,710,000	9,710,000
L			9,980,000	9,980,000
K	9,490,000	9,490,000		
J	6,210,000	6,210,000	6,210,000	6,210,000
I			66,370,000	66,370,000
H	55,020,000	55,020,000		
G	10,520,000	10,520,000	10,520,000	10,520,000
F			37,390,000	37,390,000
E	28,810,000	28,810,000		
D	47,070,000	47,070,000		
C			43,460,000	43,460,000
B			22,090,000	
B-North				21,900,000
A	17,340,000	17,340,000		
Total Line Costs	**495,330,000**	**492,810,000**	**460,070,000**	**459,880,000**

4.2 Transmission Cost Estimates for 345 kV Projects

Project cost estimates for each route alternative broken down by voltage class are provided in Table 4.2-1 below. Costs are based on the projected in-service year (2018).

Table 4.2-1 – Project Costs by Voltage Class

Voltage Class	T-Line / SS	Proposed Route			
		Northern	Northern w/P-East	Southern	Southern w/B-North
345 kV	Transmission	470,580,000	469,430,000	441,320,000	441,000,000
	Substation	19,280,000	18,450,000	18,450,000	18,450,000
	Subtotal	489,860,000	487,880,000	459,770,000	459,450,000
Less than 345 kV	Transmission	21,350,000	20,530,000	14,220,000	14,020,000
	Substation	-	-	-	-
	Subtotal	21,350,000	20,530,000	14,220,000	14,020,000
Distribution		3,400,000	2,850,000	4,530,000	4,860,000
Total Line and SS Costs		**514,610,000**	**511,260,000**	**478,520,000**	**478,330,000**

4.3 Project Substation Costs

Substation construction cost estimates for each route alternative are provided in Table 4.3-1 below. Costs are based on the projected in-service year (2018).

Table 4.3-1 – Substation Construction Cost Estimates

Substation	Cost Categories	Proposed Route			
		Northern	Northern w/P-East	Southern	Southern w/B-North
Briggs Road [1]	Material	4,410,000	3,900,000	3,900,000	3,900,000
	Construction Labor	2,220,000	1,940,000	1,940,000	1,940,000
	Other	670,000	630,000	630,000	630,000
	Subtotal	**7,300,000**	**6,470,000**	**6,470,000**	**6,470,000**
North Madison	Material	4,760,000	4,760,000	4,760,000	4,760,000
	Construction Labor	1,870,000	1,870,000	1,870,000	1,870,000
	Other	1,360,000	1,360,000	1,360,000	1,360,000
	Subtotal	**7,990,000**	**7,990,000**	**7,990,000**	**7,990,000**
Cardinal	Material	1,890,000	1,890,000	1,890,000	1,890,000
	Construction Labor	1,360,000	1,360,000	1,360,000	1,360,000
	Other	740,000	740,000	740,000	740,000
	Subtotal	**3,990,000**	**3,990,000**	**3,990,000**	**3,990,000**
Total Substation Costs		**19,280,000**	**18,450,000**	**18,450,000**	**18,450,000**

[1] Briggs Road Substation costs do not include $68,000 AFUDC for the Northern Route option or $61,000 AFUDC for the other three route options.

5.0 ROUTE INFORMATION

5.1 Routing and Siting Factors

To identify the routes proposed in this Joint Application, the Applicants used a multi-stage process that involved consulting with the PSCW, the WDNR and WisDOT, conducting the public participation process described in Section 7 and following the transmission line siting priorities established by the state of Wisconsin. The Applicants' siting process generally consisted of the following steps.

First, the Applicants identified potential route corridors between established end points meeting the routing priorities defined in Wis. Stat. § 1.12(6). These priorities are to be used consistent with economic and engineering considerations, reliability of the electric transmission system and protection of the environment. The statutory siting priorities include, in order of priority:

a. Existing utility corridors;

b. Highway and railroad corridors;

c. Recreational trails to the extent the facilities may be constructed below ground and do not significantly impact environmentally sensitive areas; and

d. New corridors.

Second, the Applicants screened possible transmission line routes against several criteria, including those specified in Wis. Stat. § 196.491(3)(d), to determine the route alternatives proposed in this Joint Application. To the extent practical, these criteria include, but are not limited to the following, which are not listed in order of priority, nor were they assigned weighted values:

- Location of existing linear infrastructure;
- Use of existing ROWs to minimize the need for additional facility ROW (corridor sharing);
- Locations of cemeteries, schools, day care facilities and hospitals;
- County and state road expansion plans;
- Community and landowner impacts;
- Ability to minimize impacts to environmental and natural resource features, including wetlands, waterways and woodlands;
- Archeological, tribal and historic resources;
- Location of airports and airstrips;
- Avoiding high-density residential areas;
- Conformance with existing and proposed land use patterns;

- Design modifications or construction practices to overcome terrain or other physical challenges; and
- Maintaining compatibility with local agricultural practices.

These elements were evaluated for their presence in the Project area and their relative sensitivity to the construction, operation and maintenance of a transmission line. These considerations were refined using collected data, information gathered from initial agency contacts and public comments.

Third, the Applicants solicited input from landowners and public officials at various stages in the process to identify local issues and concerns with potential transmission line corridors and routes.

Lastly, the Applicants performed a multidisciplinary review and evaluation considering and balancing the quantitative as well as qualitative factors discussed above along with design, engineering, economic and operational considerations, to identify the routes proposed in this Joint Application.

Project Study Area

The proposed Project is located between northern La Crosse County and northern Dane County, spanning nine counties. The study area encompasses more than 4,200 square miles. The study area is vast and diverse including rural agricultural, wooded upland, wetland, wooded wetland, several urbanized communities, two military bases and a number of environmentally sensitive areas.

The northwestern portion of the Project area includes the Driftless (Coulee) Region, Great River State Trail, La Crosse River State Trail, Kickapoo Valley Reserve, and Wildcat Mountain. The Central portion of the Project area includes the eastern edge of the Driftless Region, Black River State Forest, Fort McCoy, Volk Field, Mill Bluff State Park, the Elroy-Sparta State Trail, The 400 State Trail, and the Baraboo Range. The southeastern portion of the Project area includes the Wisconsin Dells, Mirror Lake State Park, Devil's Lake State Park, the eastern edge of the Baraboo Range, Lake Wisconsin, and the Lower Wisconsin River.

The cities of Holmen, Onalaska, La Crosse and Black River Falls are in the northwestern portion of the Project area. The cities of Tomah, New Lisbon, Mauston and Elroy are centrally located. The cities of Wisconsin Dells, Baraboo, Portage and Middleton are in the southeastern portion of the Project area. Numerous smaller urban areas are located throughout.

There are a number of airports within the Project area including two military bases, thirteen public airports, and a few dozen private runways.

Routing and Siting Factors as Applied to this Project

The Project Study Area was developed to meet the system configuration requirements of connecting a 345 kV transmission line between the Briggs Road Substation, the North Madison Substation and the Cardinal Substation. The Briggs Road Substation, which is the northwestern terminus for the Project, is under construction as part of the Hampton-Rochester-La Crosse 345

kV Transmission Project. The North Madison and Cardinal substations are existing facilities located in the southeastern portion of the study area. All three substations have the expansion space needed to accommodate the proposed Project.

With the endpoints established, existing linear features such as transmission lines, other utilities, major roads, and railroads were identified and evaluated as potential transmission line routes, thereby satisfying the routing and siting priorities established in Wis. Stat. § 1.12(6).

In developing the proposed routes, consideration was given to a number of criteria, including but not limited to public and local official input, current land use, engineering and constructability factors, clearances from existing buildings, airports and other infrastructure, environmental constraints and impacts, social/property owner impacts, cost and reliability of the transmission system.

The Applicants consulted with the PSCW and WDNR. The WisDOT was consulted several times regarding issues along the many miles of highway within the study area. The Ho Chunk Nation was consulted regarding Tribal Lands. The Applicants also consulted with several other agencies and organizations including the USFWS, the NPS, Fort McCoy, Volk Field, USACE, DATCP, Mississippi Valley Conservancy, Baraboo Range Preservation Association and the Driftless Area Land Conservancy. The Applicants also had numerous one-on-one meetings with state and local elected and appointed officials.

Significant environmental and wildlife areas located throughout the study area, along with two military bases and a number of airports, resulted in large portions of the study area that needed to be given special consideration or avoided all together. The military bases and public airports were avoided for several reasons. For example, the I-90 corridor was initially considered to be a viable option; however, it goes through Fort McCoy, a major military training base. Representatives of Fort McCoy and Volk Field attended several open houses where they discussed the proposed Project with the Applicants. These officials identified multiple Accident Potential Zones (APZs) in the areas of Fort McCoy and Volk Field which, by Department of Defense regulation, restrict any development that could potentially interfere with aircraft flight paths. The Applicants overlaid the APZs on study area maps and, based on a review of the corresponding regulations, the Project's new 345 kV transmission line would not be possible in or near the I-90 or State Trunk Highway (STH) 16 corridors near Fort McCoy or the I-90/94 corridor near Volk Field.

The Baraboo Range, Devil's Lake State Park, Kickapoo Valley Reserve and Wildcat Mountain were avoided due to environmental considerations. There are many other Federal, State and County Forests and State Trails in the study area, vast in area and length. When it was not feasible to avoid these areas, measures were taken to minimize impacts. There are a number of lakes and rivers throughout the study area. Efforts were made to avoid crossing them whenever possible, and all proposed crossings are co-located with existing crossings. The Driftless Region is so vast that there is no way to avoid it entirely; however, great efforts were made to minimize impacts.

More than 1,300 miles of existing utility corridors, 1,500 miles of transportation corridors and 400 miles of cross country corridors within the study area were identified, reviewed, assessed and considered.

The preferences established Wis. Stat. § 1.12(6) for utilizing existing infrastructure corridors, the need to avoid military bases and airports, the desire to minimize environmental impacts by avoiding high quality and sensitive environmental areas and the advantages of utilizing existing river and lake crossings drove the Project team to select the final route alternatives.

Routes Proposed in this Joint Application

The "Northern Route" is approximately 182 miles in length and goes through eight counties: La Crosse, Trempealeau, Jackson, Monroe, Juneau, Sauk, Columbia and Dane. The Northern Route is comprised of Segments P, N, M, K, J, H, G, E, D, and A (from west to east). Segment P also includes option P-East.

The "Southern Route" is approximately 159 miles in length and goes through seven counties: La Crosse, Monroe, Vernon, Juneau, Sauk, Columbia and Dane. The Southern Route is comprised of Segments O, M, L, J, I, G, F, C and B (from west to east). Segment B also includes option B-North.

Segments M, J and G are common to both the Northern and Southern Routes.

The two proposed routes are superior to all other route alternatives evaluated. Overall, the Northern Route is longer [181.7 miles vs. 159.4 miles], but utilizes existing corridors to a much greater extent than the Southern Route [91 percent vs. 59 percent by length and 62 percent vs. 35 percent by shared ROW area].

On the east end of the Project, between the Cardinal Substation and the North Madison Substation, the Applicants prefer the Northern Route (Segments A and D) over the Southern Route (Segments B and C). The Northern Route utilizes existing corridors to a much greater extent – 79 percent vs. 42 percent. Of these existing corridors, 76 percent of the Northern Route and 22 percent of the Southern Route utilize existing transmission corridors, the highest priority of corridor set forth in Wis. Stat. § 1.12(6). Additionally, comments from the public advocated for minimizing impacts to residential developments and agricultural practices, and encouraged the use of existing transmission corridors when practical. Furthermore, the Northern Route segments are shorter and less expensive than the Southern Route segments.

Between the North Madison Substation and the northwest end of Segment M (the point near Lyndon Station, Wisconsin where Segment N continues north and Segment O heads west), the Applicants prefer the Northern Route (Segments E, G, H, J, K and M) over the Southern Route (Segments F, G, I, J, L and M).[2] The Northern Route utilizes existing corridors to a much greater extent – 93 percent vs. 69 percent. Of these existing corridors, 93 percent of the Northern

[2] Segments G, J and M are segments used by both the Northern and Southern Routes but are included in the comparison for purposes of describing complete Northern and Southern Routes between the North Madison Substation and the northwestern end of Segment M.

Route and 63 percent of the Southern Route utilize existing transmission corridors and highway/railroad corridors, the two highest priority corridors set forth in Wis. Stat. § 1.12(6). Additionally, the Northern Route segments are shorter and will cost approximately 15 percent less than the Southern Route segments. Northern Route Segments E and K require considerably less new ROW than Southern Route Segments F and L, respectively. Segment F (Southern Route) is almost entirely new ROW. Although Segment I (Southern Route) requires less new ROW than Segment H (Northern Route), the Applicants prefer Segment H because Segment I crosses the Wisconsin River twice (in addition to the Wisconsin River crossing on Segment G, which is common to both routes), has more residences within 300 feet of the Project's centerline, crosses three conservation properties, and comes in close proximity to a number of archaeological and burial sites along the Wisconsin River.

Between the northwest end of Segment M and the Briggs Road Substation, the Applicants are not stating a preference for the Northern Route (Segments N and P or P-East) or the Southern Route (Segment O). Choosing between these two proposed route options depends on the weight given to different aspects of the routes. The Northern Route is longer and more costly, but shares existing corridors to a greater extent than the Southern Route. The Southern Route is shorter and lower cost, but has considerably more cross country miles and traverses more challenging terrain than the Northern Route. Both routes cross varying topography and landscapes while traversing through the Coulee section of southwestern Wisconsin to the south central part of the state. The Northern Route, from Segment M to Briggs Road, crosses more forested and non-forested wetland acres (existing plus new). The Southern Route, between Segment M and the Briggs Road Substation, crosses more agricultural lands. The Northern Route has fewer residences within 300 feet of the ROW than the Southern Route. The Northern Route crosses a greater number of waterways. Comparisons of impacts between the two routes are described throughout Section 5 of this Application and in Appendix B.

5.2 Changes to Existing Easements

5.2.1 Location and Width

The Applicants will be acquiring all new high voltage easements for this Project for both new ROW and where the Project ROW overlaps existing transmission line ROW. In those locations where Project ROW overlaps an existing transmission line easement owned by ATC or NSPW, the Applicants are evaluating whether the existing easement will be retained 'as is' or released based on the specific provisions in the easement for the Project.

5.2.2 Potential Problems With Sharing Existing Easements

The Project will not rely on any rights contained in existing easements. New easements will be acquired for all portions of the Project.

5.2.3 Renegotiations or Rewriting of Existing Easements

Existing easements, if retained, will not be modified.

5.3 Route Segments

5.3.1 Structure and Foundation Types and 5.3.2 Transmission Configuration

The Applicants performed preliminary engineering to develop structure types and configurations suitable for each section of line in each of the route alternatives. Typical structure drawings can be found in Appendix C, Figures 10 to 37.

A majority of the structures will be self-supporting tubular steel monopoles, whether they are single-circuit or double-circuit structures, and will have either a weathering steel finish or galvanized coating. Single-circuit tangent and small angle structures will predominantly be in a delta configuration, except where there is limited ROW available. If the ROW is limited, the single-circuit tangent and small angle structures will be in a vertical configuration. Single-circuit medium angle, large angle and dead-end structures will be in a vertical configuration. Double-circuit tangent, small angle, medium angle, large angle and dead-end structures will also be in a vertical configuration.

In locations where the new 345 kV line will be double-circuited with an existing lower voltage line, the double-circuit structures will be of monopole construction. All lower voltage circuits with the exception of ATC-owned 69 kV lines Y-16, Y-74, Y-85 and Y-101 will be located at the same elevation on the double-circuit structures as the 345 kV circuit with the same insulator configuration, therefore making a visually uniform structure. This will allow for all proper clearances to be maintained on the lower voltage circuit (including phase to phase clearances, obstruction clearances and galloping clearances) and will also allow either circuit to be taken out of service for maintenance or other reasons while the other circuit remains energized. The structures that will be double-circuit with ATC-owned 69 kV lines Y-16, Y-74, Y-85 and Y-101 will have the lower voltage circuit located in an underbuilt configuration on the structure.

H-frame tangent and multi-pole angle and dead-end structures will be used where land use permits. These structures will all be single-circuit with either a weathering steel finish or galvanized coating. H-frames will allow for longer span lengths without creating taller structures due to the horizontal configuration of the phase conductors, and will allow larger coulees, valleys and rivers to be spanned. There are locations in Segments G, N and O where H-frames will be utilized.

There are three segments (E, P and P-East) where the proposed 345 kV transmission line will parallel existing 345 kV transmission lines, but will not be co-located on the same structures. In Segment E, the proposed Project will parallel existing ATC Lines W7 and L-COL 21, which are in a double-circuit 345 kV configuration, as it enters the North Madison Substation from the east. In Segments P and P-East, the proposed Project will parallel the Hampton-Rochester-La Crosse 345 kV transmission line. The Hampton-Rochester-La Crosse line will be in a double-circuit 345/161 kV configuration with existing NSPW line W3203.

All structures for each of the proposed route options will be self-supporting. A preliminary geotechnical evaluation (desktop review) was conducted for the entire study area to assess the soil and geologic conditions that could be encountered. Based on that evaluation, there are two predominant foundation types that are anticipated: (1) direct embedded; and (2) reinforced

concrete caissons. The single-circuit single-shaft tangent structures, single-circuit H-frame tangent structures, and double-circuit tangent structures where the lower voltage circuit is in the underbuilt position are anticipated to be supported by direct embedded foundations. The single-circuit angle, strain and dead-end structures, as well as the double-circuit tangent, angle, strain and dead-end structures are anticipated to be supported by reinforced concrete caissons. It is anticipated that a third type of foundation, helical piers, will be used in the area of the Lemonweir River (Segment N) due to possible access difficulties and the general wet and marshy ground conditions that exist. It is anticipated that H-frame structures will be supported on the helical piers. Once soil borings have been obtained and a complete and thorough geotechnical evaluation has been completed during detailed design, the use of alternative foundation systems, such as micropiles or vibratory caissons, will be evaluated and implemented as needed. Access difficulties and/or restrictions will also be evaluated in the need for the use of alternative foundations.

In general, the excavated holes for direct embedded structures will range from 3 to 6 feet in diameter and 20 to 30 feet in depth, depending on soil conditions. The integrity of the hole may be protected with the installation of a permanent culvert. The excavated holes for reinforced concrete caissons will range from 5 to 12 feet in diameter and 20 to 60 feet in depth, depending on soil conditions. If poor soil conditions exist, greater diameters and depths may be required.

When constructing direct embedded foundations, the required hole is excavated and the embedded portion of the steel structure is inserted into the hole. The structure is plumbed and a granular engineered backfill is placed around the outside of the embedded portion of the structure and compacted in lifts until the ground surface is reached.

When constructing concrete caisson foundations, the required hole is excavated, concrete caissons are formed using a rebar and anchor bolt cage that is placed into the excavation, and concrete is poured to cover it. The caisson is allowed to cure in order to develop the necessary strength. After the caisson is cured, the structure is mounted on the caisson using the exposed anchor bolts.

5.3.3 Conductor and Shield Wire Information

The Project's transmission line will be designed for and energized at 345 kV. The Applicants propose the use of a vertically bundled pair of TP-477 kilo circular mils (kcmil) ACSR (Aluminum Conductor Steel Reinforced) (Hawk) conductors for each phase of the 345 kV circuit.

All segments will use two shield wires to help protect the phase conductors from lightning strikes. Depending on the line configuration, the two shield wires may consist of one standard steel stranded wire and one steel and aluminum stranded wire containing a 48-fiber optic bundle core (generally known as optical ground wire or OPGW) or two OPGWs. OPGW allows both lightning protection and a communication path between substations.

For the proposed 345 kV circuit, the conductors will be supported by porcelain or glass insulators in a V-string or I-string configuration. In locations where the proposed 345 kV circuit will be double-circuit with an existing lower voltage line, a mixture of porcelain or glass string assemblies or polymer braced post assemblies will be used for the lower voltage circuit.

5.3.4 Existing Transmission Line Impacts

Several existing 161 kV, 138 kV and 69 kV transmission lines along the proposed alignments for both the Northern and Southern Routes would require removal and rebuilding along the selected route. Tables 5.3.4-1 and 5.3.4-2 below summarize the affected transmission lines by route segment. For the lines owned by DPC, the Applicants have worked with DPC to ensure the ROWs can be shared and that design of the facilities meets both the Project's and DPC's needs.

Table 5.3.4-1 – Existing transmission lines affected along the Northern Route

Northern Route				
Segment	**Line**	**Voltage**	**Owner**	**Length (miles)**
P	Q-1D	161 kV	DPC	0.9
	N-226	69 kV	DPC	1.0
N	W3203	161 kV	NSPW	15.9
	W3204	161 kV	NSPW	20.4
	Y-74	69 kV	ATC	0.2
	Y-101	69 kV	ATC	3.5
M	Y-101	69 kV	ATC	3.3
H	Y-16	69 kV	ATC	0.5
D	13875	138 kV	ATC	15.3
A	13875	138 kV	ATC	4.0
Total w/P				**65.0**
Total w/P-East				**63.1**

Table 5.3.4-2 – Existing transmission lines affected along the Southern Route

Southern Route				
Segment	**Line**	**Voltage**	**Owner**	**Length (miles)**
O	W3203	161 kV	NSPW	1.0
	W3411	69 kV	NSPW	0.4
	W3414	69 kV	NSPW	9.8
	N-93	69 kV	DPC	1.6
	N-322	69 kV	DPC	0.5
	N-101	69 kV	DPC	8.6
M	Y-101	69 kV	ATC	3.3
L	Y-101	69 kV	ATC	0.5
I	Y-101	69 kV	ATC	0.2
	X-68	138 kV	ATC	12.0
	X-19	138 kV	ATC	1.0
C	Y-85	69 kV	ATC	1.3
	Y-131	69 kV	ATC	2.3
B	6927	69 kV	ATC	1.4
B-North	13875	138 kV	ATC	0.7
Total w/B				**43.8**
Total w/B-North				**43.1**

5.3.5 Existing Distribution Line Impacts

Several existing distribution lines along the proposed alignments for both the Northern and Southern Routes will require removal and relocation along the selected route. Tables 5.3.5-1 and 5.3.5-2 below summarize the affected distribution lines by route segment. For estimating purposes, relocation underground was assumed if an existing distribution line was parallel to the proposed 345 kV transmission line centerline, within 25 feet on either side of the proposed transmission line centerline. In the area of Segments A and D, portions of the existing ATC 138 kV line 13875 will be moved from its existing corridor to the new 345 kV corridor in order to take advantage of straightening out the 345 kV centerline. The distribution facilities that currently exist as underbuild on Line 13875's structures have been assumed to be relocated underground rather than removing the existing transmission facilities, topping the poles, and leaving the distribution facilities overhead, even though these distribution facilities are not within 25 feet on either side of the proposed 345 kV transmission line centerline.

Northern Route

If the Northern Route is ordered, approximately 52,000 feet of overhead and underground distribution lines would need to be removed and relocated. If the Northern Route with Segment P-East is ordered, approximately 44,000 feet of overhead and underground distribution lines would need to be removed and relocated.

Table 5.3.5-1 – Distribution Lines to be Relocated – Northern Route

Segment	Location	Approx. Length in Feet	Owner
P & P-East*	Along west side of USH 53	2,200	Riverland Electric
P &P-East	Along west side of USH 53	300	Riverland Electric
P*	Along north side of USH 35	600	Riverland Electric
P	Underbuild on DPC 69 kV line N-226	5,400	Riverland Electric
P*	Along east side of Pedretti Street	800	Riverland Electric
P	Along east side of County Trunk Highway (CTH) XX	1,100	Riverland Electric
N	Along east side of I-90/I-94 and west side of Welch Prairie Road	300	Alliant
N	Along west side of CTH W	1,000	Oakdale Electric
N*	Along north side of Horizon Avenue	200	Oakdale Electric
N	Along east side of I-94	1,550	Oakdale Electric
N*	Along east side of I-94	1,600	Jackson Electric
N*	Along east side of I-94	1,000	Jackson Electric
M	Underbuild on ATC 69 kV line Y-101	5,300	Alliant
M	Underbuild on ATC 69 kV line Y-101	2,200	Alliant
J	Along north side of CTH H	300	Alliant
H	Along the west side of I-90/94	2,500	Alliant
E	Along east side of I-39/90/94 and west side of Patton Road	500	Alliant
D	Underbuild on ATC 138 kV line 13875	4,300	MGE
A	Underbuild on ATC 138 kV line 13875	4,000	MGE
A	Underbuild on ATC 138 kV line 13875	6,700	MGE
A	Cross country along north side of USH 14	1,800	MGE
A	Underbuild on ATC 138 kV line 13875	8,100	MGE

*Denotes a distribution circuit that is currently underground. The line presents a physical conflict and will be relocated underground elsewhere.

Southern Route

If the Southern Route is ordered, approximately 88,000 feet of overhead and underground distribution lines would need to be removed and relocated. If the Southern Route with Segment B-North is ordered, approximately 92,000 feet of overhead and underground distribution lines would need to be removed and relocated.

Table 5.3.5-2 – Distribution Lines to be Relocated – Southern Route

Segment	Location	Approx. Length in Feet	Owner
O	Along north side of CTH O	9,800	Oakdale Electric
O	Underbuild on DPC 69 kV line N-101	4,500	Oakdale Electric
O	Underbuild on DPC 69 kV line N-322	600	Vernon Electric
O	Along north side of Olympic Avenue	500	Vernon Electric
O	Underbuild on DPC 69 kV line N-93	1,400	Vernon Electric
O	Underbuild on NSPW 69 kV line W3414	13,800	NSPW
O	Underbuild on NSPW 69 kV line W3411	2,100	NSPW
O	Along south side of I-90	500	NSPW
O*	Along south side of I-90 and north side of Buol Road	200	NSPW
O*	Along south side of I-90 and north side of Buol Road	200	NSPW
O	Along north side of I-90	2,100	NSPW
O	Along north side of I-90 and south side of Kinney Coulee Road	1,000	NSPW
O*	Along north side of I-90 and south side of Kinney Coulee Road	400	NSPW
O	Along east side of USH 53	1,900	NSPW
O	Along east side of USH 53	700	NSPW
M	Underbuild on ATC 69 kV line Y-101	5,300	Alliant
M	Underbuild on ATC 69 kV line Y-101	2,200	Alliant
J	Along north side of CTH H	300	Alliant
I	Along north side of railroad tracks west of Boeck Road	1,200	Alliant
I*	Below ATC 138 kV line X-19	400	Alliant
I*	Below ATC 138 kV line X-19	800	Alliant
I*	On east side of ATC Trienda Substation	300	Alliant
I	Underbuild on ATC 138 kV line X-68	6,100	Alliant
I	Underbuild on ATC 69 kV line Y-101	1,200	Alliant
I	Along north side of CTH H	300	Alliant
F	Along south side of Hahn Road	4,300	Alliant
F	Along west side and southeast side of private driveway south of CTH K	450	Alliant
F*	Cross country ~1/4 section west of Thunder Hills Road	400	Alliant

Segment	Location	Approx. Length in Feet	Owner
F	Along east side of Thunder Hills Road	1,400	Alliant
C	Along south side of Fisher Road	6,700	MGE
C	Along east side of Mulcahy Road	1,300	Alliant
C	Along east side of STH 113	550	Alliant
C	Along east side of STH 113	5,100	Alliant
C	Underbuild on ATC 69 kV line Y-85	7,000	Alliant
C	Along west side of Patton Road	1,450	Alliant
B	Along north side of USH 14	800	MGE
B & B-North	Along east side of CTH P	700	MGE
B-North	Cross country along north side of USH 14	1,800	MGE
B-North	Underbuild on ATC 138 kV line 13875	3,500	MGE

*Denotes a distribution circuit that is currently underground. The line still presents a physical conflict and will be relocated underground elsewhere.

5.3.6 Shared ROW Configuration

Table 5.3.6-1 below compares the amount of shared corridor for each of the proposed routes.

Table 5.3.6-1 – Proposed Route Corridor Sharing Comparison

	Proposed Route			
Corridor Type	**Northern**	**Northern w/P-East**	**Southern**	**Southern w/B-North**
Miles following existing Transmission*	60.1 miles (33.1 percent)	58.2 miles (32.2 percent)	43.1 miles (27.1 percent)	42.4 miles (26.6 percent)
Miles following Interstate or US highway (but not existing transmission)	102.5 miles (56.4 percent)	105.3 miles (58.2 percent)	33.6 miles (21.1 percent)	33.6 miles (21.1 percent)
Miles following road, rail or gas pipeline (but not existing transmission)	2.9 miles (1.6 percent)	2.0 miles (1.1 percent)	17.3 miles (10.7 percent)	17.1 miles (10.7 percent)
Miles following an existing corridor	165.5 miles (91.1 percent)	165.5 miles (91.4 percent)	94.0 miles (59.0 percent)	93.1 miles (58.4 percent)
Miles not following an existing corridor	16.2 miles (8.9 percent)	15.5 miles (8.6 percent)	65.4 miles (41.0 percent)	66.2 miles (41.6 percent)
Total length of proposed route	**181.7 miles**	**181.0 miles**	**159.4 miles**	**159.3 miles**

*These miles sometimes follow highway, road, railroad or gas pipeline in addition to sharing with existing transmission corridor.

5.3.7 Route Segment Descriptions

The following route segment descriptions reference the typical tangent structures drawings. Variations of these structures could be used for the project depending on the angle or tension of the line, as shown in the additional transmission structure figures provided in Appendix C.

Northern Route

Segment P will use single-circuit delta configured structures (Appendix C, Figure 10) and double-circuit vertical configured structures (Appendix C, Figure 12). The typical height above ground will range from 100 to 150 feet and the span lengths will range from 750 to 1250 feet.

Structure locations will be as follows:

- After exiting Briggs Road Substation (approximately 0.2 miles), the new 345 kV line will head northwest double-circuited in a vertical configuration with existing DPC 161 kV Line Q-1, following the existing transmission line corridor for approximately 0.8 miles.
- The new 345 kV line will depart the line Q-1 corridor and travel north cross country and along local roads as a single-circuit in a delta configuration for approximately 1.6 miles.
- Between Old CTH NA and STH 35, the new 345 kV line will continue north double-circuited in a vertical configuration with existing DPC 69 kV Line N-226, following the existing transmission line corridor for approximately 1 mile.
- The new 345 kV line will depart the line N-226 corridor and head east single-circuit in a delta configuration adjacent to the north side of STH 35 for approximately 0.7 miles until intersecting USH 53, then head north adjacent to USH 53 until the line crosses the Black River.
- Once north of the Black River, the new 345 kV line will turn east and travel cross country for a short distance and then turn north and travel cross country approximately 0.8 miles to the beginning of Segment N.

Segment P-East will use single-circuit delta configured structures (Appendix C, Figure 10) and single circuit vertical configured structures (Appendix C, Figure 11). The typical height above ground will range from 100 to 175 feet and the span lengths will range from 500 to 1250 feet. After the new 345 kV line exits the Briggs Road Substation and heads north, the single-circuit structures will be located adjacent to USH 53 until the line crosses the Black River. Once north of the Black River, the line will turn east and travel cross country for a short distance and then turn north and travel cross country approximately 0.8 miles to the beginning of Segment N.

The Project's proposed alignments for Segments P and P-East cross the Hampton-Rochester-La Crosse 345 kV transmission line.[3] If the Northern Route with Segment P or P-East is ordered by the Commission, the Applicants request the option of eliminating these crossings by swapping the impacted circuits at the points of intersection. In addition to removing a reliability risk, eliminating these line crossings averts the need for taller structures and additional ROW to facilitate the 345 kV line crossings. The cost implications associated with eliminating these line crossings are negligible.

For Segment P, the proposed alignment for the Badger Coulee 345 kV line will cross the Hampton-Rochester-La Crosse 345 kV line near where it intersects with NSPW 161 kV Line W3203 in the town of Gale. To swap the circuits and eliminate the reliability risk, the Applicants would design and construct Segment P with the same structures and conductor as the Hampton-Rochester-La Crosse line between the intersecting point and the Briggs Road Substation. The Hampton-Rochester-La Crosse structures and conductor already meet Badger Coulee Project requirements. At the point of intersection, the circuits would switch positions with the Hampton-Rochester-La Crosse circuit occupying the new (Badger Coulee) structures and the Badger Coulee circuit occupying the existing (Hampton-Rochester-La Crosse) structures. When connecting the swapped lines at the Briggs Road Substation, some additional work would be performed there to move the termination for the Hampton-Rochester-La Crosse circuit to a more westerly bus position.

For Segment P-East, there are two crossings between the 345 kV lines that the Applicants propose to eliminate. Similar to Segment P, the proposed alignment of Segment P-East will cross the Hampton-Rochester-La Crosse line near where it intersects with NSPW 161 kV Line W3203 in the town of Gale. Additionally, Segment P-East will cross the Hampton-Rochester-La Crosse line again just north of the USH 53 / STH 35 interchange on the east side of USH 53. To swap the circuits and eliminate the reliability risk, the Applicants would design and construct Segment P-East with the same structures and conductor as the Hampton-Rochester-La Crosse line between the first and second intersecting points. At the first point of intersection, the circuits would switch positions with the Hampton-Rochester-La Crosse circuit occupying the new (Badger Coulee) structures and the Badger Coulee circuit occupying the existing (Hampton-Rochester-La Crosse) structures. At the second point of intersection, the circuits would again switch positions with the Hampton-Rochester-La Crosse circuit returning to the existing (Hampton-Rochester-La Crosse) structures and the Badger Coulee circuit occupying the new (Badger Coulee) structures. Adjustment of the Hampton-Rochester-La Crosse terminal position at the Briggs Road Substation would not be necessary because the circuits would approach the substation from their original positions.

Segment N will use single-circuit, double-circuit and H-frame structures. The single-circuit structures will be in a delta configuration (Appendix C, Figure 10) or in a vertical configuration

[3] The PSCW-ordered Hampton-Rochester-La Crosse line is scheduled to be in service in 2015, prior to final design of this Project.

(Appendix C, Figure 11) in order to minimize conductor blowout and ROW width in areas with ROW constraints. The typical height above ground for the single-circuit structures will range from 100 to 155 feet and the span lengths will range from 500 to 1350 feet. The double-circuit structures will be in a vertical configuration (Appendix C, Figure 12) when double-circuit with an existing 161 kV line or in a delta configuration with the lower voltage circuit as underbuild (Appendix C, Figure 29) when double-circuit with an existing 69 kV line. The typical height above ground for the double-circuit structures will range from 120 to 155 feet and the span lengths will range from 600 to 2200 feet. There will also be a section of Segment N that will use single-circuit H-frame structures (Appendix C, Figure 13) to cross the Lemonweir River. The typical height above ground for the H-frame structures will range from 90 to 105 feet and the span lengths will range from 850 to 1200 feet.

Structure locations will be as follows:

- From the end of Segment P or P-East, the new 345 kV line will head north double-circuited in a vertical configuration with existing NSPW 161 kV Line W3203, following the existing transmission line corridor for approximately 15.9 miles until reaching NSPW's Tremval Substation.
- The new 345 kV line will bypass Tremval Substation and then head east double-circuited in a vertical configuration with NSPW 161 kV Line W3204, following the existing transmission line corridor for approximately 20.4 miles until intersecting with I-94 in Black River Falls. In this section, the new 345 kV line will parallel a natural gas pipeline for approximately 0.7 miles.
- After intersecting with I-94, the new 345 kV line will head southeast as a single-circuit in either a delta or vertical configuration adjacent to the interstate (I-94 and I-90/I-94) for approximately 38.6 miles.
- Northwest of the village of Camp Douglas, the new 345 kV line must depart the interstate corridor to avoid airspace restrictions associated with the Volk Field Air National Guard Base and also to avoid Mill Bluff State Park and Mill Bluff SNA. The line will travel south and east cross country and along local roads as a single circuit in either a delta or vertical configuration for approximately 7.7 miles until it again intersects the interstate corridor southeast of Camp Douglas.
- After intersecting with I-90/I-94, the new 345 kV line will head southeast as a single circuit in a delta configuration adjacent to the interstate for approximately 3 miles until reaching the Lemonweir River crossing area.
- For the Lemonweir River crossing, approximately 1.2 miles of single-circuit H-frame structures will be located adjacent to interstate.
- Southeast of the Lemonweir River crossing, the new 345 kV line will continue southeast, predominantly as a single-circuit in a delta configuration, adjacent to the interstate for approximately 12.8 miles. There is a 0.7 mile section where the structures will be in a single-circuit vertical configuration just north of STH 58/North

Union Street. There is also a 0.2 mile section near Mauston where there will be one span (two structures) that has existing ATC 69 kV Line Y-74 underbuilt on the 345 kV structures.

- At this point (CTH N and I-90/I-94), the new 345 kV line will double-circuit with existing ATC 69 kV line Y-101 underbuilt on the 345 kV structures and continue southeast adjacent to the interstate for approximately 0.7 miles.
- Just south of the WisDOT rest area in the town of Lemonweir, the new 345 kV line will continue southeast double-circuited with existing line Y-101 (underbuilt), following the existing transmission line corridor for approximately 2.8 miles to the beginning of Segment M.

Segment M will use double-circuit underbuild configured structures (Appendix C, Figure 29). The lower voltage circuit (existing ATC 69 kV line Y-101) will be attached as underbuild on the structures, with the 345 kV circuit above in a delta configuration. The typical height above ground will range from 125 to 150 feet and the span lengths will range from 700 to 1000 feet. The structures will be located in the existing line Y-101 corridor for approximately 3.3 miles.

Segment K will use single-circuit delta configured structures (Appendix C, Figure 10). The typical height above ground will range from 105 to 125 feet and the span lengths will range from 850 to 1000 feet. The structures will be located adjacent to I-90/94 for approximately 4.2 miles.

Segment J will use single-circuit delta configured structures (Appendix C, Figure 10). The typical height above ground will range from 100 to 135 feet and the span lengths will range from 600 to 1600 feet. The structures will be located adjacent to I-90/94 for approximately 2.3 miles.

Segment H will use single-circuit delta configured structures (Appendix C, Figure 10), single-circuit vertical configured structures (Appendix C, Figure 11), and double-circuit underbuild configured structures (Appendix C, Figure 29). The typical height above ground will range from 105 to 160 feet and the span lengths will range from 750 to 1000 feet.

Structure locations will be as follows:

- From the end of Segment J, the new 345 kV line will continue southeast as a single-circuit in a delta configuration adjacent to the interstate (I-90/I-94) for approximately 5.3 miles until just west of the southern I-90/I-94 & USH 12 interchange in the Wisconsin Dells.
- At this point, the new 345 kV line will depart the interstate corridor, avoiding the I-90/I-94 & USH-12 interchange, and travel south and east cross country as a single-circuit in a delta configuration for approximately 1 mile until it again intersects the interstate.
- After intersecting with I-90/I-94, the new 345 kV line will continue southeast as a single circuit adjacent to the interstate for approximately 14.8 miles until reaching the I-39/I-90/I-94 interchange. The structures in this section will be delta configured except for a 0.3 mile section that will be vertically configured when traversing the USFWS Fairfield Marsh property.

- At the I-39/90/94 interchange, the new 345 kV line will be routed around the west side of the interchange in the existing ATC 69 kV Line Y-16 corridor for approximately 0.5 miles. The lower voltage 69 kV circuit will be attached as underbuild on the structures, with the 345 kV circuit above in a delta configuration.
- The last approximately 0.3 miles of Segment H will route the new 345 kV line around the south side of the I-39/90/94 interchange to the beginning of Segment G. The structures in this section will be single-circuit dead-ends.

Segment G will use single-circuit delta configured structures (Appendix C, Figure 10) and single-circuit H-frame configured structures (Appendix C, Figure 13). The typical height above ground will range from 100 to 180 feet and the span lengths will range from 750 to 2300 feet.

Structure locations will be as follows:

- From the end of Segment H at the southeast corner of the I-39/90/94 interchange, the new 345 kV line will head southeast as a single-circuit in a delta configuration adjacent to the interstate for approximately 2.4 miles until reaching the Wisconsin River crossing.
- For the Wisconsin River crossing, single circuit H-frame structures will be located adjacent to the interstate (approximately 0.4 miles).
- South of the Wisconsin River crossing, the new 345 kV line will continue south as a single-circuit in a delta configuration adjacent to the interstate for approximately 1.4 miles to the beginning of Segment E.

Segment E will use single-circuit delta configured structures (Appendix C, Figure 10). The typical height above ground will range from 105 to 125 feet and the span lengths will range from 550 to 1100 feet.

Structure locations will be as follows:

- From the end of Segment G, the new 345 kV line will continue south as a single-circuit in a delta configuration adjacent to the interstate (I-39/I-90/I-94) for approximately 10.7 miles until just north of where existing ATC double-circuit 345 kV lines W7 and L-COL 21 cross the interstate.
- At this point, the new 345 kV line will depart the interstate corridor and head south parallel to but not co-located with ATC double-circuit 345 kV Lines W7 and L-COL 21 for approximately 2.4 miles and enter the North Madison Substation.

Segment D will use double-circuit vertical configured structures (Appendix C, Figure 12). The typical height above ground will range from 110 to 150 feet and the span lengths will range from 650 to 1200 feet.

Structure locations will be as follows:

- After a short distance (approximately 0.3 miles) on the North Madison Substation property, the new 345 kV line will be double-circuited in a vertical configuration with

existing ATC 138 kV line 13875, following the existing transmission line corridor for approximately 13.1 miles.

- The new 345 kV line will then depart the existing ATC 138 kV line 13875 corridor and continue south cross country, still double-circuited with existing ATC 138 kV line 13875 in a vertical configuration, for approximately 1.9 miles to the beginning of Segment A.

Segment A will use single-circuit delta configured structures (Appendix C, Figure 10) and double-circuit vertical configured structures (Appendix C, Figure 12). The typical height above ground will range from 100 to 150 feet and the span lengths will range from 550 to 1200 feet.

Structure locations will be as follows:

- From the end of Segment D, the new 345 kV line will continue south double-circuited with existing ATC 138 kV line 13874 in a vertical configuration for approximately 4 miles. Over this distance, the double-circuit line will either be cross country (approximately 2 miles) or following the existing transmission line corridor (approximately 2 miles), as efforts were made to make the new line as straight as practicable.
- Approximately 0.6 miles from the Cardinal Substation, the new 345 kV line will depart the existing transmission line corridor and head east as a single-circuit in a delta configuration parallel to an existing MGE distribution line for approximately 0.3 miles.
- The new 345 kV line will then turn south, cross USH 14 and enter the Cardinal Substation (approximately 0.3 miles).

Southern Route

Segment O will use single-circuit, double-circuit and H-frame structures. The single-circuit structures will be in a delta configuration (Appendix C, Figure 10) or in a vertical configuration (Appendix C, Figure 11) in order to minimize conductor blowout and ROW width in areas with ROW constraints. The double-circuit structures will be in a vertical configuration (Appendix C, Figure 12). The typical height above ground for the single- and double-circuit structures will range from 100 to 160 feet and the span lengths will range from 500 to 1750 feet. There will also be sections of Segment O that will use single-circuit H-frame structures (Appendix C, Figure 13) when traversing some cross country segments where terrain is difficult and longer spans with shorter structure heights are desirable. The typical height above ground for the H-frame structures will range from 80 to 120 feet and the span lengths will range from 550 to 2250 feet.

Due to the congested nature of the area between the Briggs Road Substation and the intersection of USH 53 and I-90 and the design and location of existing electric transmission lines in the area, the proposed transmission line, where single-circuit, will be designed to maintain the capability to double-circuit an additional electric transmission line along the proposed alignment at a future date.

Structure locations will be as follows:

- After a short distance (approximately 0.3 miles) on the Briggs Road Substation property, the new 345 kV line will travel east cross country as a single-circuit in a delta configuration for approximately 0.3 miles until intersecting with USH 53.
- After intersecting with USH 53, the new 345 kV line will turn and head south as a single-circuit in a delta configuration for approximately 0.4 miles until intersecting with line W3203.
- The new 345 kV line will then continue south double-circuited with existing NSPW 161 kV line W3203 in a vertical configuration, following the existing transmission line corridor adjacent to USH 53 for approximately 1 mile.
- At this point, the new 345 kV line will continue southeast as a single-circuit in either a vertical or delta configuration adjacent to USH 53 for approximately 4.4 miles until intersecting with I-90. The structures in this section will be designed to be double-circuit capable to allow for the anticipated co-location of Line W3203 in the future.
- After intersecting with I-90, the new 345 kV line will turn and head east as a single-circuit in a delta configuration adjacent to the interstate for approximately 17.6 miles.
- At this point, the new 345 kV line will depart the interstate corridor and travel cross country south and east as a single circuit in a delta configuration for approximately 0.5 miles until intersecting with line W3411.
- The new 345 kV line will then double-circuit with existing NSPW 69 kV line W3411 in a vertical configuration, heading east, following the existing transmission line corridor adjacent to Jackpot Avenue for approximately 0.4 miles.
- After departing the line W3411 corridor, the new 345kV line will head south as a single circuit in a delta configuration adjacent to Jackson Road for approximately 0.3 miles and then travel cross country south and east as a single circuit in a delta configuration for approximately 3.9 miles until intersecting with line W3414.
- The new 345 kV line will then double-circuit with existing NSPW 69 kV line W3414 in a vertical configuration, heading south, following the existing transmission line corridor for approximately 9.8 miles.
- After departing the line W3414 corridor, the new 345 kV line will travel cross country south and east as a single-circuit in a delta configuration for approximately 0.6 miles until intersecting with line N-93.
- The new 345 kV line will then double-circuit with existing DPC 69 kV line N-93 in a vertical configuration, heading east, following the existing transmission line corridor for approximately 1.6 miles.
- After departing the line N-93 corridor, the new 345 kV line will continue east as a single-circuit on H-frame structures travelling cross country for approximately 17.1 miles until intersecting with line N-322.

- The new 345 kV line will then double circuit with existing DPC 69 kV line N-322 in a vertical configuration, heading east, following the existing transmission line corridor for approximately 0.5 miles.
- After departing the line N-322 corridor, the new 345 kV line will continue east as a single circuit travelling cross country for approximately 11.7 miles until intersecting with line N-101. The first two spans of this section will travel cross country south on single circuit H-frame structures and the remaining spans in this section will travel cross country east on single circuit delta configured structures. In this section, the new 345 kV line will parallel a natural gas pipeline for approximately 0.8 miles.
- The new 345 kV line will then double-circuit with existing DPC 69 kV line N-101 in a vertical configuration, heading east, following the existing transmission line corridor for approximately 8.6 miles.
- After departing the line N-101 corridor, the new 345 kV line will continue east as a single-circuit in a delta configuration adjacent to CTH O and then southeast as a single-circuit in a delta configuration adjacent to USH 12 (approximately 2.3 miles).
- At this point, the new 345 kV line will travel cross country east as a single-circuit in a delta configuration for approximately 4.2 miles until intersecting with existing ATC 69 kV line Y-101 at the beginning of Segment M.

Segment M will use double-circuit underbuild configured structures (Appendix C, Figure 29). The lower voltage circuit (existing ATC 69 kV line Y-101) will be attached as underbuild on the structures, with the 345 kV circuit above in a delta configuration. The typical height above ground will range from 125 to 150 feet and the span lengths will range from 700 to 1000 feet. The structures will be located in the existing line Y-101 corridor for approximately 3.3 miles.

Segment L will use single-circuit delta configured structures (Appendix C, Figure 10) and double-circuit underbuild configured structures (Appendix C, Figure 29). The typical height above ground will range from 105 to 155 feet and the span lengths will range from 800 to 1100 feet.

Structure locations will be as follows:

- From the end of Segment M, the new 345 kV line will continue as a double-circuit with existing ATC 69 kV line Y-101 underbuilt on the 345 kV structures, following the existing transmission line corridor adjacent to Koval Road for approximately 0.5 miles.
- The new 345 kV line will then head southeast as a single circuit in a delta configuration adjacent to the railroad for approximately 3.8 miles to the beginning of Segment J.

Segment J will use single-circuit delta configured structures (Appendix C, Figure 10). The typical height above ground will range from 100 to 135 feet and the span lengths will range from 600 to 1600 feet. The structures will be located adjacent to I-90/94 for approximately 2.3 miles.

Segment I will use single-circuit and double-circuit structures. The single-circuit structures will be in a delta configuration (Appendix C, Figure 10). The double-circuit structures will be in a vertical configuration (Appendix C, Figure 12) when double-circuit with an existing 138 kV line or in a delta configuration with the lower voltage circuit as underbuild (Appendix C, Figure 29) when double-circuit with an existing 69 kV line. The typical height above ground will range from 105 to 150 feet and the span lengths will range from 600 to 1600 feet.

Structure locations will be as follows:

- At the end of Segment J, the new 345 kV line will depart the interstate corridor and head east as a single-circuit in a delta configuration adjacent to CTH H for approximately 0.4 miles.
- At this point, the new 345 kV line will double-circuit with existing ATC 69 kV line Y-101 underbuilt on the 345 kV structures and continue to head east, following the existing transmission line corridor for approximately 0.2 miles.
- The new 345 kV line will then continue travelling east cross country as a single-circuit in a delta configuration for approximately 0.8 miles and cross the Wisconsin River just south of the dam in downtown Wisconsin Dells.
- After crossing the Wisconsin River, the new 345 kV line will head southeast double-circuited with existing ATC 138 kV line X-68, following the existing transmission line corridor adjacent to the railroad for approximately 7.6 miles.
- At this point, the new 345 kV line will depart the line X-68 corridor and continue southeast as a single-circuit in a delta configuration adjacent to CTH O for approximately 1.1 miles and then cross country for approximately 0.3 miles before again intersecting with line X-68.
- The new 345 kV line will then continue heading southeast double-circuited with existing ATC 138 kV line X-68 in a vertical configuration, following the existing transmission line corridor adjacent to the railroad for approximately 4.4 miles.
- Line X-68 will terminate at ATC's Trienda Substation. The new 345 kV line will bypass Trienda Substation to the south on single-circuit delta configured structures for approximately 0.5 miles and then continue southeast double-circuited with existing ATC 138 kV line X-19 in a vertical configuration, following the existing transmission line corridor adjacent to the railroad for approximately 0.3 miles.
- At this point, the new 345 kV line will cross to the other side of the railroad tracks, bringing line X-19 with it, and then head southeast double-circuited with X-19 adjacent to the railroad for approximately 0.7 miles.
- The new 345 kV line will then travel cross country south and east as a single-circuit in a delta configuration for approximately 0.8 miles until intersecting with I-39 west of Portage.

- After intersecting with I-39, the new 345 kV line will head south as a single-circuit in a delta configuration adjacent to the interstate for approximately 4.8 miles to the beginning of Segment G.

Segment G will use single-circuit delta configured structures (Appendix C, Figure 10) and single-circuit H-frame configured structures (Appendix C, Figure 13). The typical height above ground will range from 100 to 180 feet and the span lengths will range from 750 to 2300 feet.

Structure locations will be as follows:

- From the end of Segment I at the southeast corner of the I-39/90/94 interchange, the new 345 kV line will head southeast as a single-circuit in a delta configuration adjacent to the interstate for approximately 2.4 miles until reaching the Wisconsin River crossing.
- For the Wisconsin River crossing, single circuit H-frame structures will be located adjacent to the interstate (approximately 0.4 miles).
- South of the Wisconsin River crossing, the new 345 kV line will continue to head south as a single-circuit in a delta configuration adjacent to the interstate for approximately 1.4 miles to the beginning of Segment F.

Segment F will use single-circuit structures in a delta configuration (Appendix C, Figure 10). The typical height above ground will range from 105 feet to 140 feet and the span lengths will range from 650 to 1600 feet.

Structure locations will be as follows:

- At the end of Segment G, the new 345 kV line will depart the interstate corridor and travel south cross country, intermittently along local roads, as a single circuit in a delta configuration for approximately 13 miles.
- At this point, the new 345 kV line will turn and head east adjacent to Hahn Road for approximately 1.5 miles.
- The new 345 kV line will then turn and travel south cross country for approximately 0.5 miles and enter the North Madison Substation.

Segment C will use single-circuit and double-circuit structures. The single-circuit structures will be in a delta configuration (Appendix C, Figure 10). The double-circuit structures will be in a vertical configuration (Appendix C, Figure 12) or in a delta configuration with the lower voltage circuit as underbuild (Appendix C, Figure 29) as described below. The typical height above ground for the structures will range from 100 to 150 feet and the span lengths will range from 550 to 1200 feet.

Structure locations will be as follows:

- After a short distance (approximately 0.3 miles) on the North Madison Substation property, the new 345 kV line will head south as a single-circuit in a delta configuration adjacent to Patton Road for approximately 0.3 miles.

- At this point, the new 345 kV line will travel cross country south and east as a single-circuit in a delta configuration for approximately 0.8 miles until intersecting line Y-85.
- The new 345 kV line will then head west as a double-circuit with existing ATC 69 kV line Y-85 underbuilt on the 345 kV structures, following the existing transmission line corridor adjacent to CTH V for approximately 1.3 miles.
- At this point, the new 345 kV line will turn and head south as a single-circuit in a delta configuration adjacent to STH 113 for approximately 1.5 miles.
- The new 345 kV line will then travel cross country west and south as a single-circuit in a delta configuration for approximately 4.7 miles until intersecting line Y-131.
- The new 345 kV line will then double-circuit with existing ATC 69 kV line Y-131 in a vertical configuration, following the existing transmission line corridor for approximately 2.3 miles. The Applicants propose using vertically configured double-circuit structures in this section so there is the future option of converting line Y-131 for operation at 138 kV without replacement of these structures. At such time, ATC will apply to the PSCW for all appropriate authorizations.
- At this point, the new 345 kV line will turn and travel west cross country as a single-circuit in a delta configuration for approximately 0.5 miles, adjacent to Fisher Road for approximately 1.7 miles, and cross country for 2.3 miles to the beginning of Segment B.

Segment B will use single-circuit and double-circuit structures. The single-circuit structures will be in a delta configuration (Appendix C, Figure 10). The double-circuit structures will be in a vertical configuration (Appendix C, Figure 12). The typical height above ground will range from 100 to 150 feet and the span lengths will range from 550 to 1650 feet.

Structure locations will be as follows:

- From the end of Segment C, the new 345 kV line will continue to travel west cross country as a single-circuit in a delta configuration for approximately 1.3 miles until intersecting CTH P.
- The new 345 kV line will then head southwest as a single-circuit in a delta configuration adjacent to CTH P for approximately 0.8 miles.
- At this point, the new 345 kV line will turn and travel south cross country as a single-circuit in a delta configuration for approximately 3.3 miles until intersecting line 6927.
- The new 345 kV line will then head east as a double-circuit with existing ATC 69 kV line 6927 in a vertical configuration, following the existing transmission line corridor for approximately 1.4 miles. The Applicants propose using vertically configured double-circuit structures in this section so there is the future option of converting line 6927 for operation at 138 kV without replacement of these structures. At such

time as the conversion is needed, ATC will apply to the PSCW for all appropriate authorizations.

- At this point, the new 345 kV line will continue east as a single-circuit in a delta configuration adjacent to USH 14 for approximately 0.5 miles before turning south, crossing USH 14, and entering the Cardinal Substation (approximately 0.2 miles).

Segment B-North will use single-circuit delta configured structures (Appendix C, Figure 10) and double-circuit vertical configured structures (Appendix C, Figure 12). The typical height above ground will range from 100 to 150 feet and the span lengths will range from 550 to 1650 feet.

Structure locations will be as follows:

- From the end of Segment C, the new 345 kV line will continue to travel west cross country as a single-circuit in a delta configuration for approximately 1.3 miles until intersecting CTH P.
- The new 345 kV line will then head southwest as a single-circuit in a delta configuration adjacent to CTH P for approximately 0.8 miles.
- At this point, the new 345 kV line will turn and travel south cross country as a single-circuit in a delta configuration for approximately 2.5 miles and then turn and travel east cross country as a single-circuit in a delta configuration for approximately 1.5 miles until intersecting line 13875.
- The new 345 kV line will then head south as a double-circuit with existing ATC 138 kV line 13875 in a vertical configuration, following the existing transmission line corridor for approximately 0.7 miles.
- Approximately 0.6 miles from the Cardinal Substation, the new 345 kV line will depart the existing transmission line corridor and head east as a single-circuit in a delta configuration parallel to an existing MGE distribution line for approximately 0.3 miles.

The new 345 kV line will then turn south, cross USH 14 and enter the Cardinal Substation (approximately 0.3 miles).

5.4 Impact Tables

The following tables are included in Appendix B:

- Table 2 – General Route Impacts;
- Table 3 – Distances of Residential Buildings from ROW Centerline;
- Table 4 – Distanced of Schools, Daycare Centers and Hospitals from ROW Centerline;
- Table 5 – Land Cover;
- Table 6 – Federal, State, Local and Tribal Lands Excluding Road ROWs; and
- Table 7 – Route Impact Summaries.

Route impact tables, which quantify the general impacts of constructing the transmission line, have been prepared for each route. Tables 2 through 7 of Appendix B summarize impacts associated with the proposed transmission line corridor. Off-ROW access will be required in certain locations to construct each route. Land cover impacts associated with off-ROW access are provided in Section 5.7. An outline of the methods used to prepare the impact tables and a summary of the results for each route option are presented below.

The information contained within Tables 2 through 7 of Appendix B was developed based on a combination of sources including available reference data, aerial photography and field observations along accessible segments. These sources were utilized to measure and calculate impacts using GIS software.

The reference data utilized include county tax parcel data obtained in the spring of 2013; databases from the State of Wisconsin regarding the locations of schools, daycares and hospitals; and state managed lands information from the WDNR. Two sources of aerial photography were utilized including 2010 Wisconsin Regional Orthophotography Consortium (WROC) photography and aerial photos taken from flights along the corridors primarily in April 2012 and to a lesser extent in May 2013. The aerial photos taken from flights were viewed in Pictometry, a licensed imagery-based system that provides high resolution, 2- or 4-way oblique views of the ground surface.

Field observation of the routes included both windshield surveys completed between 2010 and 2013, and field surveys completed along existing ROW completed May through August, 2012 and May through June, 2013. Fieldwork on existing ROW included wetland delineations and direct land cover observations. The proposed ROW typically extended beyond existing transmission line ROW or other public ROW. These adjacent areas were field checked to the extent possible from the existing ROWs during the field work.

5.4.1 Appendix B, Table 2 – General Route Impacts

5.4.1.1 Methods

The general ROW requirement and ROW sharing characteristics for each route are presented in Table 2 of Appendix B. For this table, route segments were broken into sub-segments to facilitate analysis. Sub-segment breaks were based on several factors such as total ROW width required, and type and extent of existing ROW sharing. GIS software was used to determine sub-segment lengths, and new and shared ROW widths in some cases, for this table.

The type and extent of existing ROW was determined from the following sources in conjunction with aerial photography and field observations:

- Road/Railroad: County parcel data was used for most of the Project area. In a few areas, parcel data did not define the extent of the WisDOT ROW. In those areas, the ROW width was estimated based on aerial photograph interpretation (e.g., fence line, differences in vegetation) and immediately adjacent parcel data.

- Gas line/Transmission line: Typical existing easement widths were obtained from the utility owner, a review of representative easement agreements, and/or aerial photo review.
- Distribution line: When a distribution line occurred along a road, it was assumed that additional ROW beyond road ROW was not required. When a distribution line was not co-located with another ROW, the easement width was assumed to be 20 feet.

The total ROW width for each sub-segment was determined by engineering analysis. In areas where there was substantial variation among span widths within a sub-segment (typically occurring in bluff areas along portions of Segments N and O), a weighted average was used to calculate a more-representative total ROW width for a given sub-segment. This weighted average width was calculated by dividing the total ROW Area by the sub-segment length. When a weighted average was used, it was noted in the "Comments" column of Appendix B, Table 2. Occasionally a relatively small number of spans deviated from the representative ROW width for a given sub-segment. In these instances, the representative width was used and the range of span width deviation was noted in the "Comments" column.

Due to the curvilinear nature of most roads and railroads in the Project area, and the varying placement of structures relative to the edge of existing ROW, an average new ROW width was calculated for each sub-segment along these corridors. This value was determined by digitizing in GIS the area of new ROW within the total ROW area. The area of new ROW was then divided by the total ROW Area and the resulting quotient was multiplied by the total ROW width to determine an average new ROW width for each sub-segment. This method provided a representative new ROW width along these corridors. The existing ROW width shared for these sub-segments was then determined by subtracting the total ROW width from the new ROW width.

5.4.1.2 Summary of General Route Impacts

The Northern Route is 181.7 miles long with Segment P and 181.0 miles long with Segment P-East (Appendix B, Table 2). Both Northern Route options typically require a ROW width of 120 feet; however, several sub-segments along both options require a ROW width of 100 feet (sub-segments N6, N8, N10, N18, H2 and H6) or 150 feet (N13 and N16). Sub-segments P12 and P13 (which only occur along Segment P-East) also require a ROW width of 100-feet. In addition, sub-segments N2 and G2, which occur along both Northern Route options, have a wider total ROW width due to longer spans in steep terrain (N2) or across the Wisconsin River (G2). The total ROW width for sub-segments N2 (189 feet) and G2 (193 feet) was determined by calculating a weighted average of the spans in the sub-segment.

The Southern Route is 159.5 miles long with Segment B and 159.3 miles long with Segment B-North (Appendix B, Table 2). Both Southern Route options typically require a ROW width of 120 feet; however, several sub-segments require a ROW width of 150 feet (sub-segments O13, O15 and O16). In addition, several sub-segments along both Southern Route options have a wider total ROW width due to longer spans in steep terrain (O14 - 202 feet, O18 - 273 feet and O20 -

158 feet) or across the Wisconsin River (G2 - 193 feet). The total ROW width for these sub-segments was determined by calculating a weighted average of the spans in the sub-segment. The ROW width for sub-segment O17 (129 feet) was also calculated by a weighted average due to a structure configuration change.

The Northern Route overlaps existing ROW along 91.1 percent of its length while this route with Segment P-East overlaps existing ROW along 91.3 percent of its length. Both route options share ROW primarily with interstate highway or transmission lines. Longer areas along both route options with no ROW sharing include the Camp Douglas area (sub-segments N12 - N14) and along sub-segment E2 which parallels an existing double-circuit 345 kV transmission line but does not share ROW with this line. Approximately 62 percent of the Northern Route ROW acreage, for both route options, is shared with existing ROW areas.

The Southern Route overlaps existing ROW along 58.9 percent of its length while this route with Segment B-North overlaps existing ROW along 58.4 percent of its length. Both route options share ROW primarily with interstate/state highways, transmission lines and/or railroads. Longer areas along both route options with no ROW sharing include the majority of Segment O south of Interstate 90 (e.g., sub-segments O-7a, O7d, O11a, O13, O14, O15, O18, O19, O21 and O27), much of Segment F (sub-segments F1, F3 and F5), and portions of Segment C (e.g., sub-segments C2, C5, C7 and C9) and Segment B (sub-segments B1, B3a and B3b). Sub-segment B4a for the Segment B-North option also does not have ROW sharing. Approximately 35 percent of the Southern Route ROW acreage, for both route options, is shared with existing ROW areas.

5.4.2 Appendix B, Table 3 – Distances of Residential Buildings from ROW Centerline

5.4.2.1 Methods

The types of residential buildings (homes and apartments) and the distance of these buildings from the route centerlines were determined using GIS measurements on aerial photography. The building type was also field verified to the extent possible from existing ROW. Residential buildings were tallied according to five distance categories from the route centerlines: 0–25 feet, 26–50 feet, 51–100 feet, 101–150 feet, and 151–300 feet.

5.4.2.2 Summary of Residential Buildings Distances

The Northern Route has a total of 185 homes and 2 apartment buildings (8 units) within 300 feet of the centerline (Appendix B, Table 3). This route with Segment P-East has 172 homes and 11 apartment buildings (149 units) within 300 feet of the centerline. For both Northern Route options, 4 homes are located within 26-50 feet of the centerline (2 along Segment N and 1 each along Segments H and G). The Northern Route has 11 homes and no apartment buildings within 51-100 feet of the centerline. The Northern Route with Segment P-East has 14 homes and 2 apartment buildings (4 units) within 51-100 feet of the centerline.

The Southern Route has a total of 226 homes and 59 apartment buildings (138 units) within 300 feet of the centerline (Appendix B, Table 3). This route with Segment B-North has 228 homes and 59 apartment buildings (138 units) within 300 feet of the centerline. For both Southern Route options, 1 home is located within 26-50 feet of the centerline (along Segment G). The Southern Route has 14 homes and 13 apartment buildings (26 units) within 51-100 feet of the

centerline. The Southern Route with Segment B-North has 13 homes and 13 apartment buildings (26 units) within 51-100 feet of the centerline.

5.4.3 Appendix B, Table 4 – Distances of Schools, Daycare Centers and Hospitals from ROW Centerline

5.4.3.1 Methods

The number of sensitive receptors (schools, daycare centers and hospitals) and the distance of these buildings from the route centerlines were determined in a similar fashion as the residential buildings in Appendix B, Table 3. In addition, the following databases were used to identify these facilities:

- Locations of licensed family and group child care centers were provided by the Wisconsin Department of Children and Families;
- Public and private school locations were provided by the Wisconsin Department of Public Instruction; and
- Hospital locations were provided by the Wisconsin Department of Health Services.

Similar to Appendix B, Table 3, the building type was also field verified to the extent possible from existing ROW.

5.4.3.2 Summary of School, Daycare Centers and Hospital Distances

One school is located within 300 feet of the centerline for the Northern Route. Two schools and one daycare center are located within 300 feet of the centerline for this route with Segment P-East (one building is considered a school and a daycare facility). All of these receptors are located greater than 100 feet from the centerline for both route options.

Two daycare centers are located within 300 feet of the centerline for the Southern Route and this route with Segment B-North. Both of these receptors are located along Segment O and are greater than 100 feet from the centerline. There are no schools located within 300 feet of the centerline for either of the Southern Route options.

5.4.4 Appendix B, Table 5 – Land Cover

5.4.4.1 Methods

Land cover along both routes was identified using aerial photography and field observations along accessible segments. Land cover was digitized into a GIS layer to quantify land cover impacts, and the land cover categories correspond to the categories specified in Appendix B, Table 5.

For each route, a corridor corresponding to the required ROW width for each sub-segment was established along the route centerline. Existing ROW corridors were then overlaid on the route corridor to distinguish land cover in existing ROW versus new ROW. The polygons of each land cover type were then clipped with the route and existing ROW corridors. The acreages of each resulting polygon were quantified with GIS software. The resulting acreages were summed by land type within existing and new ROW for each sub-segment.

Quantifying land cover in this fashion resulted in the total ROW area being slightly greater for certain sub-segments than shown in Appendix B, Table 2. This difference occurs because the actual extent of ROW is being used for Appendix B, Table 5 while, in some cases, a representative value for the project ROW width was used for Appendix B, Table 2 in order to reduce the number of sub-segments and complexity of the table. This difference occurred when the required ROW width for a few spans deviated from the typical ROW width for that sub-segment, as noted in the comments within Appendix B, Table 2.

5.4.4.2 Summary of Land Cover

Appendix B, Table 5 provides an estimate of the land cover area that will be impacted by each route option within the proposed Project ROW. The land cover present on the routes and identified in Appendix B, Table 5 includes agricultural lands, undeveloped lands, and developed/urban lands as described in more detail below.

Agricultural Land Use

Agricultural land cover includes active fields, pastures, recently fallow fields (old field) and specialty crops (e.g., tree farms). Fields or other areas with no evidence of recent tillage or agricultural production were not included as agricultural land. A detailed discussion of agricultural lands is included in Section 6.1.

Crop Land

The routes cross mostly lands under corn, soybean or forage (alfalfa) production, although wheat fields were occasionally observed.

Approximately 659 acres of cropland occur along the Northern Route and 634 acres occur along this route with Segment P-East. The majority of the cropland (comparing total acreage) occurs along Segments N and D. Of the total cropland in proposed ROW, a slightly higher percentage of cropland along this route occurs in new ROW as compared to existing ROW.

Approximately 788 acres of cropland occur along the Southern Route and 784 acres occur along this route with Segment B-North. More than half of the cropland occurs along Segment O, although it is also commonly present along Segments C and F. The majority of this cropland occurs in new ROW.

Pasture

Pasture lands refer to areas grazed by livestock.

Approximately 39 acres of pasture occur along both Northern Route options. The majority of pastured land occurs along Segment N, with most occurring in existing ROW.

Approximately 70 acres of pasture occur along both Southern Route options. The majority of pastured land occurs along Segment O, with most occurring in new ROW.

Old Field

The areas designated as old field are comprised of recently fallow lands that are currently not under agricultural production.

Approximately 5 acres of old field occur along both Northern Route options. The majority of this cover type occurs along Segment D and is generally evenly divided between existing and new ROW.

Approximately 4 acres of old field occur along the Southern Route and 3 acres occur along this route with Segment B-North. This cover type only occurs along Segments O, I and B (but not in the Segment B-North option) and is relatively evenly distributed among these segments. This cover type occurs primarily in new ROW.

Specialty

Specialty crops include ginseng, tree farm, orchards and cranberry bogs. Tree farms were the only specialty crop observed along either of the routes.

The Project would impact approximately 10 acres of tree farms along both Northern Route options. The majority of this cover type occurs along Segment N. Segment A is the only other location where this cover type was observed. A higher percentage of tree farm area along this route occurs in existing ROW.

The Project would impact approximately 1 acre of tree farms along the Southern Route or 2 acres along this route with Segment B-North. This cover type only occurs along Segment O and along Segment B-North, and is present primarily in new ROW.

Undeveloped Lands

The types of undeveloped lands include upland prairie / grassland, non-forested wetland and upland woodland.

Prairie / Grassland

Grasslands identified along both routes consist primarily of maintained grasses in road ROW, and to a lesser extent open fields (dominated by herbaceous vegetation) or grassed swales not in agricultural production. The majority of grasslands along the routes are comprised of species characteristic of disturbance (e.g., smooth brome grass, Kentucky blue grass) with few prairie species observed. Remnant prairies on steeper slopes in bluff areas were occasionally observed along portions of Segment N (sub-segments N1 - N5) and these communities would be expected to occur in similar locations of Segment O (portions of Segment O were not observed in the field). Upland areas dominated by shrubs and/or tree saplings, which occur occasionally along railroad or some transmission line corridors, are included in this land cover category but represent a small percent of the total area. This land cover category does not include cleared forest on existing transmission line or pipeline ROW.

Approximately 719 acres of grassland occur within the ROW along the Northern Route and 728 acres occur along this route with Segment P-East. This cover type occurs primarily in existing ROW. The majority of grassland along this route occurs along Segment N, and to a lesser extent Segments H and E.

Approximately 501 acres of grassland occur within the ROW along the Southern Route and 502 acres occur along this route with Segment B-North. The majority of grassland along this route

occurs in existing ROW. This land cover type is most common along Segment O, although it is also prevalent along Segment I.

Non-Forested Wetland

This section refers to non-forested wetland types encountered along the routes (e.g., wet meadow, shrub carr, shallow marsh). Forested wetlands are discussed in the next section. A detailed discussion of wetland types along both routes is provided in Sections 6.4 and 8.1.

Approximately 267 acres of non-forested wetland occur within the ROW along both Northern Route options, with this land cover split approximately evenly between new and existing ROW. The majority of the non-forested wetland occurs along Segment N and, to a lesser extent, Segment H.

Approximately 240 acres of non-forested wetland occur within the ROW along the Southern Route and 241 acres occur along this route with Segment B-North. The majority of these wetlands occur in new ROW. Non-forested wetlands were most commonly observed along Segment O and, to a lesser extent, Segment I.

Forested Wetland

As previously discussed, a detailed discussion of wetland types along both routes, including forested wetlands and the criteria used to identify forested wetland areas, is included in Sections 6.4 and 8.1. The forested wetland category includes wetlands located in existing transmission line ROW which are no longer forested.

Approximately 134 acres of forested wetland occur within the ROW along both Northern Route options, including about 20 acres of cleared forest on existing utility corridors. The majority of forested wetland is present in new ROW and occurs along Segment N and, to a lesser extent, along Segments M and H.

Approximately 71 acres of forested wetland occur within the ROW along both Southern Route options, including about 9 acres of cleared forest on existing utility corridors. The majority of forested wetland is present in new ROW and occurs along Segments O, M and I.

Upland Woodland

A detailed discussion of forested lands along both routes, including the criteria used to identify forested areas, is included in Section 6.3. The upland woodland category includes cleared areas in existing transmission line ROW through previously wooded areas.

The quantity of upland woodland presented in Appendix B, Table 5 for both routes assumes all woodland in the proposed ROW will be cleared. However, in areas with steep terrain and bluffs (e.g. in portions of Segment N and O), some woodlands in valleys may not need to be cleared if there is sufficient distance between the height of the conductor and the top of the trees. These areas were not identified for purposes of preparing this joint Application, and thus Appendix B, Table 5 may over estimate woodland impacts along segments with this terrain.

Approximately 571 acres of upland woodland occur within the ROW along the Northern Route and 576 acres occur within the ROW along this route with Segment P-East. These totals include

about 179 acres of cleared forest on existing utility corridors. The majority of the uncleared woodland is present in new ROW; however, a relatively high percentage of this woodland occurs in existing ROW. Most of the woodland along this route occurs along Segment N and, to a lesser extent, Segment H.

Approximately 576 acres of upland woodland occur within the ROW along the Southern Route and 577 acres occur within the ROW along this route with Segment B-North. These totals include about 58 acres of cleared forest on existing utility corridors. The majority of the uncleared woodland is present in new ROW and occurs along Segment O and, to a lesser extent, along Segments F and I.

Developed / Urban Land

Developed / urban lands located along both routes include residential, commercial, industrial and other developed lands such as paved/gravel roads and railroads. For homes located within subdivisions, the extent of residential land generally equals the length of the lots across the route. For homes located in rural areas, the area was determined by the extent of lawns associated with these residences. Commercial and industrial lands are comprised of individual businesses and adjacent grounds (including parking lots). The extent of roads was determined by paved or graveled surface while railroad areas were determined by the extent of ballast. Other land cover within road / railroad ROW was placed in the appropriate land cover category (e.g., grassland, woodland).

Approximately 222 acres of developed / urban land occurs along the Northern Route and 219 acres occur along this route with Segment P-East. The majority of this cover type occurs along Segment N within existing ROW.

Approximately 202 acres of developed / urban land occurs along the Southern Route and 201 acres along this route with the Segment B-North. The majority of this cover type occurs along Segment O and, to a lesser extent Segment I, within existing ROW.

5.4.5 Appendix B, Table 6 – Federal, State, Local and Tribal Lands Excluding Road ROWs

5.4.5.1 Methods

County parcel data obtained in spring, 2013 was used to identify federal, state, local and Tribal lands along the routes; road ROW was not included in this evaluation. The acreages of these lands intersecting the Project ROW were determined by digitizing the relevant information in a GIS; however, as requested by the Commission, a representative length is also provided for each entry in Appendix B, Table 6. The length refers to the maximum length of a parcel within the proposed ROW. If several parcels are combined for a given entry within a sub-segment, this length was determined by summing the maximum lengths of each parcel.

Privately owned lands that are managed by federal or state entities are also included in Appendix B, Table 6. State managed lands were identified from the WDNR's Managed Lands web site (http://dnrmaps.wi.gov/DNRManagedLands/). Lands with a known federal

conservation easement (refer to Section 6.2) were assumed to be federally managed and are also included in Appendix B, Table 6.

5.4.5.2 Summary of Federal, State Local and Tribal Lands

An estimate of the potential impacts to public lands is compiled for both routes and is provided in Appendix B, Table 6. Public lands will not be impacted by substation construction for the Project.

Northern Route

The Northern Route (both options) crosses the USFWS Fairfield Marsh Waterfowl Production Area along I90/94 on Segment H. Because new ROW would be required along this federally owned property, the Applicants have filed a ROW request application with the USFWS to initiate the federal review process. In addition, both route options cross a privately owned parcel with a federal conservation easement on it, the Necedah Wildlife Refuge Conservation Easement (this property is along Skutley Creek on sub-segment N3b). A 161 kV transmission line currently occurs through this parcel along the same alignment as the proposed transmission line, and no additional ROW is anticipated. Since this is a federal conservation easement, it is assumed to be federally managed. The Applicants have had discussions with the USFWS regarding potential impacts to both properties.

Several state-owned properties are crossed by the Northern Route (both options). This route crosses a WDNR State Wildlife Habitat parcel along sub-segment N3b. A 161 kV transmission line currently occurs through this parcel along the same alignment as the proposed transmission line, and no additional ROW is anticipated. This route also crosses the Black River State Forest (sub-segment N6) along I-90, and Mirror Lake State Park (sub-segment H2) and Pine Island State Wildlife Area (sub-segments H5 and H7) along I-90/94. New ROW will be required in these areas. The Black River State Forest and Mirror Lake State Park have received Land and Water Conservation (LAWCON) funding and the impact from the proposed transmission line will require a separate state and federal review process. The WDNR has been consulted regarding these properties. Other state-owned land crossed by the Northern Route includes undeveloped State of Wisconsin parcels along sub-segments N6 and G2, and undeveloped WisDOT parcels along sub-segments H1 and H7. New ROW will be required along these state-owned parcels and the WDNR and WisDOT have been consulted regarding these parcels.

The Northern Route crosses the New Amsterdam Grassland property, which is owned by the Mississippi Valley Conservancy, Inc. (MVC). A 69 kV transmission line currently occurs through this property along the same alignment as the proposed transmission line. Additional ROW may be required for this Project depending on the final structure configuration. This property, which has received WDNR Knowles-Nelson Stewardship Program funds, is primarily managed for grassland birds and the WDNR has input on the management plan. The WDNR and MVC have been consulted regarding this property. The WDNR has not identified any unresolvable impediment to granting consent.

Numerous parcels owned by a municipality or a county are crossed by the Northern Route (both options). These include several undeveloped parcels, a City of Black River Falls golf course (Skyline Golf Course), Jackson County forest land and an Omaha County trail crossing (in Juneau County). In addition, the Northern Route crosses a town hall and park property and an undeveloped parcel (Town of Holland), and this route with Segment P-East crosses an undeveloped Village of Holman parcel. Except for the golf course, Omaha County trail, and the Town of Holland town hall and park properties, these crossings occur along existing corridors. New ROW will typically be required for these parcels and the land owners have been informed of the proposed routes.

Tribal lands and Native American reservations are not crossed by either Northern Route option.

Southern Route

Neither Southern Route options cross federally owned land; however, there are privately owned parcels with easements managed by the NRCS. Two properties are enrolled in the Wetland Reserve Program (WRP) along sub-segments O24 and I5, and one property has an Emergency Watershed Protection Program - Floodplain Easement (EWPP-FPE) along sub-segment I13. Under the proposed alignments, new land rights would be required on these lands. The Applicants have consulted with NRCS regarding these parcels and will work with NRCS if these segments are ordered.

Several state properties are crossed by both Southern Route options. These include:

- WDNR Scattered Wildlife land along sub-segment O6;
- The WDNR La Crosse River State Trail along sub-segment O6 (the proposed transmission line crosses the trail at this location);
- The WDNR Dells of the Wisconsin River SNA along sub-segment I5;
- The WDNR Pine Island Wildlife Area along sub-segments I8 and I13;
- A State of Wisconsin undeveloped parcel adjacent to the Wisconsin River along sub-segment G2;
- A WisDOT rest stop area along sub-segment F1; and
- A WDNR Scattered Wildlife parcel (Dekorra public hunting grounds) along sub-segment F1.

All of these properties occur along existing corridors (e.g., interstate highway or transmission line) but some new ROW would be required. The WDNR and WisDOT have been consulted regarding all of these properties.

Several privately owned parcels that are assumed to be managed by the state occur along both Southern Route options. These include two La Crosse Area Comprehensive Fishery Areas along sub-segments O7d and O8, a 400 State Trail crossing along sub-segment O19, and a Statewide Mitigation Program parcel along sub-segment I5. New ROW would be required on these parcels and the WDNR has been consulted regarding these properties.

Numerous parcels owned by a municipality or a county are crossed by the Southern Route. These include several parks, undeveloped parcels, property associated with substations (e.g., an access road to substation), and property with undefined buildings. Except for parcels owned by the Village of Cashton (sub-segment O11a), City of Elroy (sub-segment O19), City of Portage (sub-segment I12), Dane County (sub-segment B4a, route option with Segment B-North only) and the Town of Vienna (sub-segment C2), these property crossings occur along existing corridors. New ROW will typically be required for these parcels and the land owners have been informed of the proposed routes.

The Southern Route crosses the Black Earth Creek Wildlife Area – Sunnyside Unit (along sub-segment B4), which is owned by Dane County and was purchased in part with WDNR Knowles-Nelson Stewardship Program funds. A 69 kV transmission line, with a 50-foot easement, currently occurs through this parcel along the same alignment as the proposed transmission line. An additional 70 feet of new ROW would be required on this property. In addition, this proposed route option (along with the Segment B-North option) crosses potential future expansion areas (which are privately owned) immediately adjacent to this county-owned property. The WDNR and Dane County have been consulted regarding this property. The WDNR has not identified any unresolvable impediment to granting consent.

Tribal lands and Native American Reservations are not crossed by either Southern Route option.

5.4.6 Appendix B, Table 7 – Route Impact Summaries

A summary of the impacts associated with each route option is provided in Appendix B, Table 7.

5.5 Construction Impacts

5.5.1 Construction Sequence

The Project does not involve construction of underground lines. Therefore, construction activities are described only for overhead transmission line construction. An overhead transmission line requires several different activities at any given location. The following information generally describes the major construction activities, their approximate sequence, and the anticipated impacts associated with each activity:

- Soil borings – Collection of geotechnical data will be necessary for final design of the transmission line. Soil borings are typically completed using rubber tired or tracked drill rigs, depending on site and access conditions. A pick-up truck or ATV is also typically used to transport the crew and drilling supplies to the work area.
- Surveying and staking of ROW – These activities are minimal impact, typically completed by a two-person crew travelling by foot, ATV or pick-up truck.
- Clearing of ROW – To facilitate construction equipment access and ensure safe clearances between vegetation and the transmission line, all vegetation will be cleared for the full width of the ROW. Vegetation will be cut at or slightly above the ground surface using mechanized mowers, harvesters or by hand. Root stocks will generally be left in place, except in areas where stump removal is necessary to facilitate the movement of construction vehicles, or required by the landowner.

Where permission of the landowner has been obtained, stumps of tall-growing species will be treated with an herbicide to discourage re-growth.

- Road building – In areas of steep topography, access roads and work platforms will need to be constructed prior to construction access. This work is typically completed using equipment such as a bulldozer, track-hoe, skid-loader and dump trucks. The travel surface of the access road is typically 14 to 20 feet wide and work platforms are typically 30 feet by 30 feet. The total amount of disturbance of the road (cut slope to base of the spoils slope) is dependent on soil type and topography. Following construction, the access roads will be left in place or returned to prior conditions, depending on landowner preference.
- Construction matting – Matting will be installed to provide access through wetlands or other unstable soil areas prior to construction access. Construction matting may consist of timber, composite or hybrid timber mats and will be installed with rubber tired mat trucks, forwarders, forklifts or skid loaders. Mat access roads will generally be 16 to 20 feet wide and mat work platforms may be as large as 100 feet by 100 feet, depending on the type of structure. If a wire stringing location is in a wetland, additional matting will be needed to provide a stable area for the stringing equipment. Matting will be removed using similar equipment as for installation as each section is completed.
- Temporary staging of poles and other materials along ROW – Trucks, loaders and cranes will be needed to unload poles and other materials near each work location.
- Installation of erosion control Best Management Practices (BMPs) – BMPs will be location specific and installed prior to all anticipated ground disturbance. Where unexpected ground disturbance occurs, BMPs will be installed immediately after the disturbance occurs. Typical erosion control equipment includes ATVs and or trucks for crew transportation, skid loaders, tractors, backhoes, hydro-seeders and other light duty equipment.
- Foundation installation and/or excavation for direct embedded structures – In general, the excavated holes for each type of foundation will range from 3 to 12 feet in diameter and 20 to 60 feet in depth, or greater, depending on soil conditions. The method of installation, diameter and depth of the foundation will vary depending on the soil capability and structure loadings. Excavation is required for all structures whether they are direct-embedded or use reinforced concrete foundations.

  In areas where groundwater seeps into the excavation, or where water is needed to hold the hole during drilling, it may be necessary to dewater the excavation. Depending on site conditions, the water may be de-silted and discharged to an upland area where it is allowed to re-infiltrate, or removed from site via a tank truck. Dewatering will proceed in accordance with applicable regulations and permit requirements.

For direct-embedded poles (no concrete foundation required), a hole is excavated to the appropriate depth. The base of the structure is placed into the excavated hole, and the area around the pole is backfilled with clean granular fill.

For structures requiring a reinforced concrete foundation, the required hole is excavated and a rebar cage and anchor bolts are placed into the excavation. The excavation is then filled with concrete to a point where the rebar cage and anchor bolts are covered leaving a typical one to two foot reveal of the foundation above grade with exposed threaded anchor bolts. The complete caisson is allowed to cure.

Typical equipment for this phase of construction includes: dump trucks, drill rigs, cranes, vacuum trucks, and tanker trucks.

- Structure setting – after the direct embed base is set or the caisson is cured, the remainder of the steel pole structure (or sections) is mounted to the base. Typical equipment for this phase of construction are cranes and bucket trucks.
- Wire stringing and clipping – once all of the structures within a wire pull segment are set, the wires are pulled and clipped into place. This requires access to each structure with either a bucket truck or helicopter. Wire set up areas containing reel trailers, wire pullers, and related equipment are located at each end of the wire pull.
- Cleanup and Restoration of ROW – Upon completion of construction, cleanup and site restoration occurs. This includes removing construction mats, temporary clear span bridges (TCSBs), and other material or debris from the ROW, any necessary seedbed preparation, and seeding. Typical equipment for these activities includes mat trucks, bobcats, pickup trucks and other light duty vehicles.

5.5.2 Construction Impacts by Phase

Measures that will be considered to minimize and mitigate impact include:

- Scheduling the work to take advantage of working on frozen ground;
- Laying mats; and
- Employing low pressure equipment (balloon tires or track vehicles) to minimize ground compaction.

5.5.2.1 Size of Excavations

It is anticipated that a large number of foundations for the steel structures will be drilled-pier, poured-concrete foundations. Because of diverse loadings and soil conditions, the cylindrical foundations will take on a variety of sizes. The drilled-pier, poured-concrete foundations will range from 5 to 12 feet in diameter and from 20 to 60 feet in depth. Consequently, the volume of the holes is anticipated to range from 20 cubic yards to in excess of 150 cubic yards on several of the largest foundations. Most holes will be in the range of 30 to 60 cubic yards.

5.5.2.2 Type of Construction Machinery Used

Section 5.5.1 describes the typical construction equipment anticipated to be used on the Project.

5.5.2.3 Construction Disturbance Zone

Transmission line construction will be confined to the ROW, identified access routes, and the laydown and staging areas. Most disturbances will likely occur in the area immediately surrounding transmission line structures. In areas where access cannot be gained from existing roads, some disturbance from vehicular traffic may also occur. Disturbance at these areas may include clearing of vegetative cover, soil compaction, vehicular tracking, and some topsoil disturbance.

5.5.2.4 Spoil Materials Management

Excavated soil may be thin spread on surrounding upland areas and stabilized depending on site conditions, landowner preferences, and environmental requirements. Soil may also be hauled to an approved disposal site. Temporary stockpiles of excavated soils and woody debris resulting from ROW clearing and construction will be required throughout the course of construction. While specific locations have not been determined, it is anticipated that minor soil piles may be required adjacent to excavations for the new transmission line structures and within the laydown yards. Stockpiles will be placed in upland locations. Stock piled materials will be prevented from entering any wetlands or waterways by the use of proper erosion control methods such as silt fence, silt socks, or wattles.

If contaminated materials are encountered during the construction, spoils will be isolated and steps will be taken to determine disposal requirements in accordance with applicable regulations.

5.5.3 Unique Construction Methods

Unique construction methods that may be employed on the Project include light helicopter usage, heavy helicopter usage, micro-piles, helical piers, vibratory or hammer driven piles, and vibratory cans.

5.5.3.1 Location and Reason for Construction Method

Light helicopters may be used along the entire length of the Project. The primary usage for light duty helicopters is to assist in stringing operations and the installation of conductor and shield wire accessories. Applications include:

- Pulling in stringing ropes;
- Installation of spacers, dampers, shunts or bird diverters;
- Clipping in conductor; and
- Logistical support for the installation and removal of stringing blocks.

Light duty helicopters are beneficial because they:

- Decreases total Project construction time;
- Allows work in remote or inaccessible locations;
- Reduces environmental impacts;
- Minimizes right-of-way intrusion; and
- Minimizes matting in sensitive areas.

Applications for **heavy helicopter** usage are more limited than light helicopters. The best application for heavy helicopter usage is the transport of equipment and material to remote locations. For example, a good portion of the Southern Route traverses the Coulee Region of Wisconsin. It is anticipated that line construction in many locations may be from ridge top to ridge top, with the conductor spanning the valley below. As an alternative to traditional drilled pier foundations, other foundation types (described below) may be used. In support of those alternative foundations, heavy-lift helicopters may be employed to carry material (e.g. poles, hardware, and grout) or equipment (compact drill rigs) to the ridge tops.

The benefits for this type of approach include:

- Allows work in remote or inaccessible locations;
- Eliminates the need for extensive road building for access; and
- Reduces environmental impacts.

As an alternative to traditional drilled pier foundations, **micro-piles** may be used in remote and rocky locations. Areas that would lend themselves to the use of heavy helicopters would also be a likely location for the installation of micro-piles. As indicated above, this would include the Coulee Region on the Southern Route, and the hilly areas west of Black River Falls on the Northern Route.

Micro-piles are a good alternative to traditional drilled pier foundations because the logistical support for construction results in a much lighter environmental footprint than traditional drilled pier installations. Since all material and equipment needed for installation can be flown to the structure location, there is no need for extensive road building to provide access.

Although down the ROW or off-ROW access to the structure location is still necessary, the construction vehicles are limited to small excavators and pick-up trucks as opposed to cranes and concrete trucks used in traditional foundations. Accordingly, the lighter foot print significantly reduces environmental impacts to the access route.

A second alternative to traditional drilled pier foundations is the installation of **helical piers**. The most likely application for helical piers is soil strata indicating expansive soils, a high water table, fill, or other unstable conditions in locations requiring a deep foundation.

A third alternative to traditional drilled pier foundations is **vibratory or hammer driven piles**. This type of foundation is often used where poor soil conditions would result in excessively large drilled pier foundations. Construction traffic for vibratory or hammer driven piles is considerably heavier than that used for micro-piles, as a large track mounted crane would be

needed to install the piles. The benefit of using vibratory or hammer driven piles is the avoidance of matting a large percentage of the access route to make way for concrete truck traffic. Low ground pressure track equipment significantly reduces environmental damage to the access route.

Finally, for lightly loaded structures (tangents) in sandy soil, **vibratory cans** may be employed as an alternative to vibratory or hammer driven piles. The vibratory can is a special case type of pile whereby an inverted steel can is vibrated into the soil to serve as the foundation for the steel pole. The benefits of this type of installation are the same as those for vibratory or hammer driven piles.

5.5.3.2 Description of Construction Methods

The following is a description of the proposed unique construction methods for the Project.

Helicopter Usage

The following is a step-by-step overview of the general process for using light helicopters:

1. Utility linemen will be transported to each structure via the helicopter. They will then hang stringing blocks on each arm of the structure.
2. Rope is then hooked onto the helicopter and pulled through the stringing blocks for the wire pull segment (anywhere from 2-4 miles at a time). Wire rope is then connected and pulled back the opposite way through the stringing blocks.
3. Conductor is then connected to the hard line and pulled through the stringing blocks using a wire pulling machine located on the ground(conductor is too heavy to be pulled by the helicopter).
4. Using the helicopter, the stringing blocks are removed from each arm. Clamps, dampers, bird diverters, and spacers are installed on the conductor as required.

In order to efficiently use heavy lift helicopters to transport material and equipment to remote sites, marshaling yards are chosen to best utilize existing road networks. The typical distance between yards is about 5 miles, making the one-way flight distance no more than 2.5 miles. Ground crews at these yards assemble the pole sections, kit material, and stage any equipment that will be transported to the pole location. Setting crews at the pole locations take receipt of the material and equipment, and assist the helicopter crew in setting or topping the transmission line structure.

Micro-piles

Micro-piles, also known as mini-piles (and less commonly as pin piles, needle piles and root piles), are deep foundation elements constructed using high-strength, small-diameter steel casing and/or threaded bar. Capacities vary depending on the micro-pile size and subsurface profile. Allowable micro-pile capacities in excess of 1,000 tons have been achieved.

The micro-pile casing generally has a diameter in the range of 3 to 10 inches. Typically, the casing is advanced to the design depth using a drilling technique. Reinforcing steel in the form of an all-thread bar is typically inserted into the micro-pile casing. High-strength cement grout is

then pumped into the casing. The casing may extend to the full depth or terminate above the bond zone with the reinforcing bar extending to the full depth. The finished micro-pile resists compressive, uplift/tension, and lateral loads and is typically load tested in accordance with ASTM requirements. The relatively light and compact micro-pile drill rig allows installation in areas with restricted access or low headroom.

Helical Piers

A helical pier is a pre-manufactured steel deep foundation element consisting of a central steel shaft (usually square), and one or more helical shaped bearing plates (helices). The element is similar to a large screw. A helical pier is installed by rotating (screwing) it into the ground. Each helical bearing plate is formed into a screw thread with a uniform defined pitch. The helical pile is installed into the ground until the helical plates are located in load bearing soil.

Clusters of helical piers are installed together to provide foundation support for steel transmission structures. The clusters are tied together with a pile cap. For more information on a pile cap, reference the description in the vibratory pile section below.

Vibratory Piles

A pile foundation consists of installing a cluster of steel piles to a depth of as much as 120 feet. These can be installed either with conventional pile driving hammers or by vibratory methods. At these locations, a rectangular shaped concrete pile cap is installed to tie the pile cluster together to form a structural unit. The pile cap could vary in size from 10 feet to 30 feet wide, 20 feet to 40 feet long and 3 feet to 6 feet thick. The bottom of the pile cap is installed to a depth of 7 feet to 10 feet below grade. Above the pile cap a concrete stem is installed in which the anchor bolts are installed and on which the pole will rest. The stem is either cylindrical or square and will have nominal outside dimensions of 6 feet to 13 feet. The stem is structurally anchored into the pile cap with reinforcing bars. For this type of foundation, after the cluster of piles is advanced to an appropriate depth to develop structural capacity, several feet of soil is removed to accommodate the dimensions of the pile cap. Soil is removed by use of a backhoe and transported to an approved upland location for disposal or dispersal. Forms for the pile cap and stem are installed, anchor bolts and reinforcing rods are placed, and concrete is poured. After the concrete has properly cured, soil is placed over the pile cap leaving only the top portion of the stem exposed with an appropriate amount of reveal.

Vibratory Cans

The Applicants will consider vibratory-driven steel cans in sandy soil and wetland areas to minimize construction impacts. During detailed design, location specific soil borings will be drilled to evaluate the foundation system required. Vibratory-driven steel can installation consists of a crane and a vibratory hammer which vibrates the steel cylinder foundation. The weight of the steel and the vibratory hammer pushes the foundation into the ground.

5.5.3.3 Temporary Construction Needs and Issues

During construction, temporary wire pulling/handling areas, staging/laydown areas and helicopter landing pads will be required. Section 5.6 provides additional detail for these items.

5.5.4 Substation Construction Impacts

The following information is provided in accordance with Section 1.8.3 of the Substation Filing Requirements. All construction activities at the North Madison and Cardinal Substations will be conducted within the existing fenced-in areas, and no grading will be required. At the Briggs Road Substation, a small expansion of the fenced-in area will be required.

For Briggs Road Substation:

- The Northern Route with Segment P option would require an additional 1.5 acres of fenced-in area along the west side and southwest corner of the existing fenced-in area. The Northern Route with Segment P-East option or either of the Southern Route options would require an additional 0.9 acres of fenced-in area along the west side and southwest corner of the existing fenced-in area. All construction activities will be conducted within existing NSPW property boundaries.
- The depth of excavation would be approximately 2 feet. From that point we would fill 2-4 feet with existing onsite sands.
- The typical construction machinery would include a dozer, a backhoe, an off-road truck and a smooth drum compactor.
- The area disturbed would be as stated above, 1.5 acres for the Northern Route with Segment P option or 0.9 acres for the other options. Construction would be accessed from the substation driveway and would not cause disturbance to public roads.
- All spoils materials would be handled on-site. There is adequate room on-site to borrow or waste materials needed for construction. Materials would be handled with the above referenced machinery. The only materials coming to the site would be class 5, and they would be transported to the site via dump truck.

5.6 Staging Areas and Temporary Work Space

Temporary staging areas (laydown yards / laydown areas) will be utilized to store job trailers, construction vehicles and equipment, transmission line structures, conductor, cables and equipment, and other related material/equipment on the ROW and at laydown yards outside of the Project ROW. If helicopters are utilized for construction, landing zones will be required along the Project ROW. Additionally, wire-stringing setup areas will be necessary for construction of the Project.

Laydown yards will be required throughout construction for the setup of job trailers and storage and staging of construction equipment and material. Potential laydown yards have been identified based on the construction requirements of the Project, proximity to work areas, and environmental and landowner impacts. Laydown yards have been selected to minimize the amount of disturbance and preparation required to provide suitable surfaces for temporary storage and staging of construction equipment and material. The amount of grading and clearing at these sites will be kept to a minimum as sites are chosen with these considerations in mind. For example, sites that are paved and/or have been previously graded and cleared of vegetation, such as parking lots, old gravel pits, and fields are ideal locations for laydown yards.

The Applicants have identified 25 potential laydown yards for the Project. An environmental review of the potential laydown yards was conducted using existing GIS data and aerial photography. The following resources were utilized in the evaluation: WDNR Natural Heritage Inventory, WDNR Hydro Layer, WDNR Wisconsin Wetland Inventory (WWI), WHS database and county soil maps. The potential laydown yards are listed in Table 5.6-1 below, and are shown on site maps included in Appendix A, Figure 7.

Table 5.6-1 – Laydown Yards

Site #	Parcel Owner	Legal Description	Municipality	County	Size (Acres)
1	Mathy Construction Co/Croell Redi-Mix Inc.	T18N, R8W, Sec 19	Town of Caledonia	Trempealeau	45
2	Nationwide Limited Partnership	T18N, R8W, Sec 19	Town of Caledonia	Trempealeau	29
3	Lofgren	T21N, R6W, Sec 8	Town of Springfield	Jackson	3
4	Badger Mining Corp/Earthland Resources LP	T22N, R6W, Sec 29	Town of Curran	Jackson	16
5	Chippewa Valley Bank	T21N, R4W, Sec 11	Town of Adams	Jackson	5
6	Fort McCoy – Us Army	T18N, R3W, Sec 25	Town of Lafayette	Monroe	14
7	Mathy Construction Co.	T18N, R1W, Sec 34	Town of La Grange	Monroe	6
8	M&O Aggregate Inc.	T17N, R1W, Sec 3	City of Tomah	Monroe	8
9	City of New Lisbon	T16N, R3E, Sec 9	City of New Lisbon	Juneau	5
10	JCC Realty LLC BCP Realty LLC	T16N, R3E, Sec 9	City of New Lisbon	Juneau	3
11	Woodside Ranch LLC	T15N, R4E, Sec 2 & Sec 1	Town of Lemonweir	Juneau	52
12	Kolba Pit	T15N R4E, Sec 3	Town of Lemonweir	Juneau	9
13	TKC Real Estate Holdings LLC	T12N, R6E, Sec 3	Town of Delton	Sauk	4
14	Mathy Construction/Goerks	T12N, R6E, Sec 22 & Sec 23	Town of Baraboo	Sauk	28
15	Lake Morganne Group LLC	T12N, R8E, Sec 14	Town of Caledonia	Columbia	3
16	Lycon Inc.	T11N, R8E, Sec 2	Town of Caledonia	Columbia	7
17	ATC North Madison Substation	T9N, R9E, Sec 15	Town of Vienna	Dane	7
18	A&L Buchner LLC	T9N, R10E, Sec 14	Town of Windsor	Dane	6
19	McHugh Family Trust	T17N, R7W, Sec 19	Town of Onalaska	La Crosse	9
20	Monroe County Highway Department	T17N, R4W, Sec 25	Town of Sparta	Monroe	14

Site #	Parcel Owner	Legal Description	Municipality	County	Size (Acres)
21	Arthur Overgaard, a Division of Mathy Construction Co.	T15N, R3W, Sec 19	Town of Jefferson	Monroe	6
22	Leis/Menn	T15N, R2W, Sec 2	Town of Sheldon	Monroe	13
23	Kraemer Quarry	T14N, R1E, Sec 8 & Sec 17	Town of Hillsboro	Vernon	15
24	City of Elroy	T14N, R2E, Sec 4	City of Elroy	Juneau	1
25	Nelson Joint Rev Tr/Leage Joint Rev Tr	T13N, R6E, Sec 12	Town of Newport	Columbia	43

These potential laydown yards are predominantly comprised of active sand and gravel mining operations. These sites are not located within wetlands, and generally have minimal vegetative cover. The sites appear to contain little or no potential habitat for rare species.

Although the sites are mostly disturbed and contain active mining operations, portions of some of the sites have other land cover features as described below:

- Site 4 (Badger Mining Corp/Earthland Resources LP) is adjacent to several mining areas and comprised of meadow/grassland. The WDNR hydro layer identifies an open water area on the southern portion, which does not appear to exist in recent aerial photography.
- Site 6 (Fort McCoy – US Army) is primarily open meadow/grassland that contains some access roads, indicative of past disturbance.
- Site 11 (Woodside Ranch LLC) is a previously agricultural and forested site that has been recently graded and possibly mined for sand and gravel.
- Site 24 (City of Elroy) is a gravel parking lot adjacent to STH 80 in the City of Elroy.
- Site 25 (Nelson/Leage Property) is mostly an active sand/gravel mining operation with a small amount of agricultural land along the western extent of the property.

In general, the Applicants plan to utilize about 10 acres at each laydown site and a minimum of a 30-foot-wide access path will be required for ingress and egress. If a selected site is located in close proximity or upslope of a wetland or waterway, appropriate erosion control measures will be implemented in order to prevent impacts. In addition, access points and haul routes for these work sites will be selected and designed to minimize disturbance to soils and sensitive natural resources to the extent practicable and to minimize off-site tracking.

In addition to the laydown yards, helicopter landing zones/pads may be required along the Project corridor. Heavy-lift helicopters may be utilized to install alternative foundations, set structures and move materials and equipment to designated areas along the ROW. Typically, heavy-lift helicopters will require temporary laydown yards of 1 - 2 acres to provide enough space for the landing pad, tower assembly and equipment and material storage. Typical spacing for heavy-lift helicopter landing zones is 5 to 7 miles. Light-duty helicopters may be utilized for

moving personnel to remote Project areas, pulling in wire pull ropes, wire-clipping and/or other work along the ROW. Typically, light-duty helicopters require a 50-foot by 50-foot landing pad, spaced every 3 to 4 miles in close proximity to the ROW.

Once a route is ordered, helicopter landing zones/pads will be identified based on the construction techniques and design criteria of the Project. It is preferable to utilize sites that are in close proximity to the ROW, relatively flat (1 - 2% slope), require minimal site preparation and are free of obstructions and debris for safe equipment movement. For example, sites such as vacant parking lots, quarries, gravel pits or fallow fields are suitable locations for helicopter landing pads. Compacted gravel or matting is typically used to construct the actual landing pad and water is typically applied to surrounding soil to control dust during helicopter operation. Refueling is generally provided by fuel trucks; however, a fuel tank may be spotted at longer duration landing zones. Secondary containment will be provided if a fuel tank is utilized at a landing zone.

During construction, temporary wire pulling/handling areas will be required approximately every 10,000 feet along the route. This distance will depend on the type of conductor that will be used. A typical area used for wire pulling/handling would be approximately 40 feet by 300 feet. The Applicants will attempt to locate wire pulling/handling areas outside of wetlands; however, based on the typical distance between these areas, it may be necessary to temporarily locate wire pulling/handling areas in some of the more extensive wetlands. In such circumstances no permanent wetland fill would be needed.

Upon approval of this Joint Application and final route selection, the actual sites and the locations on the sites that will be used as equipment staging areas will be determined. As discussed, the selection of these areas will be based on many factors including Project needs and environmental constraints.

The selection of additional laydown yards or other staging areas that may be required will be reviewed and approved by the Applicants prior to use by the contractor. Additional sites will be evaluated for potential impacts or concerns with respect to wetlands, waterways, natural features, grading and clearing requirements, threatened and endangered resources, and cultural or archaeological concerns. If additional staging areas or temporary workspaces are required, the Applicants will notify the Commission of these new locations and will submit the necessary information to the Commission prior to establishing any such areas in accordance with Wis. Admin. Code § PSC 111.71.

5.7 Off-ROW Access Roads

The Northern and Southern Routes are located adjacent to, or commonly cross public roads. Wherever possible, the Applicants intend to access the Project down the Project ROW or directly from public roads that intersect the Project ROW, unless the contractor is able to arrange for alternative access that minimizes environmental and/or landowner impacts.

Access from outside the Project ROW may be required in some cases where physical limitations exist within the Project ROW or where other constraints prevent direct access from public roads. The need for potential off-ROW access paths has been identified based on a preliminary

review of both routes. The identified off-ROW access paths necessary for construction of the Project due to physical limitations or constraints within the ROW are described below. Upon approval of a route, the preliminary access plan may be amended based on field review of the routes, negotiations with local landowners and/or contractor requirements.

5.7.1 Required Off-ROW Access

The off-ROW access paths are shown on Figures 4A and 4B in Appendix A. Most of the off-ROW access paths are located along existing access routes or trails. Agricultural gravel and grassed lanes, driveways and existing cleared forest roads or trails will be utilized wherever possible. In addition, existing waterway crossings such as bridges or culverts will be utilized wherever possible.

5.7.2 Total Length of Off-ROW Access Roads

The lengths of off-ROW access paths are provided in Appendix B, Table 10. The Northern Route includes approximately 16.5 miles of off-ROW access paths and the Southern Route includes approximately 15 miles of off-ROW access paths.

5.7.3 Necessity for Off-ROW Access Roads

The need for potential off-ROW access paths has been identified based on a preliminary review of both routes. This review was completed using aerial photography and by the use of Pictometry with topography data. Additionally, field reviews were conducted to the extent possible from public ROW. This analysis considered constraints within the Project ROW and adjacent roadways. The purpose of developing these off-ROW access paths is to allow for safe material and equipment movement to and from the Project ROW.

The constraints identified as part of this analysis generally included steep terrain (>20% slope), wide waterway crossings (>12-feet), and access limitations along roadways or railroads. The northern parts of both routes include areas with undulating topography and steep slopes within the Project ROW. Access from outside the ROW in these areas is required to avoid significant grading and road building within the ROW. There are several areas of the Project that cross wide waterways with adjacent oxbow channels. Access from outside the ROW at these locations would reduce the need for large bridges and the amount of matting or grading within these features. A significant portion of the Project is located along or in close proximity to roadways which have restrictions on equipment access and steep embankments at ramps and overpasses, which prevent direct access to the Project ROW. Access from outside the ROW is required at many of these locations to allow for safe access to the Project ROW.

Upon approval of a route, the access paths may be amended based on field review and negotiations with local landowners.

5.7.4 Land Cover Information for Off-ROW Access Roads

A list of preliminary off-ROW access paths are provided in Appendix B, Table 10. This table provides quantitative land cover information for upland areas such as agriculture, grassland, forested areas, and forested and non-forested wetlands. The land cover information was

quantified using GIS, as described in Section 5.4. Waterway crossings and potential TCSB locations are also identified.

The impacts included in this table were calculated utilizing an access path with an approximate width based on typical construction practices. Depending on equipment requirements and site conditions, additional width may be needed for safe and efficient movement of construction equipment. In forested lands, existing cleared roads or trails were utilized where possible, however, in most cases these areas were relatively narrow and the entire width was identified as forested land cover. As such, the forested land impacts, as outlined in Appendix B, Table 10, may overstate the actual tree clearing necessary for utilizing these paths. As discussed, these paths may be amended once a route is ordered and further analysis is conducted.

5.7.5 Post-Construction Modification of Off-ROW Access Roads

Prior to construction, some of the off-ROW access paths may need modifications and improvements to allow for safe equipment movement to and from the Project ROW. These modifications may include vegetation removal, grading and/or gravel placement; however, permanent wetland fill associated with off-ROW access paths is not proposed. Access within wetlands may include the use of ice roads, conducting work during dry or frozen conditions, low ground pressure equipment or construction mats. These methods are further described in Section 6.4.

Once construction has been completed, most of the off-ROW access paths created or modified for the Project would be restored to pre-construction conditions. Appropriate restoration materials and methods would be employed, as described in Section 6.9. Depending on landowner negotiations and requirements, the improved access paths may be left in place. Some of the off-ROW access paths may be required for long-term maintenance and safe operation of the transmission line. Once a route has been ordered, the need for permanent access routes will be evaluated.

6.0 NATURAL RESOURCE IMPACTS

6.1 Agriculture

6.1.1 Type of Farming

Agricultural land uses were identified during field observations and by using aerial photography. Two sources of photography were used: (1) the WROC aerials from 2010; and (2) photography from flights along the routes taken in spring 2012 and 2013 which were viewed with Pictometry. Data from these sources were verified through field observations from roads or existing accessible ROW easements when fieldwork was conducted from May to August, 2012, and May to June 2013.

The amount and type of agricultural land along both routes by segment is detailed in Appendix B, Table 5. Property classified as being in agricultural use includes active fields, pastures, recently fallow fields (old field), and specialty (e.g., tree farms, orchards, cranberry bogs, ginseng). Fields or other areas with no evidence of recent tillage were not included as agricultural land. As with other land cover types, agricultural acreage by type was determined for each Project route by digitizing these land cover types with GIS software. Refer to Section 5.4 for a summary of this methodology.

Northern Route

Just over one-quarter of the proposed ROW for both Northern Route options is in agricultural land use, with row crops comprising over 90 percent of this area. The majority of the crops are corn and soybeans; however, wheat and alfalfa/hay fields also occur along segments evaluated in the field. About five percent of the agricultural land is pasture and the remainder is in old (fallow) fields and tree farms.

As a proportion of segment area, Segment D crosses the most agricultural land (79%), followed by Segments A (62%), E (38%), P (35%), and G (23%). Segments H, N, and P-East each have approximately 19 percent agricultural land cover, while each of the remaining segments has 11 percent or less. Segment K, a short stretch of mostly forest and scrub land, has no agricultural land. Although less than one-fifth of Segment N is in agricultural land cover, over 40 percent of all the agricultural land use along the Northern Route falls within this, the longest, segment.

Approximately 10 acres of land in tree farms would be impacted by the Northern Route, primarily on Segment N in Trempealeau (N3b), Monroe (N9), and Juneau Counties (N22, N23). A small area of tree farm would also be crossed near the southern end of the proposed ROW for Segment A in Dane County. No other specialty crops, such as ginseng, orchards or cranberry bogs, were observed within the proposed ROW along the Northern Route.

Southern Route

Over one-third (37%) of the proposed ROW for both Southern Route options is in agricultural land use, with row crops comprising approximately 90 percent of this area. The majority of the crops are corn and soybeans; however, wheat and alfalfa/hay fields also occur along segments evaluated in the field. About eight percent of the agricultural land is pasture (primarily Segment

O), and there are very few old fields and only two tree farms crossed by this route (three for the Segment B-North alternative).

As a proportion of segment area, Segment C has the most agricultural land cover, at 70 percent, followed by Segments F (56%), O (40%), B (36%), B-North (33%), and G (23%). The other segments each have approximately 10 percent, or less, of cover in agricultural land uses. Segment L, a short forested stretch in the same vicinity as Segment K on the Northern Route, has no agricultural land. Almost 60 percent of all the agricultural land use along this route falls within Segment O, which is the longest segment for the Southern Route.

Less than 1.5 acres of land in tree farms would be impacted by the Southern Route. These farms are located in two general locations along Segment O for both options: northwest of Lyndon Station (sub-segment O27) and in a few small areas near the Monroe County line (sub-segment O19) in Juneau County. An additional tree farm occurs along sub-segment A6a for the Segment B-North option. No other specialty crops, such as ginseng, orchards or cranberry bogs were observed within the proposed ROW along the Southern Route.

6.1.2 Agricultural Practices Affected By Project

Based on field observations along accessible routes, aerial photograph review, database queries and review of public comments provided to the Applicants, agricultural practices that may be affected by the Project (construction or operation), such as irrigation systems, aerial seeding or spraying, windbreaks, organic farms and drainage tiles, were documented.

No clear evidence of drain tile lines along the Northern or Southern Route was apparent from either aerial photography interpretation or field investigation. However, there are many areas of farmland along each route that contain hydric soils and are in proximity to ditches, which suggests that drain tiles may exist in these locations. During the final design process, the Applicants will work with the landowners to place structures such that impacts to drain tiles are minimized, to the extent practicable. During construction, matting may be used to more evenly distribute the weight of heavy equipment and/or low ground impact construction equipment may be used. Post-construction, the Applicants will work with the landowners to repair any damaged drain tiles to pre-construction conditions.

Center pivot irrigation systems are known to occur in several locations along the Northern and Southern Routes. For center pivot systems located along portions of the routes on shared ROW (e.g., along roads, transmission lines, and railroads), interference with the system should be minimal. The center pivot system could be affected by placement of proposed transmission line structures along unshared segments; however, these segments often follow parcel or property lines (occasionally tree lined) which should reduce impact.

Based on review of a National Organic Program database provided by the DATCP and public comments, there are a number of farms along the proposed routes that utilize organic management practices or are certified organic. Several reported organic farms occur along the Northern Route (e.g., along sub-segment N3b). Organic farming is a more common practice along the Southern Route with occurrences reported along Segment O on sub-segment O7d, south of Sparta; west and south of Cashton in sub-segments O10, 11, and 13; in the Ontario

area along sub-segments O14 and 15; and west of Elroy in sub-segment O19. If tree lines separate an organic farm parcel from a farm operation not under organic management, removing the tree lines may increase the possibility of herbicide drift. Potential mitigation measures are discussed in Section 6.1.4 below.

As discussed above, tree farms were observed in several areas along both routes. The Project ROW will need to be cleared, and maintained free of woody vegetation, which will result in a loss of this crop.

As requested in Section 5.1.2 and 5.1.3 of the Substation Filing Requirements, the Project's substation construction consisting of line termination additions at the Briggs Road, North Madison and Cardinal Substations will not take any additional farmland out of production or have any impact on farming operations.

6.1.3 Farmland Preservation Program

The number and size of parcels enrolled in the Farmland Preservation Program (FPP) along each route were identified from a database obtained from DATCP. The database lists landowners who have voluntarily filed a FPP agreement with DATCP; therefore, it is not necessarily comprehensive, but it is the only database that could be obtained. The FPP parcels that intersect the centerline of either route are listed below in Table 6.1.3-1. The parcel sizes specified are the entire parcel; not the affected area. There are at least 30 parcels intersected on the Northern Route and at least 18 on the Southern Route.

Table 6.1.3-1 – Intersected Parcels Enrolled in Farmland Preservation Program

Parcel Tax ID	Route	Segment	County	Acres
16011610000	Northern	N	Trempealeau	39.79
16011470000	Northern	N	Trempealeau	38.76
24002430000	Northern	N	Trempealeau	34.50
24002420000	Northern	N	Trempealeau	26.85
24003160000	Northern	N	Trempealeau	9.29
2.06006E+11	Northern	N	Trempealeau	62.74
24004170000	Northern	N	Trempealeau	37.00
24004200000	Northern	N	Trempealeau	38.65
24003390000	Northern	N	Trempealeau	39.41
16011480000	Northern	N	Trempealeau	38.90
16011560000	Northern	N	Trempealeau	39.63
16011440000	Northern	N	Trempealeau	39.26
24004120000	Northern	N	Trempealeau	23.29
29030735	Northern	N	Juneau	40.15

Parcel Tax ID	Route	Segment	County	Acres
29030734	Northern	N	Juneau	40.15
290181121.1	Northern	N	Juneau	2.12
290181132	Northern	N	Juneau	1.02
29014870	Northern	N	Juneau	0.62
008-1067-00000	Northern	H	Sauk	9.04
008-1069-00000	Northern	H	Sauk	4.58
008-1065-00000	Northern	H	Sauk	12.20
008-1068-00000	Northern	H	Sauk	34.43
012-0304-00000	Northern	H	Sauk	10.33
012-0299-10000	Northern	H	Sauk	14.68
012-0301-00000	Northern	H	Sauk	39.06
012-0279-00000	Northern	H	Sauk	15.38
012-0282-00000	Northern	H	Sauk	12.91
012-0269-00000	Northern	H	Sauk	9.17
012-0281-00000	Northern	H	Sauk	7.10
012-0298-00000	Northern	H	Sauk	12.91
290181055	Southern	O	Juneau	14.07
290181120	Southern	O	Juneau	34.39
290181121	Southern	O	Juneau	3.39
290181063	Southern	O	Juneau	38.12
290181059	Southern	O	Juneau	2.60
290181058	Southern	O	Juneau	113.27
290181124	Southern	O	Juneau	39.76
290181131	Southern	O	Juneau	39.02
290181133	Southern	O	Juneau	40.13
29034159	Southern	O	Juneau	65.50
290181103	Southern	O	Juneau	39.96
290181088.1	Southern	O	Juneau	55.91
290181057	Southern	O	Juneau	64.88
29014866	Southern	O	Juneau	19.23

Parcel Tax ID	Route	Segment	County	Acres
29014869	Southern	O	Juneau	3.62
29014868	Southern	O	Juneau	35.81
29014868	Southern	O	Juneau	0.16
22001070000	Southern	O	Vernon	19.98

Electrical transmission lines are permitted on lands enrolled in the FPP and are considered to be compatible with agricultural use.

6.1.4 Mitigating Project Impacts In/Near Agricultural Lands

Potential construction-related impacts on agriculture will generally be short term in nature, and would primarily consist of crop losses, soil mixing, and/or soil compaction along equipment access routes and around structure installation sites. The Applicants would mitigate these short term impacts by providing compensation to producers, and by restoring agricultural lands to the extent practicable. Where appropriate, mitigation techniques such as topsoil replacement and deep tilling will be utilized.

The Applicants have attempted to minimize long term impacts associated with constructing the Project across agricultural lands through careful consideration of alignment routing and individual structure siting. Many of the route segments in agricultural areas are proposed for siting along fence lines or between fields; others would run along public road ROW, where practicable, so the proposed structures are located along the edge of the land area used for agricultural purposes. These routing and siting practices minimize the loss of tillable land and associated interference with agricultural equipment operation. If conflicts occur, the Applicants will work with property owners during the real estate acquisition process to accommodate property owner needs to the extent practicable.

In the case of organic farms, the Applicants will work with the landowners to minimize potential impacts to their organic farming status due to the transmission line routing or construction. Methods to minimize impacts could include offsetting the transmission line structures from the property line so tree lines or other buffers are maintained. Additionally, construction vehicles may be cleaned prior to entering the organic farm parcels, based on input from the landowner. Further, to protect organic farms during vegetation management activities once the line is in operation, the Applicants do not apply herbicide within portions of an easement on which the landowner wishes not to introduce it.

Upon receipt of the Commission Order, the Applicants will coordinate with each agricultural landowner regarding farm operation (e.g. irrigation systems, drainage tiles), locations of farm animals and crops, current farm biological security practices, landowner concerns, and use of access routes. Potential impacts to each farm property along the ordered route will be identified and where practicable, construction impact minimization measures may be implemented. Site-specific practices would vary according to the activities of the landowner/farm operator, the type of agricultural operation, the susceptibility of site-specific

soils to compaction, the degree of construction occurring on the parcel, and the ability to avoid areas of potential concern.

6.1.5 Agricultural Impact Statement

An Agricultural Impact Statement (AIS) is generally required when a project involves the actual or potential exercise of the powers of eminent domain and if any interest in more than five acres of any farm operation may be taken. Wis. Stat. § 32.035(4)(a). The Applicants have the authority under Wis. Stat. ch. 32 to condemn property through eminent domain. Therefore, this Project has the potential for the powers of eminent domain to be exercised. In terms of farm operations, the Project may affect more than five acres of any farm operation. While an AIS would normally be required, because an EIS under Wis. Stat. § 1.11 will be prepared for the proposed Project and the information required in an AIS will be included in the EIS, this Project qualifies for the exception in Wis. Stat. § 32.035(2) and no AIS is required.

During the pre-filing agency consultation phase of the Project, the Applicants provided the DATCP with information about the Project at agency consultation meetings.

6.1.6 Induced Voltage

6.1.6.1 Confined Animal Dairy Operations and 6.1.6.2 Agricultural Buildings

The number of confined animal dairy operations and agricultural buildings within 300 feet of the proposed centerlines are listed below in Tables 6.1.6-1 and 6.1.6-2.

6.1.6.3 Induced Voltage Issues Related to Project Routes

Structures and other facilities made of conductive material located in close proximity to electric transmission lines may experience an induced current and voltage due to electric and magnetic field coupling between the facilities. Facilities potentially affected by the proposed Project include railroads and pipelines as well as distribution facilities at multiple segment locations as discussed in Section 5.3.

Induction and its potential impacts can be mitigated through implementation of appropriate design measures and techniques, such as:

- Cancellation – The arrangement of transmission line conductors and shield wires to lower electric and magnetic field levels;
- Separation – Increasing the distance between the transmission line and other conductors or conductive objects. Electric and magnetic field levels decrease rapidly with distance; and,
- Grounding of non-energized conductors or conductive objects.

The Applicants will design and construct the proposed facilities to minimize the potential for induction issues. See Section 5.3 of this Joint Application for locations where electric distribution lines will be relocated to eliminate physical conflicts with the Project or to increase separation with the proposed transmission line. Additionally, the Applicants will work with the owners of the potentially impacted facilities to address their concerns. This includes

coordinating with the local distribution companies to perform pre and post-construction testing of potentially impacted facilities if necessary to ensure that no adverse impacts result.

The following tables show the number of agricultural buildings and dairy options located within 300 feet of each route segment:

Table 6.1.6-1 – Northern Route

Route Segment	Agricultural Buildings within 300 feet	Dairy Operations within 300 feet
Segment P	18	0
Segment P-East	3	0
Segment N	66	1
Segment M	1	0
Segment K	0	0
Segment J	0	0
Segment H	4	0
Segment G	3	0
Segment E	11	0
Segment D	6	1
Segment A	10	0
Total with Segment P	**119**	**2**
Total with Segment P-East	**104**	**2**

Table 6.1.6-2 – Southern Route

Route Segment	Agricultural Buildings within 300 feet	Dairy Operations within 300 feet
Segment O	91	7 (1-goats)
Segment M	1	0
Segment L	0	0
Segment J	0	0
Segment I	0	0
Segment G	3	0
Segment F	0	0
Segment C	12	0
Segment B	10	1
Segment B-North	0	0
Total with Segment B	**117**	**8**
Total with Segment B-North	**107**	**7**

6.2 Conservation Easements

Geographic information regarding properties with conservation easements or encumbrances was acquired from the sources listed in Table 6.2-1. Public comments were also reviewed to further identify conservation easements that may occur on parcels along the routes.

Table 6.2-1 – Conservation Easement/Program Review

Property Type	Database Source
Wetland Reserve Program and Grassland Reserve Program Easements	NRCS
Emergency Watershed Protection Program - Floodplain Easement	NRCS
Riparian Easements	USFWS
State Fishery Areas, State Parks, Forests and Trails	WDNR - Managed Lands
Land & Water Conservation Fund Properties	WDNR, Bureau of Community Financial Assistance
Knowles-Nelson Stewardship Program Properties	WDNR - Stewardship Grant Acquisitions
Jackson County Scenic Easements	WisDOT
Black Earth Creek Wildlife Area – Sunnyside Unit	Dane County Parks
Mississippi Valley Conservancy Easements	Mississippi Valley Conservancy
Natural Heritage Land Trust Easements	Natural Heritage Land Trust
The Nature Conservancy Easements	US Geological Survey Gap Analysis Program - Stewardship

Conservation land interests, among many other factors, was utilized in the routing and siting process to inform the selection of proposed route segments while avoiding, to the extent practicable, properties with recorded conservation land interests. There are many types of conservation easements and encumbrances that exist today. Some of the conservation easements are placed upon properties by state and federal agencies (i.e., scenic easements or Managed Forest Lands), while other conservation land interests are initiated by the landowner (i.e., CRP or FPP). The Applicants have been made aware of some of these types of easements through public outreach and meetings with various agencies. These land rights are generally not known until we initiate the Project's easement acquisition process with the landowner of record. Once the Applicants are made aware of the existence of other land rights on the property, they will work with the landowner to accommodate the existing agreement or make them whole if there are additional monetary burdens they have to incur. The following is a discussion, for each route and by route segment, identifying unavoidable properties that have conservation easements or other types of agreements that restrict land use.

Northern Route

Segment P (sub-segment P5) crosses the New Amsterdam Grassland property along an existing transmission line corridor between Old CTH NA and STH 35 in the Town of Holland (La Crosse County). This property is owned by the Mississippi Valley Conservancy (MVC) with additional land use restrictions stemming from a grant received from the Knowles-Nelson Stewardship Program (administered by the WDNR). This property is managed primarily for grassland birds. Measures to minimize the impacts of the Project have been discussed with the MVC and the WDNR and, if the Northern Route is ordered by the Commission, the Applicants will work with the MVC and the WDNR to obtain an easement on this property. This property is not affected by the Northern Route with Segment P-East.

Segment N (sub-segment N3b) crosses privately owned land with a habitat conservation easement held by the USFWS along the junction of Skutley Creek and an unnamed tributary in the Town of Springfield (Jackson County), which is about one and a half miles southeast of Taylor. There is an existing NSPW transmission line and ROW. The Project would not require any structures to be located within the easement area. This proposed design and other measures to minimize the impacts of the Project on the easement area have been discussed with the USFWS land manager.

The Segment N (sub-segment N6) corridor along I-94 between Black River Falls and the southern Jackson County line involves a number of crossings of properties having scenic easements held by the WisDOT. See Section 1.6.6 for a discussion of these scenic easements.

Southern Route

Segment O crosses two separate WDNR La Crosse Area Comprehensive Fishery Area easements on private property (sub-segments O7d and O8) in the Town of Leon (Monroe County). Sub-segment O19 crosses a narrow easement on private property for The 400 State Trail in the City of Elroy. No structures would be located within the easement, which appears to be a WDNR easement for management of the trail. On sub-segment O24, the route follows an existing DPC transmission line through a Wetland Reserve Program (WRP) easement held by the NRCS, located in the Town of Summit in Juneau County. Structures would not be erected within the WRP easement area. NRCS review and approval of an easement for the Project would be necessary.

Segment I crosses a WRP easement, located in the Town of Lewiston, Columbia County (sub-segment I5). The proposed route follows an ATC transmission line and a railroad. ATC currently has structures within the easement area. Due to the constraint created by the railroad, the Project's structures (double-circuited with the existing line) will continue to be needed within the easement area. Also on Segment I, the NRCS has an Emergency Watershed Protection Program - Floodplain Easement on private property along I-39 south of Portage (sub-segment I13). The WisDOT ROW is not sufficient for the Project's facilities so structures would be required within the Floodplain Easement. NRCS review and approval of an easement for the Project would be necessary for both of these locations on Segment I.

Segment B (sub-segment B4) crosses the Black Earth Creek Wildlife Area – Sunnyside Unit along an existing transmission line corridor near USH 14 in the Town of Middleton (Dane County). This property is owned by Dane County with additional land use restrictions stemming from a grant received from the Knowles-Nelson Stewardship Program (administered by the WDNR). Measures to minimize the impacts of the Project have been discussed with Dane County and the WDNR and, if the Southern Route is ordered by the Commission, the Applicants will work with Dane County and the WDNR to obtain an easement on this property. This property is not affected by the Southern Route with Segment B-North.

Both Routes

There are four properties (two on each route) that are owned and managed by the WDNR and are encumbered by restrictions that require the Project to have review and approval by state and federal agencies due to the property either having been purchased or improved with Land and Water Conservation (LAWCON) funds. Project impacts on these properties must be reviewed by both the NPS and WDNR to determine if the impacts constitute a "conversion of recreational use" on the property. The Applicants have consulted with the WDNR on these properties. Through continued coordination with the WDNR program administrator, the respective WDNR property managers, and NPS, impact minimization measures will be identified and compensatory mitigation will be determined, if required.

The Northern Route crosses two LAWCON properties, the Black River State Forest and the Mirror Lake State Park, both adjacent to the interstate, along sub-segments N6 (Jackson County) and H2 (Sauk County), respectively.

The Southern Route crosses two LAWCON properties. In the Town of Hamilton (La Crosse County), Segment O crosses the La Crosse River State Trail (sub-segment O6). The Southern Route also touches the edge of the Dells of the Wisconsin River SNA (sub-segment I5) in an already disturbed area with an existing ATC owned transmission line corridor and a railroad corridor. The Project would only require a slight expansion of the ROW within the SNA (based on preliminary design the expanded ROW area is approximately 0.01 acres). The SNA program protects natural communities and native landscapes so in addition to being subject to the LAWCON review process, the Applicants will continue to consult with the WDNR on obtaining the necessary permits.

6.3 Forested Land

Forested lands were identified and reviewed using aerial photography and observations from fieldwork completed in 2012 and 2013. Forested lands are defined as areas where mature trees are present forming mostly closed stands (>20% canopy cover and trees with diameter at breast height [dbh] of 6 inches or more). Forested lands on existing ROW (converted forest) located between agricultural areas are included within this category. Narrow tree lines (e.g., wooded fence rows) or windbreaks were generally not included as forested cover.

Forest lands on existing and new corridor are described by route and segment below, and are summarized in the Environmental Inventory Table (Appendix F, Table 9). Forested areas were

quantified as part of the impact analysis (Section 5.4) and the resulting acreages are outlined in the Land Cover table (Appendix B, Table 5).

The following tree size classification system was used: saplings refer to live trees from 1 to 5 inches dbh; pole timber ranges from 5 to 9 inches dbh for softwoods and from 5 to 11 inches dbh for hardwoods; and saw timber is over 9 inches dbh for softwoods, and over 11 inches dbh for hardwoods.

6.3.1 Woodlands Description

The following descriptions are organized along the Northern and Southern Routes, from north to south. Generally, the routes begin at the northern end of the Project with a mix of agriculture and forested bluffs, move into a mixture of agriculture and forested fringes along existing ROW, and end along the southern portion in predominantly agricultural lands.

Northern Route

The following generally describes forested lands along the Northern Route. Woodlands along this route are broken into three general portions: the North, Central and South.

North Portion. The north portion of the Northern Route (Segments P and P-East and Sub-segments N1-N5) is located in the Coulee Region of the Driftless Area ecoregion. This region is characterized by dissected slopes and open hills, with gently sloping valleys and lowlands. The potential natural vegetation of the ecoregion is prairie and large stands of mixed deciduous forests with oaks, sugar maple (*Acer saccharum*) and basswood (*Tilia americana*). Current vegetation of the region is comprised of extensive forests on the steep hillslopes and agricultural fields in the valleys. Forests within this region are typically pole and saw-sized timber, frequently deciduous and occasionally mixed deciduous-coniferous. The deciduous forests are dominated by oaks (*Quercus* spp.), hickory (Carya spp.) and red maple (*Acer rubra*), with a variety of species of secondary importance. Mixed forests are typically dominated by red and white pine (*Pinus resinosa*, *P. strobus*) and oaks. Forested wetlands occur occasionally in these segments, and are typically hardwood swamps in riparian areas. Dominant species include box-elder (*Acer negundo*) and silver maple (*Acer saccharinum*).

The southern portion of Segment P is flat and almost completely converted to agriculture and urban development. Forests within this segment are limited to the northern portion, primarily near the riparian habitat along the Black River. This area is primarily dominated by oaks and pine.

Ownership of forested lands within these north portion segments is almost entirely private. Land use of the forested lands is recreational and riparian habitat.

Central Portion. The central portion of the Northern Route (sub-segments N6-N23 and Segments M, K, J and H) runs along the western edge of the Glacial Lake Wisconsin Sand Plain and Central Sand Ridges ecoregions. This area is located primarily along Interstate 90/94. The Glacial Lake Wisconsin Sand Plain is characterized as a flat, sandy area of outwash, lacustrine and slope wash sands, sand buttes, and stream bottoms. The potential natural vegetation is jack pine (*Pinus banksiana*) and scrub-oak forests and barrens, and sedge meadow and conifer

swamp wetlands. The Central Sand Ridges is characterized by glacial outwash with extensive eskers and drumlins, ice contact deposits, rolling ground moraines and steep end moraines. The potential natural vegetation of this region is primarily oak savanna with areas of sedge meadow. Forests along the interstate highway tend to be larger, more contiguous blocks of forest (over 10 acres on average) than were found in the agricultural areas further south.

Forests along this portion of Segment N include a range of deciduous and mixed deciduous-coniferous stands, dominated by oak, maple, and aspen (*Populus* spp). Traveling from north to south along this segment, white, red and jack pines are less dominant in the overstory, while shagbark hickory (*Carya ovata*) becomes more prevalent.

Wooded wetlands, primarily hardwood swamps, are also common along this portion of Segment N. Dominant species include red maple, American elm (*Ulmus americana*), green and black ash (*Fraxinus pennsylvanica, F. nigra*), and river birch (*Betula nigra*). White pine, tamarack (*Larix laricinia*) and alder (*Alnus incana*) are more prevalent near the vegetation tension zone. Floodplain forests are found along both crossings of the Lemonweir River.

The forests along Segment M, K, J and H are mainly deciduous forests with pole and saw timber size classes, dominated by oaks, hickory, and maples. Minor species include quaking aspen (*Populus tremuloides*), black locust (*Robinia pseudoaccacia*), ash and wild black cherry (*Prunus serotina*). Mixed and coniferous stands include white and red pines. Understory commonly includes sumac (*Rhus* spp.).

Both public and privately owned forested areas exist within this portion of the Northern Route. A large section of Segment N traverses the Black River State Forest and the Jackson County Forest. The forests in this area are large, contiguous stands of pole-sized white and jack pine, and red oak (*Quercus rubra*), with beaked hazelnut (*Corylus cornuta*) common in the understory.

Mirror Lake State Park is also traversed by the Project ROW along Segment H. This area contains a large, deciduous forest dominated by pole and saw timber-sized oak, maple and hickory, with sumac and common buckthorn (*Rhamnus cathartica*) commonly found in the understory.

Several forested areas in Segment H are part of Pine Island State Wildlife Area, owned by the State of Wisconsin. This area is in active management, with the goal to restore a continuum of habitats, from prairie to savanna to oak woodland. Forests along the Project ROW through the wildlife area include a hardwood swamp as part of a wetland ecotone, dominated by river birch, silver maple, American elm, and black willow (*Salix nigra*). Other publicly-owned forested areas exist where woodlands are within upon the WisDOT's interstate ROW.

Land use of the forest lands within this portion of the Northern Route is primarily recreational. A combination of uses – recreation and timber management – was found in the Black River State Forest, Jackson County Forest and adjoining areas along Segment N along the interstate. Forested wetlands along waterways are considered to be riparian habitat.

South Portion. The south portion of the Northern Route (Segments G, E, D and A) is located in the Southeastern Wisconsin Savanna and Till Plain ecoregion and primarily traverses

agricultural areas. The potential natural vegetation for this area are forests dominated by white, black and bur oaks (*Quercus alba, Q. velutina, Q. macrocarpa*), and oak savanna, prairie and sedge meadows. Most of the original vegetation has been cleared and fragments of forests remain in very small, scattered woodlots, on steeper end moraines, and in wetlands.

The forested areas along these segments are predominantly small upland deciduous stands of pole and saw timber, embedded in a matrix of agricultural fields. Dominant overstory species typically include a variety of oaks, basswood (*Tilia americana*), black walnut (*Juglans nigra*), shagbark hickory, ashes, and eastern cottonwood (*Populus deltoides*). Understory shrubs include sumac, prickly ash (*Zanthoxylem americanum*), European bush honeysuckle (*Lonicera x bella*), and common buckthorn. Mixed deciduous-coniferous and coniferous stands were less frequently observed and are dominated by pole size white and red pine with understories of honeysuckle and common buckthorn.

Forested wetlands are typically found along waterways, and were dominated by deciduous species such as basswood, American elm, green ash, and box-elder.

Forested land ownership is mostly private, with the exception of forest fringes in the WisDOT ROW, a small publicly owned parcel in the Village of Dane, and an area of undeveloped forested land along the Wisconsin River owned by the State of Wisconsin. Land use of the forested lands is primarily classified as recreational; forested wetlands are classified as riparian habitat.

Southern Route

The following generally describes forested land along the Southern Route. Similar to the Northern Route, woodlands along the Southern Route are broken into three general portions: the North, Central and South.

North Portion. The north portion of the Southern Route (Segment O) traverses the Coulee Region of the Driftless Area ecoregion. This region is characterized by dissected slopes and open hills, with gently sloping valleys and lowlands. The potential natural vegetation of the ecoregion is prairie and large stands of mixed deciduous forests with oaks, sugar maple, and basswood. Current vegetation in the region is comprised of extensive forests on steep hillslopes and agricultural fields in the valleys.

Forests within this region that were observed in the field are typically pole and saw-sized timber, frequently deciduous and occasionally mixed deciduous-coniferous. The deciduous forests are dominated by oaks, shagbark hickory, sugar and red maples, basswood, and ashes with a variety of species of secondary importance. Mixed forests are dominated by red and white pine and oaks.

Forested wetlands include floodplain forests, riparian forests, and hardwood swamps. Dominant species observed in the field include box-elder, silver maple, cottonwood, American elm, ashes and willows. A large floodplain forest complex is located adjacent to the La Crosse River and its backwaters. A large wetland complex along Sevenmile Creek includes both a hardwood and coniferous swamp.

Ownership of forested lands in this area is predominantly private, with occasional parcels owned by municipalities or the State of Wisconsin. Land use of the forested lands is recreational and riparian habitat.

Central Portion. The central portion of the Southern Route (Segments M, L, J and I) runs along the western edge of the Glacial Lake Wisconsin Sand Plain and the Central Sand Ridges ecoregions. The Glacial Lake Wisconsin Sand Plain is characterized as a flat, sandy area of outwash, lacustrine and slope wash sands, sand buttes, and stream bottoms. The potential natural vegetation is jack pine and scrub-oak forests and barrens, and sedge meadow and conifer swamp wetlands. The Central Sand Ridges is characterized by glacial outwash with extensive eskers and drumlins, ice contact deposits, rolling ground moraines and steep end moraines. The potential natural vegetation of this region is primarily oak savanna with areas of sedge meadow.

These segments cross areas of large, contiguous tracts of forests. The deciduous forests along these segments are dominated by pole and saw timber-sized oaks, hickory, and maples; while the mixed deciduous-coniferous forests are dominated by pole and saw timber-sized oaks, pines, and quaking aspen. The understory commonly includes sumac, buckthorn and honeysuckle.

Segment I traverses two forested portions of Pine Island State Wildlife Area: a floodplain forest complex south of the Wisconsin River, and a forested area north of the river. The floodplain forest complex contains hardwood swamps dominated by river birch, silver maple, green ash, quaking aspen, cottonwood, and swamp white oak (*Quercus bicolor*) in the overstory, and glossy buckthorn (*Rhamnus frangula*) and honeysuckle in the understory. The Pine Island State Wildlife Area north of the river is a sedge meadow – shrub-carr – hardwood swamp complex, where the hardwood swamp is dominated by quaking aspen, with grey dogwood (*Cornus racemosa*) and common winterberry (*Ilex verticillata*) in the understory. Segment I also traverses Wisconsin River floodplain forest in other areas, with silver maple, green ash, red oak, shagbark hickory, red maple and river birch dominant in the overstory.

Wooded wetlands, primarily hardwood swamps, are common in Segments M and I. Dominant species include red maple, American elm, green and black ash, quaking aspen and river birch.

Land use of forest types within this portion of the Southern Route is primarily recreational. The forested lands are in private ownership, with the exception of small areas owned by the City of Portage, the City of Wisconsin Dells, and the Village of Lyndon Station. In addition, the Pine Island State Wildlife Area is owned by the State of Wisconsin.

South Portion. The south portion of the Southern Route (Segments G, F, C and B) is located in the Southeastern Wisconsin Savanna and Till Plain ecoregion. The potential natural vegetation for this area is forests dominated by white, black and bur oaks, as well as oak savanna, prairie and sedge meadows. Much of the original vegetation has been cleared. Forests in this area are larger and less fragmented than in the Northern Route agricultural areas. Segments F and B, in particular, are on the boundary with the Driftless area, and contain forested steep slopes.

Forests along the ROW in these segments are predominantly upland deciduous stands of pole and saw timber. The surrounding areas are mostly agricultural lands. Dominant overstory species typically include oaks, basswood, black walnut, wild black cherry, and shagbark hickory. Common understory species include sumac, common buckthorn, honeysuckle and black locust. Segment F contains occasional small plantations of white and red pine. Deciduous riparian forests were found along several waterways. Other forested wetlands are hardwood swamps dominated by silver maple, black willow, quaking aspen and cottonwood.

The ROW runs through the Sunnyside Unit of the Black Earth Creek Wildlife Area for the Southern Route with the Segment B option. A large, contiguous forest of pole and saw-sized timber, dominated by white oak and shagbark hickory in the overstory, and common buckthorn in the understory occurs along the ROW in this area, which follows a previously established and cleared transmission line ROW.

Forested land ownership is mostly private, with the exception of the WisDOT ROW in Segment G, a state-owned area of forested land along the Wisconsin River, and the Dane County-owned Black Earth Creek Wildlife Area-Sunnyside Unit. Land use of the forested lands is primarily classified as recreational; the few pine plantations are classified as timber.

6.3.2 Managed Forest Law / Forest Crop Law Programs

The extent to which program participation may be affected cannot be determined based on the information available to the Applicants. The extent to which a property is enrolled in the MFL or FCL program will be identified during the easement negotiation process. If any landowner would be unable to continue participation, the Applicants will compensate the landowner for the costs of withdrawal and any adverse tax consequences.

6.3.3 Mitigating Construction Impacts In or Near Woodlands

This Project will require the clearing of tall vegetation within the ROW, and clearing of brush / trees along temporary construction access. Tall-growing vegetation that may interfere with safe construction, and safe and reliable operation of the transmission line will be removed and controlled. Specifically woody vegetation will be removed as needed within the ROW for construction of the Project and managed through the operational life of the facility. Clearing of vegetation within the ROW will occur prior to construction activities as allowed by landowner agreements and permit conditions.

Certain areas of the ROW with steep topography may not need to be cleared which will reduce woodland impacts in these areas. In addition, off-ROW access through wooded areas will be required, primarily in bluff areas along Segments N and O. The majority of this access through wooded areas occurs along existing logging roads which minimizes the amount of clearing that will be necessary to construct and operate the Project.

The cut and scatter method may be used during construction in areas where limited clearing will occur. The purpose of this method is to limit the need for unnecessarily hauling and potentially disturbing the existing ground or vegetation. Likely situations where this method will be used are in shrub and brush areas with a limited numbers of trees. Limited numbers of trees

in shrub wetlands may be disposed of in this manner as long as trees that are cut and scattered originate within the wetland.

Woody vegetation may be chipped and scattered over the ROW in non-agricultural upland areas. Invasive shrubs such as common and glossy buckthorn with berries will not be chipped and scattered to minimize the spread of these species. Chipping will not occur in wetlands or floodplains, with the exception of chipped material that is evenly scattered through the use of rubber-tracked blade mowers or ASV Posi-Track mower type equipment used to clear small diameter trees and shrubs. Chipped material derived from onsite locations may be spread as mulch up to six inches deep in upland areas to provide ground protection along access paths. Upon abandonment of access routes, mulch will be spread evenly to a depth no greater than two inches.

As discussed in Section 6.7 (Invasive Species) tree clearing timing restrictions and slash management procedures can be implemented to prevent the spread of oak wilt, emerald ash borer and gypsy moth in forested areas. All vegetation clearing will be completed in accordance with the Commission restrictions on oak tree cutting and pruning as specified in Wis. Admin. Code § PSC 113.0511.

Substation construction for the Project will not impact forested lands.

6.4 Wetlands (see Section 8.0 for additional information)

A summary of all wetlands intersecting the routes is presented in Appendix F, Table 9 and shown In Appendix A, Figures 4B and 4B. As discussed in Section 8.3 wetlands were identified during field investigations along accessible corridors and/or from review of aerial photographs and other reference material. In addition, access through several wetlands will be required for off-ROW access. These wetlands are identified in Section 5.7; however they are also briefly addressed in this section.

Substation construction for the Project will not impact wetlands.

6.4.1 Wetland Crossings

Numerous wetlands occur within the proposed transmission line ROW along each route. The following is a summary of the total number of wetlands intersected by the proposed Project ROW for each segment along each route. These numbers are derived from the detailed inventory of wetlands presented in Appendix F, Table 9. Although each separate crossing was counted, any given wetland unit may be crossed more than once, depending on its shape.

The Northern Route and the Northern Route with Segment P-East will each have 294 wetland crossings. The number of wetland crossings along each of the Northern Route segments is indicated in Table 6.4.1-1, below:

Table 6.4.1-1 – Wetland Crossings - Northern Route

Segment	Number of Wetland Crossings
P	5
P-East	5
N	208
M	15
K	7
J	1
H	21
G	4
E	25
D	3
A	5

The Southern Route will have 241 wetland crossings and the Southern Route with Segment B-North will have 237 wetland crossings. The number of wetland crossings along each of the Southern Route segments is indicated in Table 6.4.1-2, below:

Table 6.4.1-2 Wetland Crossings - Southern Route

Segment	Number of Wetland Crossings
O	118
M	15
L	7
J	1
I	53
G	4
F	10
C	16
B	17
B-North	13

In addition, several wetlands may be crossed for off-ROW access along the Northern and Southern Routes (Refer to Section 5.7).

6.4.2 Number of Structures That Would be Constructed Within Wetlands

Conceptual pole locations, shown in Appendix A, Figures 4A and 4B, have been developed to evaluate the potential impacts to wetlands and develop preliminary access routes. These pole locations are approximated based on the proposed design spans for the structures that will be used and have been spotted along the alignment to conservatively estimate transmission line impacts. The wetland impacts will be re-examined during detailed design to determine how to minimize such impacts without adding undue costs or physical impacts to the integrity and reliability of the transmission line design. The detailed design phase will also reexamine wetland impacts to accommodate landowner concerns. The wetland impact estimates provided below

may require adjustment during detailed design if previously unknown or unanticipated conditions are encountered prior to final design. Examples of these conditions include: new physical terrain details that may affect span lengths or refinement of wetland boundaries (primarily aerial delineated boundaries) once easements are obtained and additional on-site delineations are completed.

Based on preliminary engineering, the Northern Route and the Northern Route with Segment P-East will each have 273 structures constructed within wetlands. Further detail on each wetland, including the area of wetland impact, is provided in Appendix F, Tables 8 and 9.

The number of structures that would be constructed in wetlands along the each of the Northern Route segments is indicated in Table 6.4.2-1, below:

Table 6.4.2-1 – Structures in Wetlands - Northern Route

Segment	Structures in Wetlands
P	2
P-East	2
N	196
M	14
K	5
J	0
H	33
G	3
E	14
D	2
A	4

Based on preliminary engineering, the Southern Route will have 193 structures in wetlands and the Southern Route with Segment B-North will have 190 structures constructed within wetlands. Further detail on each wetland, including the area of wetland impact, is provided in Appendix F, Tables 8 and 9. The number of structures that would be constructed in wetlands along each of the Southern Route segments is indicated in Table 6.4.2-2, below:

Table 6.4.2-2 – Structures in Wetlands - Southern Route

Segment	Structures in Wetlands
O	74
M	14
L	2
J	0
I	67
G	3
F	8
C	14
B	11
B-North	8

The information above represents conservative estimates, as all structures within about 50 feet of a wetland were counted as being within the wetland.

6.4.3 Avoiding / Minimizing Construction Impacts In or Near Wetlands

Through the Applicants' routing and siting process and the use of particular construction techniques, the Project will avoid or minimize wetland impacts. Avoidance and minimization of wetland impacts through the routing and siting process is discussed in Section 8.2. However, wetlands occur along each of the proposed routes and some impacts cannot be avoided. Equipment access and pole installation within wetlands will be required during transmission line construction. The use of heavy equipment in wetlands will be minimized to the extent practicable.

Disturbance to wetlands will be minimized by one or more of the following standard construction techniques: completing wetland construction during dry or frozen conditions, the use of equipment with low ground pressure tires or tracks, placement of construction matting to help minimize soil and vegetation disturbances and distribute axle loads over a larger surface area thereby reducing the bearing pressure on wetland soils, and/or the use of ice roads. Site conditions at the time of construction will dictate the type of construction access technique. Wetland access routes will not require permanent fill.

Depending on the soil conditions within wetlands, the various techniques could be utilized. If saturated or unstable soil conditions exist at a construction location, several construction techniques may be implemented to reduce the effects on wetland soil structure and dependent functions, including hydrology and the wetland's capacity for re-vegetation of native species. These techniques include construction during frozen conditions, the use of ice roads, construction mats, low ground pressure or tracked vehicles in areas where the soils are saturated or not frozen, and/or TCSBs installed in wetlands that contain cross-cut channels. In addition, the use of heavy equipment in some wetland or portions of wetlands may be avoided if unstable soil conditions exist and alternate access is practical.

If the wetland to be crossed has drier, stable, and cohesive soils or is frozen, construction will proceed in a manner similar to upland construction. If the wetland soils are not saturated at the time of construction and can support both tracked and/or rubber-tired equipment, the Applicants will construct in that area using construction mats only when needed to minimize impacts and stabilize the area to support construction vehicles.

A general discussion of the dominant vegetation found within wetlands along both routes is provided in Section 8.3, and dominant vegetation found within each wetland (where field access was available) is provided in Table 9 of Appendix F. If it is evident that transmission line construction activities could spread invasive plant species to new areas, appropriate protection measures will be implemented. These measures, detailed in Section 6.7, may include: avoidance of infested areas, removal or control of small populations of plants, scheduling construction activities during the plant's dormant period, or cleaning of equipment prior to accessing uninfested areas.

Upon completion of the transmission line, the Applicants will complete site restoration and revegetation consistent with the activities described in Section 6.9. Compensatory mitigation requirements will be coordinated with the regulatory agencies.

6.4.4 "Significant" or "High-Quality" Wetlands

Although the majority of wetlands along both routes are wet meadows and farmed wetlands, most of which are characterized by low plant diversity due to domination by invasive species or agricultural crops (and associated weedy facultative hydrophytes), higher-quality sedge-dominated wet meadows are relatively common along each route. Other significant wetlands along each route are notable for their more uncommon characteristics such as relatively intact native plant communities, structural diversity (i.e., mix of cover types; suitable rare species habitat), and/or hydrological attributes/functions (e.g., floodplain, riparian, open water interspersion).

Examples of these higher-quality wetlands are listed by segment and route in Table 6.4.4, below. Refer to Appendix F, Table 9 for further descriptive details, map page numbers, proposed construction activities, and access methods associated with each of the listed wetlands. Aerially interpreted wetlands were typically not included in this evaluation due to the difficulty in remotely assessing wetland quality.

Table 6.4.4-1 – Significant or High Quality Wetlands by Route and Segment

Route / Segment	Wetland Feature ID(s)
Northern	
P	P-W4 and P-W5
N	N-W3, N-W4, N-W5, N-W15, N-W24, N-W26, N-W28, N-W33, N-W35, N-W36, N-W37, N-W41, N-W42, N-W47, N-W48, N-W57, N-W64, N-W68, N-W69, N-W70, N-W80, N-W81, N-W82, N-W83, N-W84, N-W85, N-W86, N-W87, N-W88, N-W89, N-W90, N-W91, N-W92, N-W93, N-W94, N-W95, N-W103, N-W106, N-W112, N-W148, N-W114, N-W132, N-W152, N-W153, N-W185, N-W197, N-W186, N-W187, N-W189, N-W200
K	K-W1, K-W2, K-W3, K-W4, K-W5, K-W6
H	H-W1, H-W11, H-W12, H-W13, H-W14, H-W15, H-W16, H-W17
E	E-W2, E-W3, E-W3a, E-W3b, E-W3c
Southern	
O	O-W6, O-W30, O-W42, O-W43, O-W44, O-W45, O-W50, O-W51, O-W52, O-W56, O-W67, O-W70, O-W71, O-W115
L	L-W6
I	I-W6, I-W7, I-W8, I-W9, I-W20, I-W25, I-W27, I-W28, I-W29, I-W30, I-W31, I-W32, I-W33, I-W34, I-W35, I-W36, I-W37, I-W38, I-W39, I-W40, I-W48
F	F-W3, F-W5
Both	
M	M-W2, M-W3, M-W4, M-W8, M-W13
G	G-W2, G-W4

In addition, numerous wetlands along both routes have been identified (and italicized) in Appendix F, Table 9 as Areas of Special Natural Resource Interest (ASNRI), in accordance with Wis. Admin. Code. § NR 1.05. Wetlands are considered ASNRI when they fall within (entirely or in part), or are contiguous with, one or more of the designated special features listed in NR 1.05 (e.g., trout streams, state wildlife areas or parks, etc.). However, despite their association with these special features, not all ASNRI-designated wetlands are significant or of high quality; many are affected by historical and/or ongoing land use practices (e.g., agriculture, development, etc.) that have caused degraded conditions such as altered hydrology or infestation with invasive plant species.

6.4.4.1 Location of Crossings or Wetland Impacts

The location of the important wetlands listed in Section 6.4.4 is shown in Appendix A, Figures 4A and 4B. In addition, each wetland designation listed in Section 6.4.4 begins with the letter designation of the route segment in which it is located.

6.4.4.2 Wetland Type

The Resource Description and Working Comments columns of Table 9 in Appendix F respectively specify the type (e.g., wet meadow/hardwood swamp) and primary characteristics (e.g., dominant species, hydrogeomorphic position, surrounding land use) corresponding to each of the important wetlands listed in Table 6.4.4-1, above.

6.4.4.3 Mitigation Methods

The process that was undertaken to avoid and minimize impacts to wetlands, discussed in Section 8.2, included consideration for avoiding wetlands of relative importance, as well as minimizing the number of wetland crossings and the number of structures spotted within wetlands.

During construction, the implementation of BMPs and the Applicants' standard environmental protection practices will provide for further avoidance and minimization of wetland impacts. Through careful attention to access routing, consideration of off-ROW access, types of equipment used, construction time of year, sedimentation control, and the implementation of other relevant site-specific measures (further described in Section 6.4.3), the Applicants will mitigate impacts to important wetlands, to the extent practicable in each case. Where necessary to ameliorate minor impacts such as rutting and vegetation disturbance due to equipment operation and mat placement in wetlands, site restoration activities will be implemented, monitored, and remedial measures applied (as necessary) until established restoration goals are achieved.

The construction of either route will result in the loss of a small amount of wetlands along the length of the Project (total area of foundations or structures, and backfill) and a larger area of forested wetland conversions. In areas where additional ROW is needed, the adjacent lands will be cleared of trees and other woody vegetation, resulting in a conversion to wet meadow or shrub-carr wetland types. Compensatory mitigation options that meet regulatory requirements will be developed in coordination with agency representatives to address these impacts.

6.5 Waterbodies/Waterways (see Section 8.0 for additional information)

A summary of all waterbodies and waterways (hereafter collectively referred to as "waterways") intersecting the routes is presented in Appendix F, Table 9 and shown in Appendix A, Figures 4A and 4B. The identification of waterways was based on review of the WDNR 24K Hydro layer, the WROC aerial photographs (from 2010), Pictometry which utilized photographs of the corridors from 2012 or 2013, and field observations along accessible routes. Those features with a distinguishable bed and banks were considered to be a waterway, regardless of the width or if it was identified in the WDNR 24K Hydro layer. Several waterways appear on the WDNR 24K Hydro layer that were not evident based on field and/or aerial photograph review. These features are identified in Appendix F, Table 9 (but not given a unique waterway label) with the explanation that it is our interpretation these features would likely not be considered navigable. Because these waterways were not evident based on field/aerial photograph review, they were not identified Appendix A, Figures 4A and 4B. The Applicants understand the WDNR has final jurisdictional authority over navigability determinations.

Substation construction will not impact waterways.

6.5.1 Proposed Waterway Crossings

The number of proposed waterway crossings for each route segment is summarized in Table 6.5.1-1. All waterways intersecting the proposed ROW are included in these totals. These waterways will either require a bridge crossing (either a TCSB or a bridge requiring support below the ordinary high water mark (OHWM) or will need to be crossed during wire pull activities (no equipment crossing).

Table 6.5.1-1 – Summary of Waterway Crossings Along Each Route

Northern Route	
Segment	Number of Crossings
P	4
P-East	4
N	129
M	3
K	3
J	1
H	11
G	5
E	6
D	2
A	1
Total	165
Total with Segment P-East	165

Southern Route	
Segment	Number of Crossings
O	63
M	3
L	1
J	1
I	18
G	5
F	5
C	6
B	6
B-North	5
Total	108
Total with Segment B-North	107

In addition, several waterway crossings will be required for off-ROW access. Two waterway crossings will be required for off-ROW access along the Northern Route (along Segment N for both route options) and two crossings will be required along the Southern Route (along Segment O for both route options).

6.5.2 Structures Constructed Below the OHWM

No transmission line structures are proposed to be placed below the OHWM of waterways along the Northern or Southern Route options. However, temporary structures to facilitate construction access may need to be placed below the OHWM of the following waterways:

- Northern Route
    - N-R75 and N-R76 (New Lisbon Lake / Lemonweir River);
    - N-R84, N-R85 and N-R85a (Lemonweir River oxbows);

  - H-R5a (Blass Lake); and
  - G-R1 (Wisconsin River), and G-R2 and G-R3 (Wisconsin River side channels).
- Southern Route
  - G-R1 (Wisconsin River), and G-R2 and G-R3 (Wisconsin River side channels).

These temporary structure types may include wooden mats and bridge-supporting materials such as piers, sheet piling or jersey barriers (or similar equipment). These temporary structures would be removed, and existing contours restored after construction.

In addition, an in-stream support structure for a temporary bridge will be required at a Trempealeau River side channel crossing (N-OR-R2) for off-ROW access along the Northern Route, and at the Kickapoo River crossing (O-R25) along the Southern Route. These support structures would be a reinforced culvert, cement block or similar material.

The need for and/or type of structure placement below the OHWM will be determined during final design after a route is ordered.

6.5.3 Need and Method of Constructing Waterway Crossing

A summary of the waterways proposed to be crossed along the Northern and Southern routes, and their proposed crossing methods, are presented in Appendix F, Table 9. The majority of the crossings require either a TCSB or will only be crossed for wire pull activities (no stream crossing with equipment is required for wire pulls). As discussed in Section 6.5.2, several waterways along both routes may require that temporary structures be placed below the OHWM of a waterway for construction access due to waterway configuration and location within the ROW. All proposed crossings are required to allow for safe and efficient construction access along both routes. In addition, several waterways are proposed to be crossed as part of off-ROW access requirements (refer to Section 5.7). These crossings will require a TCSB or a bridge with an in-stream support structure.

Where necessary and authorized by the WDNR, TCSBs will be placed to avoid in-stream disturbance. Each TCSB will consist of construction mats and/or steel I-beam frames, or other similar material, placed above the OHWM on either side to span the stream bank. Preparation for setting the bridge may include minor blading and excavation confined to the minimum area necessary for safe bridge installation. Removal of low-growing trees, shrubs, and other shoreline vegetation will be kept to a minimum. Proper erosion control measures will be implemented and maintained during and after the utilization of the temporary crossing. For those streams that will not be crossed by construction vehicles and where stream crossing permits have not been acquired, wire will be pulled across those waterways by boat, helicopter, or by a person traversing across the waterway. Wire stringing activity may require that waterways be temporarily closed to navigation. Potential methods to construct the crossings that require placement of temporary structures below the OHWM, and additional detail regarding waterway crossings (e.g., typical detail drawing of a TCSB crossing, photos of waterways observed in the field) are provided in Section 8.0.

6.5.4 Avoiding / Minimizing Construction Impacts In or Near Waterways

The number of potential temporary stream crossings has been minimized by proposing to access from the ROW on either side of the stream or by using existing public crossings to the extent practical. The Applicants will work with private landowners to identify alternate access routes to further reduce the use of stream crossings, if possible. Some of these crossings may not be required if the Applicants are able to secure alternate access via privately owned land. However, the Applicants have applied for WDNR permits for all potential crossings that are reasonably anticipated in the event that avoidance is not possible. The Applicants will also attempt to minimize the placement of structures below the OHWM of navigable waters; however transmission line structure location, waterway configuration and safe construction requirements may limit the ability to avoid these locations.

As discussed in Section 6.5.3, the amount of disturbance associated with deployment of the TCSBs will be minimized to reduce potential impact to the waterways. Other mitigation methods will be employed during construction to further reduce impacts. Refer to Section 6.7 for a description of mitigation methods that will be employed to avoid the spread of invasive plants and Section 6.9 for a discussion of re-vegetation and restoration plans for disturbed areas, including those near waterways. In addition, an Erosion Control Plan will be prepared once a route is ordered, and BMPs will be employed near waterways to minimize the potential for erosion.

6.5.5 Mitigation for Special Waterways

Waterways along both routes that are considered to be ASNRI, which includes the classifications in Sections 6.5.5.1 - 6.5.5.3 of the Transmission Line Filing Requirements, are identified in Appendix F, Table 9. The WDNR's Surface Water Data Viewer web site (http://dnrmaps.wi.gov/imf/imf.jsp?site=SurfaceWaterViewer) was used to identify these designated waterways in the Project area.

Refer to Section 6.5.4 for procedures to avoid, reduce and mitigate impacts associated with all waterway crossings. In addition, the following provides further methods, which will be based on site-specific information once a route is ordered, to mitigate potential impacts to designated waterways in the Project area.

Potential direct and indirect impacts to the designated waterways have been minimized during preliminary pole spotting as structures are not immediately adjacent to the majority of these designated waterways. During final design of an ordered route, additional attention will be given to maintaining a suitable distance from the structure to the waterway, to the extent feasible. In addition, at this point, it is anticipated that numerous designated waters will require a TCSB crossing; however, as discussed above, attempts will be made to find alternate access that does not require a bridge crossing once a route is ordered.

As previously discussed, an Erosion Control Plan will be prepared once a route is ordered and additional site-specific information is available. BMPs will be employed near waterways during construction to minimize the potential for erosion.

6.5.5.1 Outstanding or Exceptional Resource Waters

The following waterways intersecting the proposed ROW of both Northern Route options are designated as an Outstanding Resource Water (ORW) or Exceptional Resource Water (ERW):

Table 6.5.5.1-1 – ERWs / ORWs Along the Northern Route

Waterway Name	Waterway Classification
Unnamed tributary (UNT) to Bear Creek (N-R9)	ERW
UNT to Bear Creek (N-R10)	ERW
Squaw Creek (N-R28)	ERW
Coffee Creek (N-R35)	ERW
Mill Creek (N-R44)	ERW
Gilmore Creek (K-R3)	ERW

The following waterways intersecting the proposed ROW of both Southern Route options (unless otherwise noted) are designated as an ORW or an ERW:

Table 6.5.5.1-2 – ERWs / ORWs Along the Southern Route

Waterway Name	Waterway Classification
Gilmore Creek (L-R1)	ERW
Sixmile Creek (C-R2)	ERW
Black Earth Creek (B-R3 and B-R4) (only on Southern Route with Segment B)	ORW

6.5.5.2 Trout Streams

The following waterways intersecting the proposed ROW of both Northern Route options are designated as trout streams:

Table 6.5.5.2-1 – Trout Streams Along the Northern Route

Waterway Name	Classification
UNT to Dutch Creek (N-R2)	Class II
Beaver Creek (N-R4)	Class II
UNT to Bear Creek (N-R9)	Class I
UNT to Bear Creek (N-R10)	Class I
Oxbow to Trempealeau River (N-R12c and N-R12d)	Class III
Trempealeau River (N-R13 to N-R19)	Class III
Skutley Creek (N-R23)	Class II
French Creek (N-R25 to N-R27)	Class I
UNT to Squaw Creek (N-R27c and N-R27d)	Class II
Squaw Creek (N-R28)	Class I
Kenyon Creek (N-R29)	Class II
Hoffman Creek (N-R30)	Class II

Waterway Name	Classification
Coffee Creek (N-R35)	Class I
Glenn Creek (N-R39)	Class III
Robinson Creek (N-R40)	Class II
Mill Creek (N-R44)	Class I
Holtzlander Creek (M-R1)	Class III
Tracy Creek (M-R2)	Class III
Lyndon Creek (M-R3)	Class III
Gilmore Creek (K-R3)	Class I
Hulburt Creek (H-R1)	Class II
Rowan Creek (E-R1)	Class II
Trempealeau River side channel (N-OR-R2) (required for off-ROW access)	Class III

The following waterways intersecting the proposed ROW of both Southern Route options (unless otherwise noted) are designated as trout streams:

Table 6.5.5.2-2 – Trout Streams Along the Southern Route

Waterway Name	Classification
Dutch Creek (O-R7)	Class II
Fish Creek (O-R12)	Class II
Little La Crosse River (O-R13)	Class I
Little La Crosse River (O-R14)	Class I
UNT to Little La Crosse River (O-R15)	Class III
UNT to Little La Crosse River (O-R17 and O-R17a)	Class I
Upper Brush Creek (O-R18)	Class III
Brush Creek (O-R20)	Class III
Cook Creek (O-R24)	Class III
Billings Creek (O-R29)	Class II
Seymour Creek (O-R33)	Class III
Little Onemile Creek (O-R42)	Class III
Holtzlander Creek (M-R1)	Class III
Tracy Creek (M-R2)	Class III
Lyndon Creek (M-R3)	Class III
Gilmore Creek (L-R1)	Class I
Rowan Creek (F-R1)	Class II
UNT to Spring Creek (F-R4)	Class II
Black Earth Creek (B-R3 and B-R4) (only on Southern Route with Segment B)	Class I

6.5.5.2 Wild and Scenic Rivers

Waterways designated as Wild and Scenic Rivers are not present along the Northern or Southern Routes.

6.6 Rare Species and Natural Communities (see Section 9.0 for additional information)

6.6.1 Communication with WDNR and USFWS

Pre-application agency consultation with the WDNR and USFWS has been ongoing since February 2012 and September 2012, respectively. Consultation regarding rare species and natural communities has occurred in the form of telephone calls, conference calls, email correspondence, and meetings. Key meetings and conference calls are summarized in the Endangered Resource (ER) Review submitted to WDNR.

6.6.2 Compliance with WDNR and USFWS Direction

An ER Review has been submitted to the WDNR. Due to confidentiality requirements for Wisconsin Natural Heritage Inventory (NHI) data, a redacted copy of the ER Review is included in Appendix J, Exhibit 1. Appropriate follow-up actions will be coordinated with USFWS and WDNR. The Applicants will continue regular communication with the agencies throughout the application process to follow state and federal endangered resources laws during Project evaluation, planning, and implementation.

6.6.3 Concerns and Potential Impacts to Rare Species

The ER Review summarizes all state-listed rare species, natural communities and other natural features with element occurrence records within one mile of the Project segments for terrestrial and wetland occurrences, and within two miles for aquatic occurrences. Several of the rare species and natural communities have multiple element occurrence records along the route segments. In addition to providing an inventory of rare species and communities, the ER Review also outlines the required follow-up actions necessary to protect threatened and endangered animal species, as well as the recommended follow-up actions to help conserve rare species, communities, or other natural features that are not legally protected or are exempt from protection by the Project (i.e. special concern animal species; threatened, endangered, and special concern plant species and; natural communities).

6.6.3.1 Endangered Species Law Impacts on Project

Table 3 of the ER Review (Appendix J, Exhibit 1) summarizes the specific segments along which element occurrence records exist for animal species requiring follow up actions. The required actions will be implemented by species where threatened and endangered animals are verified to occur based on species surveys or where species are assumed to occur based on the presence of suitable habitat along the identified segments. The required follow-up actions, as well as the effects these actions have on the proposed Project, vary by animal group and are summarized in the ER Review (Appendix J, Exhibit 1). In general, the actions include completing species surveys or specific host plant surveys in areas of suitable habitat; implementing time-of-year avoidance periods; installing and maintaining exclusion fencing; avoiding work below the OHWM of waterways; implementing erosion / runoff prevention measures; using on-site

biological monitors to perform visual encounter surveys, removals, and relocations during work activities; consulting with the WDNR's Bureau of Natural Heritage Conservation (BNHC) if a protected species is verified or assumed to be present; and, if necessary altering the Project where a protected species is verified to be present.

If during the course of the Project there is uncertainty regarding actions to avoid impacts or take for some species or in some situations, the Applicants will coordinate with the WDNR's BNHC on appropriate conservation measures. If the Project cannot completely avoid all areas of suitable habitat or take, the Applicants will work with the WDNR's BNHC Incidental Take Coordinator to apply for an Incidental Take Permit for the affected species.

6.6.3.2 Voluntary Conservation Actions

Rare species and natural communities that are not legally protected or are exempt from protection by the Project include special concern animal species; threatened and endangered, and special concern plant species; and natural communities. In addition, two other natural features identified in the NHI include bat hibernacula and the Karner Blue Butterfly Federal High Potential Range. Table 3 of the ER Review (Appendix J, Exhibit 1) summarizes the specific segments along which element occurrence records exist for each species, community, or feature. In consultation with the WDNR BNHC, the Applicants may implement recommended avoidance and impact minimization measures by species, community, or feature where they are verified to occur.

Avoidance and minimization measures recommended as follow-up actions to help conserve rare species and natural communities are similar to those outlined in Section 6.6.3.1. Recommended measures to protect special concern animal species when and where practicable include: voluntary species surveys and/or specific host-plant surveys conducted in conjunction with required surveys (as noted in Section 6.6.3.1), adherence to avoidance periods, use of exclusion fencing, use of erosion / runoff prevention practices, and use of on-site biological monitors. Similarly, measures recommended for conserving rare plants include voluntary species surveys, use of exclusion fencing in occupied areas, and use of on-site biological monitors during work activities. Recommendations that may be implemented for natural communities and bat hibernacula (if present) include avoiding direct impacts, completing work during a portion of the year when impacts are minimal, and incorporating buffers along community edges where practicable. The Karner Blue Butterfly Federal High Potential Range is intended to be used as guidance for addressing required actions for the federally-endangered butterfly (as summarized in Section 6.6.3.1 and the ER Review).

6.7 Invasive Species

The following summarizes invasive species present along both routes and identifies BMPs to minimize the spread of these species.

6.7.1 Location of Invasive Species/Disease-Causing Organisms

Invasive Species. The ROW was evaluated for invasive plant species during field visits along existing corridors in the growing season of 2012 and 2013 (refer to Section 5.4 for a discussion of segments evaluated in the field during this time). The general location and composition of

dominant invasive species present within the ROW were identified and noted on field maps during wetland delineations and vegetation mapping evaluations. In general, invasive species were observed in disturbed areas such as roadsides and near highway corridors.

Invasive plant species were commonly observed along the segments evaluated in the field. Overall, fifteen invasive plant species were noted along both routes, all falling into the "Restricted" category of Wis. Admin. Code ch. NR 40. There were no "Prohibited" species found. The observed species include:

- Garlic mustard (Alliaria petiolata);
- Spotted knapweed (Centaurea biebersteinii);
- Canada thistle (Cirsium arvense);
- Common teasel (Dipsacus fullonum);
- Russian olive (Elaeagnus angustifolia);
- Leafy spurge (Euphorbia esula);
- Dame's rocket (Hesperis matronalis);
- Bell's honeysuckle (Lonicera x bella);
- Purple loosestrife (Lythrum salicaria);
- Wild parsnip (Pastinaca sativa);
- Phragmites (Phragmites australis);
- Common buckthorn (Rhamnus cathartica);
- Glossy buckthorn (Rhamnus frangula);
- Multiflora rose (Rosa multiflora); and
- Cattail species (Typha angustifolia and T. x glauca).

The most commonly observed "Restricted" plant species along both routes are spotted knapweed, cattails, honeysuckle *(Lonicera x bella*), buckthorns (*Rhamnus spp*.), and wild parsnip.

Disease-causing organisms and aquatic species. The entire Northern and Southern Routes are located within areas where oak wilt (*Ceratocystis fagacearum*) is known to occur. Oak trees (*Quercus* spp.) are present and widely distributed on both routes. To minimize the spread of oak wilt, Applicants will avoid cutting, or pruning oak trees during the restricted times required by the PSC in Wis. Admin. Code § PSC 113.051 (April 15 – July 1). Other recommended restricted times that fall outside of this window may also be followed (e.g. WDNR or local restrictions) if practicable.

Portions of both routes are in the emerald ash borer (*Agrilus planipennis*) quarantine areas: Trempeleau and La Crosse counties. Practices that minimize the spread include avoiding movement of ash wood products (logs, posts, pulpwood, bark and bark products, slash and chipped wood from tree clearing) and hardwood firewood from emerald ash borer quarantine areas (La Crosse and Trempeleau counties) to non-quarantine areas, as per Wis. Admin. Code §

ATCP 21.17. Where ash wood products cannot be left on-site, alternative plans will be developed to meet the requirements.

Most of the project is located within the gypsy moth (*Lymantria dispar*) quarantine area (Dane, Sauk, Juneau, Monroe, and Jackson counties). Standard practices to avoid the spread of the gypsy moth damage include inspections and avoiding movement of wood products (logs, posts, pulpwood, bark and bark products, firewood, slash and chipped wood from tree clearing) from gypsy moth quarantine areas (entire project area except Trempeleau and La Crosse counties) to non-quarantine areas, as per Wis. Admin. Code § ATCP 21.10.

Several larger rivers are crossed by the proposed routes (e.g., Wisconsin River, Black River and the Lemonweir River), along with numerous other smaller waterways. Work below the OHWM of waterways is only proposed at a few locations along both routes as outlined in Section 6.5.2.

Neither route is located within an area known to contain waters where Viral Hemorrhagic Septicemia (VHS) has been detected. However the WDNR aquatic invasive species mapping indicates that Eurasian water milfoil (*Myriophyllum spicatum*) and curly leaf pondweed (*Potamogeton crispus*) are present in New Lisbon Lake, rusty crayfish (*Orconectes rusticus*) is present in the Lemonweir River and zebra mussels (*Dreissena polymorpha*) are present in the Wisconsin River. Where equipment or materials are placed below the OHWM of a waterway, prior to moving construction equipment and material between waterway construction locations, standard inspection and disinfection procedures will be incorporated into construction methods as applicable.

6.7.2 Mitigation Methods

The Applicants will comply with Wis. Admin. Code ch. NR 40 by implementing BMPs when encountering species listed as “Restricted” or “Prohibited”. Standard BMPs have been developed to avoid and minimize the spread of NR 40 listed species. These BMPs will vary throughout the ROW based on the degree of invasiveness, severity of the current infestation, and susceptibility of non-infested areas to invasion.

Typical BMPs include:

- Avoidance through construction timing and alternate access;
- Proper management of construction vehicles and materials (i.e. storage, cleaning);
- Minimizing ground disturbance;
- Placing a barrier between construction vehicles and plants (i.e. construction matting);
- Proper storage and disposal of plant materials;
- Promoting native regeneration; and
- Leaving cut vegetation on site where it is cut (i.e. mowing shrubs).

Additional evaluation will be conducted on the ordered route to further identify invasive species, their locations, and locations where site specific BMPs are appropriate. Appropriate

BMPs will be incorporated into Environmental Access Plans and implemented during construction.

6.8 Archeological and Historic Resources

6.8.1 Wisconsin Historical Society Sites

Commonwealth Cultural Resources Group, Inc. (CCRG) was hired by the Applicants to conduct an archival and literature review of cultural resources of architectural/historic resources and previously recorded archaeological and burial sites within the areas of the proposed routes. This cultural resource assessment identified sites that may be potentially affected and provides recommendations for further study and investigation to determine appropriate impact avoidance and/or minimization measures. A summary of historic and archaeological sites by route is described below.

The Northern Route and the Northern Route with P East both have a total of 38 previously reported archaeological and cemetery/burial sites and one architectural/historic resource eligible for the National Registry of Historic Properties (NRHP). The archaeological sites include eight uncataloged cemetery/burial sites protected under Wisconsin Statute §157.70(4).

The Southern Route has a total of 28 previously reported archaeological and cemetery/burial sites and one NRHP-eligible architectural/historic resource, while the Southern Route with B-North has a total of 29 previously reported archaeological and cemetery/burial sites and one NRHP-eligible architectural/historic resource. Both options contain four uncataloged cemetery/burial sites and three cataloged cemetery/burial sites protected under Wis. Stat. § 157.70(4).

Upon route approval and final line design, further archaeological and historic resource review and investigation will be undertaken to ensure that all identified sites found to be within the ROW or along access routes are properly protected.

6.8.2 Archaeologist Reports and Official Correspondence

Details regarding historic, cultural resources, archaeological, and burial sites by proposed route and segment are described in CCRG's report included in Appendix J, Exhibit 2.

6.9 Restoration of Disturbed Areas

The need for and approach to site restoration and re-vegetation will be based on the degree of disturbance caused by construction activities and the ecological setting of each site, and will need to reflect and satisfy the requirements of the property owner. If construction can be accomplished without creating appreciable soil disturbance, restoration may not require active re-vegetation efforts. Restoration activities will be implemented following the completion of construction activities. These activities will begin as soon as practical and as allowed by seasonal conditions.

6.9.1 Proposed Revegetation

The Applicants will develop a restoration plan for disturbed sites based on the level of ground disturbance and the site setting. In some cases, re-growth of vegetation in disturbed areas may

be allowed to occur without supplemental seeding. In cases where there is no sign of re growth of pre-existing vegetation species in the first month of the subsequent growing season, an assessment will be made and if necessary, an appropriate seed mix will be brought in and properly applied. The Applicants will monitor the sites that are seeded to ensure adequate growth occurs. The restoration and re-vegetation methods for wetland areas are described in Section 8.1.4 below.

6.9.2 Vegetative Monitoring Criteria and Methods

During active construction and ROW restoration, the Applicants or their representatives will inspect re-vegetation and restoration activities in accordance with Wis. Admin. Code ch. NR 216 and the Wisconsin Pollution Discharge Elimination System (WPDES) general permit conditions. Written documentation of the inspection will be maintained by the Applicants describing the re-vegetation progress and corrective measures taken, if applicable. Areas where ground disturbance occurs will be monitored until 70% re-vegetation has occurred.

6.9.3 Invasive Species Monitoring and Management

The invasive species located along the Project corridors and the BMPs to avoid the spread of invasive species are discussed in Section 6.7. A post construction assessment of these areas will be conducted in the growing season following construction. If f this monitoring shows that the species composition within the ROW varies from surrounding conditions, the applicants will discuss the need for additional monitoring with WDNR.

7.0 COMMUNITY IMPACTS

7.1 Communication with Potentially Affected Public

The Applicants' representatives have actively sought input on Project route alternatives and related issues from state, county and local governments, elected officials, landowners and business leaders.

The Applicants conducted 25 public open houses for the Project. Ahead of each of these open houses, representatives took steps to reach out and directly engage local officials (and staff) at local units of government within the Project study area and/or crossed by potential corridors or preliminary/proposed routes. These steps included mailings, phone calls/conversations, one-on-one meetings, and presentations to local officials and staff, as well as with other stakeholders and potentially affected interests (such as economic development organizations, environmental groups, and business, civic and community groups). Detailed information about each Phase of Open Houses is provided in Appendix E.

The invitation packet included a letter, fact sheet and Project area map with existing utility and transportation corridors identified. A news release announcing the open houses was also issued. Copies of Project mailings and information related to each Phase of open houses are provided in Appendix E, Exhibits 1-5.

In addition to open house outreach, the Project had its own web page at the www.atc-Projects.com website, which included all Project-related information as well as an interactive map. Direct mail pieces included references to the website as well as the Applicants' local relations contacts for more information.

Written comments were encouraged throughout the outreach process. Written comments were received directly at the open houses as well as through the website, email, letters and other means. Public comments and feedback received are being provided electronically to the PSCW on a compact disc concurrent with this application.

7.2 Community Issues

The following paragraphs detail some of the more prevalent issues raised by groups and potentially impacted communities: stray voltage, EMF, increased rates, environmental impact, aircraft safety, preservation of natural and scenic beauty, and noise.

Communities also expressed concern about the effect on private and public property including agricultural land, forested areas, wildlife habitats, wetlands, airports, historic and archeological resources, and residential development.

Some of the questions raised regarding planning for the Project include: can the need for the Project be addressed through conservation, distributed generation, dispersed renewable generation, energy related economic development, demand and supply side management, or low voltage options.

Concern was also expressed as to how the Project will affect property values, land rights, condemnation, tourism, job creation, local ownership, and the general economy.

The Applicants conducted Open Houses and met with local officials to discuss their concerns. The issues identified above are not necessarily an all-inclusive list; however, it is quite reflective of most of the concerns that have been brought to our attention primarily through Community Resolutions submitted to the Commission and Applicants.

7.3 Land Use Plans

The Applicants' Local Relations and Real Estate departments have been working closely with all inquiries and interested parties that may be impacted by the new line. The Applicants talked to hundreds of landowners at open house as well as met with municipal officials to talk through the impacts on their jurisdictions. Existing land use plans are provided in Appendix A, Figures 8A through 8H.

7.4 Residential and Urban Areas

Construction of the transmission line, substations and access roads will generate temporary impacts to residential/urban neighborhoods and communities. The Project will be built using conventional construction equipment (e.g., bulldozers, heavy trucks, drill rigs, cranes and hydraulic and pneumatic tools). Work will generally be completed during daylight hours under a typical 8 to 12 hour work day, unless night work is specifically required (e.g., WisDOT required nightly lane closures).

The Applicants will mitigate construction impacts to residential and urban areas, where possible. Noise generated during construction will be temporary and sporadic throughout a typical work day including night work if specifically required. Dust will be controlled by periodic wetting of access roads and work areas or by application of polymer to exposed soil. Tracking pads will be constructed at frequently used access points to minimize mud being tracked onto public roads. Road sweepers will be used to remove mud tracked onto the road, at a minimum of, the end of each work day. Wet sweeping will be used as needed to minimize dust. Traffic control plans will be developed and implemented during construction to minimize traffic impacts and comply with permit requirements.

Use of residential concrete or blacktop driveways will be avoided whenever possible. If access is unavoidable, the driveways may be protected using composite mats or other low profile protection systems. Commercial or industrial driveways may be used without surface protection, but will be evaluated prior to their use. Any damage caused by construction access will be repaired as needed.

7.5 Aesthetic Impacts

7.5.1 Photo Simulations

Concerns were raised about the visual aesthetics of the proposed transmission line during the Applicants' public outreach activities; however, no significant concerns were raised warranting a photo simulation of the proposed transmission line in a particular area of the landscape. Photo simulations were also not identified as needed during any pre-application meetings.

7.5.2 Scenic Roads

The Great River Road, a national scenic byway, and a number of state-designated Rustic Roads are touched by the proposed transmission line route alternatives.

On the Northern Route north of the Briggs Road Substation, Segment P shares ROW for approximately 1825 feet and crosses the Great River Road (STH 35) west of the northern STH 35/USH 53 interchange in the village of Holmen. Segment P-East also crosses the Great River Road at the northern STH 35/USH 53.

On the Southern Route, south of the Briggs Road Substation, Segment O crosses the Great River Road at the southern STH 35/USH 53 interchange in the village of Holmen.

The Northern Route passes in the vicinity of one rustic road and the Southern Route passes in the vicinity or over two designated rustic roads as described below. Access routes for construction do not follow any designated Rustic Roads.

On the Northern Route, Segment P passes the termini of Rustic Road 64 northwest of the village of Holmen. Rustic Road 64 makes a loop off STH 53 along Old WI-93 and Amsterdam Prairie Road to the west of the proposed transmission line route.

On the Southern Route, Segment O passes a terminus point of Rustic Road 31 in the village of West Salem. Rustic Road 31 begins at the County Road C interchange with I-90 and proceeds north into the village. Segment I crosses Rustic Road 49, Levee Road, where I-39 crosses over Levee Road just south of the Wisconsin River in the city of Portage.

The crossings and limited ROW sharing all occur on or near major roadways creating no or limited new scenic impacts.

7.6 Parks and Recreation Areas

Parks and recreation areas and trails that may be impacted by the Project and mitigation plans are described by route below.

Northern Route

As listed below in Table 7.6.1-1, the Northern Route would affect seven parks and recreation areas while the Northern Route with Segment P-East would affect five. The additional two recreational resources affected by the Northern Route are located in La Crosse County: sub-segments P2 and P3 run along the east and north edges of the Town of Holland hall and park, beyond the outfields of two ball diamonds; and sub-segment P5 crosses the New Amsterdam Grasslands, a privately-owned grassland bird conservation area that is open to the public for recreational uses.

Table 7.6-1 – List of Parks, Recreation Areas and Trails Affected by Northern Route

Property Name	Owner/Manager	With Segment P	With Segment P-East
Town of Holland Hall and Park	Town of Holland	X	
New Amsterdam Grasslands	Mississippi Valley Conservancy Inc.	X	
Skyline Golf Course	City of Black River Falls	X	X
Jackson County Forest	Jackson County Forestry and Parks	X	X
Black River State Forest	WDNR	X	X
Omaha County Trail	Juneau County Parks Committee	X	X
Mirror Lake State Park	WDNR	X	X

The other five areas are common to both Northern Routes. In Jackson County, sub-segment N5 crosses an undeveloped area in the northwest corner of the Skyline Golf Course, a public course located on the northwest side of the City of Black River Falls. Sub-segment N6 shares ROW with I-94, which bisects a large area of county and state forest lands between Black River Falls and the Jackson County line north of Warrens; therefore, a narrow swath of these forest lands, which are also used for public recreation, would be part of the Project ROW in this area. South of Camp Douglas (Juneau County), sub-segment N14 crosses the Omaha County Trail, a multi-use recreational trail. Project ROW needs for sub-segment H2 would straddle the boundary between Mirror Lake State Park and the I-90/94 ROW, south of the Village of Lake Delton in Sauk County.

Southern Route

As indicated below in Table 7.6.1-2, the Southern Route would affect eight parks and recreation areas while this route with Segment B-North would affect seven of these areas. The Southern Route with Segment B would affect three municipal parks, two state trails, one SNA, one public hunting area, and a county wildlife area. The Southern Route with Segment B-North would affect all of these same areas, except for the county conservation area.

Table 7.6-2 – List of Parks, Recreation Areas and Trails Affected by Southern Route

Property Name	Owner/Manager	With Segment B	With Segment B-North
West Cedar Meadows Park	Village of Holmen	X	X
Strawberry Commons Park	Town of Onalaska	X	X
Sandalwood Park	City of Onalaska	X	X
La Crosse River State Trail	WDNR	X	X
The 400 State Trail	Private / WDNR	X	X
Dells of the Wisconsin River SNA	WDNR	X	X
Dekorra Public Hunting Grounds	WDNR	X	X
Black Earth Creek Wildlife Area - Sunnyside Unit	Dane County Parks	X	

Seven areas are common to both the Southern Route and this route with Segment B-North. In a residential area of the Village of Holmen in La Crosse County, sub-segment O3 would cross the edge of West Cedar Meadows Park where it abuts USH 53. In congruent situations located approximately three-quarters of a mile and 3.8 miles to the south, respectively, sub-segments O4 and O6 would cross the edges of Strawberry Commons Park and Sandalwood Park in Onalaska. Both of these parks abut USH 53. In La Crosse County, approximately halfway between Onalaska and West Salem, and adjacent to I-90, sub-segment O6 would cross the La Crosse River State Trail.

In Juneau County, sub-segment O19 crosses The 400 State Trail south of Elroy. Following an existing transmission line and railroad corridor in Columbia County, sub-segment I5 would cross the Dells of the Wisconsin River SNA. Just south of the Dekorra rest stop on I-90/94, sub-segment F1 would intercept the southern tip of state-owned public hunting grounds in Columbia County.

Along the Southern Route with Segment B, only, sub-segment B4 would cross the Black Earth Creek Wildlife Area – Sunnyside Unit, a public hunting and outdoor recreation area, along an existing transmission corridor near USH 14 in the Town of Middleton.

The Applicants propose to mitigate short and long-term Project impacts to these resources along the proposed routes as follows.

Northern Route Mitigation

The most significant impacts common to both the Northern Route and this route with Segment P-East would be to the Black River State Forest and Mirror Lake State Park. Short-term impacts may be addressed by implementing mitigation efforts such as relocating existing trails to maintain or improve their recreational value and performing construction during the season(s) of lowest public use in each area. Long-term impacts would be addressed by replanting vegetative screens and with compensatory land purchases to be made by WDNR and paid for by the Applicants. No long-term impacts are anticipated in connection with the Skyline Golf Course or the Omaha County Trail. The Project alignment was planned to avoid the play area of

the golf course rather than following the existing transmission line. The Trail would be affected only by overhead crossing of conductors; transmission structures would be sited more than 400 feet away. Neither of these Project elements is likely to affect the recreational experience of the average trail user.

The primary long-term impacts to recreational resources that are unique to the Northern Route have been minimized through careful consideration of the siting of each crossing. In addition, for the portion of the line crossing the New Amsterdam Grasslands, efforts to further minimize impacts to birds (e.g., structure modifications and/or the use of bird diverters) are currently being discussed with the WDNR and the landowner.

Southern Route Mitigation

Potential long term impacts on the affected properties along the Southern Route have been avoided primarily through the selection of route segments that share existing corridors. Trail crossings by the proposed Project would be minimized through structure siting that avoids impacts to the trail users' recreational experience.

Short-term construction impacts for affected areas on the selected route would be mitigated, in coordination with the corresponding land managers, through strategic scheduling and the application of construction BMPs.

7.7 Airports

7.7.1 Location of Airports/Airstrips within Project Area

The Applicants identified 42 public and private airports, and airfields/airstrips that are located within four miles of the proposed routes' centerlines (also known as the Project area). A list of the airports and airstrips and their corresponding locations is provided in Appendix H, Table 1.

Public airstrips are regulated by FAA obstruction standards. FAA obstruction standards do not apply to non-public airstrips, and Wisconsin does not require specific clearance surfaces either. Nevertheless, the Applicants used the same imaginary surface requirements that the FAA enforces on public use airports when evaluating the proposed route corridors and potential impacts to non-public airstrips within ½ mile of a proposed route segments. This is the most conservative approach with respect to clearance requirements for these non-public airstrips. Also, any non-public airstrip that was greater than ½ mile from a proposed route segment, but did potentially have structure height concerns with a horizontal, conical, or approach surface, as defined by the FAA, was evaluated and is discussed below.

7.7.2 Airport/Airstrip Descriptions and 7.7.3 Potential Project Impact

The **Parkway Farm Airstrip** is a privately owned airstrip near Holmen, Wisconsin. The latitude/ longitude of the airstrip is 44.00357 N/91.30764 W at an elevation of 705 feet. The runway is a turf surface, 2,500 feet long and runs in a north/south alignment. This airstrip is approximately 0.424 miles from proposed Segment P.

The proposed alignment does not impact the FAA horizontal and conical surface requirements. If this segment is ordered, the Applicants would coordinate with the appropriate local officials, Wisconsin Bureau of Aeronautics and the airport operator.

The **Holland Air Park** is a privately owned airstrip near Holmen, Wisconsin. The latitude/ longitude of the airstrip is 44.03218 N/91.29959 W at an elevation of 730 feet. The runway is an asphalt surface, 3,200 feet long and runs in a north/south alignment. This airstrip is approximately 0.431 miles from proposed Segment P/P-East.

The proposed alignment does not impact the FAA horizontal and conical surface requirements. If this segment is ordered, the Applicants would coordinate with the appropriate local officials, Wisconsin Bureau of Aeronautics and the airport operator.

The **NIMBY Airstrip** is a privately owned airstrip near Rockland, Wisconsin. The latitude/ longitude of the airstrip is 43.90944 N/90.89528 W at an elevation of 760 feet based on Wisconsin Bureau of Aeronautics databases. According to the Bureau of Aeronautics database, the runway is a turf surface, 2,685 feet in length; however, the airstrip could not be identified or located from aerial imagery. According to the WisDOT Aeronautics Department, the status of this airstrip is unknown. Based on the latitude and longitude mentioned above, the airstrip is approximately 0.314 miles from proposed Segment O.

The **Duncan Airstrip** is a privately owned airstrip near Oakdale, Wisconsin. The latitude/ longitude of the airstrip is 43.94833 N/90.34694 W at an elevation of 930 feet based on Wisconsin Bureau of Aeronautics databases. There was no information given on runway type or length in the Bureau of Aeronautics database and the airstrip could not be identified or located from aerial imagery. According to the WisDOT Aeronautics Department, the status of this airstrip is unknown. The airstrip based on the longitude and latitude mentioned above is approximately 0.202 miles from proposed Segment N.

The **Blair Airstrip** is a privately owned airstrip near Blair, Wisconsin. The latitude/longitude of the airstrip is 44.28607 N/91.22655 W at an elevation of 864 feet. The runway is a turf surface, 1,900 feet long and runs in an east/west alignment. This airstrip is approximately 1.318 miles at its closest point from proposed Segment N.

The proposed alignment does show some possible issues with the FAA conical surface requirements. These issues occur to the west approximately 1.32 miles and to the north approximately 1.32 miles from the runway. In both locations where there are possible issues with the FAA surfaces there are existing 161 kV transmission lines in place. If this segment is ordered, the Applicants would coordinate with the appropriate local officials, Wisconsin Bureau of Aeronautics and the airport operator to mitigate any conflicts.

The **Lewis Airstrip** is a privately owned airstrip near Black River Falls, Wisconsin. The latitude/ longitude of the airstrip is 44.29369 N/90.98866 W at an elevation of 1,041 feet. The runway is a turf surface, 2,400 feet long and runs in an east/west alignment. This airstrip is approximately 0.917 miles at its closest point from proposed Segment N.

The proposed alignment does show a possible issue with FAA horizontal and conical surface requirements. This issue occurs to the north approximately 0.917 miles. In the location where

there is a possible issue with the FAA surfaces, there is an existing 161 kV transmission line in place, and the proposed alignment runs parallel with the runway. If this segment is ordered, the Applicants would coordinate with the appropriate local officials, Wisconsin Bureau of Aeronautics and the airport operator to mitigate any conflicts.

The **Target Bluff Airport** is a privately owned airstrip near Camp Douglas, Wisconsin. The latitude/longitude of the airstrip is 43.90444 N/90.24639 W at an unknown elevation based on Wisconsin Bureau of Aeronautics databases. According to the Bureau of Aeronautics database, the runway is a turf surface, 1,980 feet in length; however, the airstrip could not be identified or located from aerial imagery. According to the WisDOT Aeronautics Department, the status of this airstrip is inactive. Based on the latitude and longitude mentioned above, the airstrip is approximately 0.315 miles from proposed Segment N.

The **Yukon Trails Camping Airstrip** is a privately owned airstrip near Lyndon Station, Wisconsin. The latitude/longitude of the airstrip is 43.71833 N/89.88444 W at an elevation of 865 feet based on Wisconsin Bureau of Aeronautics databases. According to the Bureau of Aeronautics database, the runway is a turf surface, 1,600 feet in length; however, the airstrip could not be identified or located from aerial imagery. According to the WisDOT Aeronautics Department, the status of this airstrip is unknown. Based on the latitude and longitude mentioned above, the airstrip is approximately 0.412 miles from proposed Segment M.

The **J.B. Heliport** is a privately owned heliport in the Wisconsin Dells, Wisconsin. The latitude/ longitude of the heliport is 43.62723 N/89.78507 W at an elevation of 900 feet based on Wisconsin Bureau of Aeronautics databases. The heliport could not be identified or located from aerial imagery. According to the WisDOT Aeronautics Department, this heliport is currently closed. Based on the latitude and longitude mentioned above, the heliport is approximately 0.061 miles from proposed Segment I.

The **Holiday Inn Heliport** is a privately owned heliport in the Wisconsin Dells, Wisconsin. The latitude/longitude of the heliport is 43.62500 N/89.79444 W at an elevation of 880 feet based on Wisconsin Bureau of Aeronautics databases. The heliport could not be identified or located from aerial imagery. According to the WisDOT Aeronautics Department, this heliport is currently closed. Based on the latitude and longitude mentioned above, the heliport is approximately 0.108 miles from proposed Segment I.

The **Badgerland Heliport** is a privately owned heliport in the Wisconsin Dells, Wisconsin. The latitude/longitude of the heliport is 43.62111 N/89.78528 W at an elevation of 860 feet based on Wisconsin Bureau of Aeronautics databases. The heliport could not be identified or located from aerial imagery. According to the WisDOT Aeronautics Department, this heliport is currently closed. Based on the latitude and longitude mentioned above, the heliport is approximately 0.352 miles from proposed Segment I.

The **Eberle Ranch Airstrip** is a privately owned airstrip near Dane, Wisconsin. The latitude/ longitude of the airstrip is 43.26951 N/89.48735 W at an elevation of 1,050 feet. The runway is a turf surface, 1,900 feet long and runs in a northwest/southeast alignment. This airstrip is approximately 0.810 miles at its closest point from proposed Segment D.

The proposed alignment does show a possible issue with FAA horizontal surface requirements. This issue occurs to the south approximately 0.810 miles. In the location where there is a possible issue with the FAA surfaces, there is an existing 138 kV transmission line in place. If this segment is ordered, the Applicants would coordinate with the appropriate local officials, Wisconsin Bureau of Aeronautics and the airport operator to mitigate any conflicts.

The **Dane Airstrip** is a privately owned airstrip near Dane, Wisconsin. The latitude/longitude of the airstrip is 43.22247 N/89.46881 W at an elevation of 1,035 feet. The runway is a turf surface, 1,600 feet long and runs in a northeast/southwest alignment. This airstrip is approximately 0.414 miles at its closest point from proposed Segment C.

The proposed alignment does show a possible issue with FAA approach surface requirements. This issue occurs to the northeast approximately 0.414 miles. If this segment is ordered, the Applicants would coordinate with the appropriate local officials, Wisconsin Bureau of Aeronautics and the airport operator to mitigate any conflicts. According to the WisDOT Aeronautics Department, this airstrip is currently closed.

7.7.3 Potential Construction Concerns and 7.7.4 FAA Consultation

For the routing and siting process, surface models were created based upon the published FAA criteria for above ground obstructions (Federal Aviation Regulation Part 77). These models were used to help facilitate the siting of the route options proposed in this Joint Application. The FAA Notice Criteria Tool was utilized to determine what structures in the proposed project would require a filing with the FAA. In using the tool, the Applicants' used the structure heights from the preliminary design, plus an additional amount of feet to account for potential inaccuracies in the elevation and location information. For those structures requiring a filing the Applicants submitted the FAA form "7460-1 Notice of Proposed Construction or Alteration" to the FAA for review. FAA determinations were received back on all structures that were filed with the FAA. Once a route is ordered and detailed design is completed, any required notices to the FAA will be refiled and will include temporary equipment elevations where cranes may be used during construction.

During coordination with the FAA and from the FAA's review of the Applicants' filed notices, there were two segments, Segments O and A, that the agency identified as having potential problems.

There are two sections within Segment O that the FAA expressed a concern. First, in Segment O along USH 53 near the La Crosse Municipal Airport, the FAA indicated that the anticipated structure heights would increase the instrument flight altitude within the terminal area of the La Crosse Municipal Airport. It is noteworthy, however, that there are overhead transmission lines currently in that location. The other section of Segment O concern was regarding the horizontal or conical imaginary surface that the FAA has established. Part of this area is in a location where the proposed structures would be shielded by a bluff and existing overhead transmission lines.

With regard to Segment A, the FAA expressed a concern related to the area in the vicinity of the Middleton Municipal Airport (Morey Field). Specifically, the FAA was concerned about the

anticipated structure heights that would increase the instrument flight altitude within the terminal area of Morey Field. There were no horizontal or conical imaginary surface concerns and is an existing overhead transmission line currently in that location.

Several steps have been and will be taken to address the concerns related to Segments O and A. First, the FAA has completed additional studies and surveys to explore ways to address these issues. Second, during the detailed design phase, the Applications will obtain new topographical survey data and will be able to determine the exact structure locations. The Applicants will use this additional information to work through the FAA's concerns; such remedies may include marking and lighting the Project structures if height remains a concern.

In addition to Segments O and A, the FAA indicated that near the Portage Municipal Airport on Segment I, structure locations would need to be marked or lit if the height could not be reduced. This issue is in regard to the instrument flight altitude within the terminal area. It is noteworthy that there are overhead transmission lines currently in that location.

The FAA did not have concern with any other locations of the proposed routes that were within four miles of public use airstrips. All preliminary determinations/communications received from the FAA have been included in Appendix H, Exhibit 2.

7.8 Communication Towers

There are 172 communication facilities located in close proximity to the proposed routes which could be impacted by the new 345 kV transmission line. There are nine AM Broadcast Facilities, twenty-eight FM Broadcast Facilities, nineteen TV Broadcast Facilities and hundred sixteen Additional Facilities such as cell towers, microwave towers, water tower antennas and railway microwave facilities. A detailed list is located in Appendix K, Exhibit 1 Communication Facility Impact Study Phase 1.

An initial assessment (Communication Facility Impact Study Phase 1) was conducted to determine the potential impact to communication towers by the proposed line. This Phase 1 investigation is intended to validate whether a viable risk is present. The conclusions from the Phase 1 assessment indicate that there are communication facilities in close proximity to the new Badger Coulee 345 kV transmission line that could be impacted by the 345 kV transmission line; further testing will be conducted during the construction of the line.

7.9 Community Income from High-Voltage Transmission Impact Fees

7.9.1 Estimated Fee Payments to the Department of Administration

There are two types of community income from high-voltage transmission impact fees required under Wis. Stat. § 196.491(3g) for transmission lines designed for operation at 345 kV or more: a one-time impact fee and an annual impact fee. The impact fees for each route alternative are provided in Table 7.9.1-1 below. Costs are based on the projected in-service year (2018).

Table 7.9.1-1 – High-Voltage Transmission Impact Fees

Cost Categories	Proposed Route			
	Northern	Northern w/P-East	Southern	Southern w/B-North
T-Line High-Voltage Costs	390,760,000	389,800,000	366,360,000	366,080,000
SS High-Voltage Costs	16,800,000	16,040,000	16,040,000	16,040,000
Total High-Voltage Costs	407,560,000	405,840,000	382,400,000	382,120,000
One-Time 5.0% High-Voltage Impact Fee	20,378,000	20,292,000	19,120,000	19,106,000
Annual 0.3% High-Voltage Impact Fee	1,222,680	1,217,520	1,147,200	1,146,360

7.9.2 Base Costs and Fee Calculations

In accordance with previous Commission rulings under Wis. Stat. § 196.491(3)(gm), the Applicants considered the cost of the 345 kV transmission line and the 345 kV and lower voltage substation components when calculating these impact fees. Excluded from the high-voltage costs were costs associated with: the construction of lower voltage transmission lines and distribution lines; operations and maintenance; pre-certification expenses; and the high-voltage impact fees themselves. Additionally, the high-voltage cost estimates do not have any allowance for risk, which is included in the Project cost estimates.

7.9.3 One-Time and Annual Payments

Estimates of the one-time and annual high-voltage impact fee payments to each affected city, village, town or county for each route alternative are provided in Appendix L, Tables 1 through 4. If actual Project costs vary from the high-voltage cost estimates shown in Table 7.9.1-1 above, due to realization of risk or cost savings, adjustment (true up) of the fees will occur in accordance with Wis. Admin. Code §§ Adm. 46.04(2) and 46.05(2).

7.10 Shared Revenue

In Wisconsin, the utility shared revenue aid compensates local governments for costs they incur in providing services to public utilities. These costs cannot be directly recouped through property taxation since utilities are exempt from local taxation and, instead, are taxed by the state. Qualifying utility property includes electric substations, general structures such as office buildings, and power production plants. Production plants are the major type of qualifying property and aid calculations on these plants depend on when the plants became operational. The shared revenue calculations for the additional investment at the three substations of the Badger Coulee Project are detailed in the following tables:

Table 7.10-1 – North Madison Substation Projected Revenue Sharing* for Town of Vienna

Year		Cost	Accum. Depreciation 2.9015%	Net Book Value at Year End	Township Revenue Sharing (3 mils)	County Revenue Sharing (6 mils)
In-service	Dec-2018	$7,990,000	$0	$7,990,000	**$0**	**$0**
2nd yr	2019	$7,990,000	$231,800	$7,758,200	**$23,970**	**$47,940**
3rd yr	2020	$7,990,000	$463,600	$7,526,400	**$23,275**	**$46,549**
4th yr	2021	$7,990,000	$695,400	$7,294,600	**$22,579**	**$45,158**
5th yr	2022	$7,990,000	$927,200	$7,062,800	**$21,884**	**$43,768**
6th yr	2023	$7,990,000	$1,159,000	$6,831,000	**$21,188**	**$42,377**
7th yr	2024	$7,990,000	$1,390,800	$6,599,200	**$20,493**	**$40,986**
8th yr	2025	$7,990,000	$1,622,600	$6,367,400	**$19,798**	**$39,595**
9th yr	2026	$7,990,000	$1,854,400	$6,135,600	**$19,102**	**$38,204**
10th yr	2027	$7,990,000	$2,086,200	$5,903,800	**$18,407**	**$36,814**
11th yr	2028	$7,990,000	$2,318,000	$5,672,000	**$17,711**	**$35,423**
12th yr	2029	$7,990,000	$2,549,800	$5,440,200	**$17,016**	**$34,032**

Table 7.10-2 – Cardinal Substation Projected Revenue Sharing* for Town of Middleton

Year		Cost	Accum. Depreciation 2.9015%	Net Book Value at Year End	Township Revenue Sharing (3 mils)	County Revenue Sharing (6 mils)
In-service	Dec-2018	$3,990,000	$0	$3,990,000	**$0**	**$0**
2nd yr	2019	$3,990,000	$115,800	$3,874,200	**$11,970**	**$23,940**
3rd yr	2020	$3,990,000	$231,600	$3,758,400	**$11,623**	**$23,345**
4th yr	2021	$3,990,000	$347,400	$3.642,600	**$11,275**	**$22,550**
5th yr	2022	$3,990,000	$463,200	$3,526,800	**$10,928**	**$21,856**
6th yr	2023	$3,990,000	$579,000	$3,411,000	**$10.580**	**$21,161**
7th yr	2024	$3,990,000	$694,800	$3,295,200	**$10,233**	**$20,466**
8th yr	2025	$3,990,000	$810,600	$3,179,400	**$9,886**	**$19,771**
9th yr	2026	$3,990,000	$926,400	$3.063,600	**$9,538**	**$19,076**
10th yr	2027	$3,990,000	$1,042,200	$2,947,800	**$9,191**	**$18,382**
11th yr	2028	$3,990,000	$1,158,000	$2,832,000	**$8,843**	**$17,687**
12th yr	2029	$3,990,000	$1,273,800	$2,716,200	**$8,496**	**$16,992**

Table 7.10-3 – Briggs Road Substation Projected Revenue Sharing* for Town of Onalaska

Year		Cost	Accum. Depreciation 2.9015%	Net Book Value at Year End	Township Revenue Sharing (3 mils)	County Revenue Sharing (6 mils)
In-service	Dec-2018	$7,300,000	$0	$7,300,000	**$0**	**$0**
2nd yr	2019	$7,300,000	$211,800	$7,088,200	**$21,900**	**$43,800**
3rd yr	2020	$7,300,000	$423,600	$6,876,400	**$21,265**	**$42,529**
4th yr	2021	$7,300,000	$635,400	$6,664,600	**$20,629**	**$41,258**
5th yr	2022	$7,300,000	$847,200	$6,452,800	**$19,994**	**$39,988**
6th yr	2023	$7,300,000	$1,059,000	$6,241,000	**$19,358**	**$38,717**
7th yr	2024	$7,300,000	$1,270,800	$6,029,200	**$18,723**	**$37,446**
8th yr	2025	$7,300,000	$1,482,600	$5,817,400	**$18,088**	**$36,175**
9th yr	2026	$7,300,000	$1,694,400	$5,605,600	**$17,452**	**$34,904**
10th yr	2027	$7,300,000	$1,906,200	$5,393,800	**$16,817**	**$33,634**
11th yr	2028	$7,300,000	$2,118,000	$5,182,000	**$16,181**	**$32,363**
12th yr	2029	$7,300,000	$2,329,800	$4,970,200	**$15,546**	**$31,092**

*Assumptions to the Applicants' Shared Revenue Calculations:

1. All construction costs will be incurred prior to the in-service date and equipment will be placed in service on December 31, 2018. Prorated depreciation will be reported in the first year. Land costs are not included.
2. There will be no additions or retirements between in first ten years.
3. The book depreciation rate will be 2.9015% of original cost for all years.
4. The state revenue sharing rate will continue to be 3 mils/6 mils on net book.
5. Annual amount cannot exceed $300 times the population of the municipality.
6. Annual amount cannot exceed $100 times the population of the county.

8.0 WDNR PERMITS AND APPROVALS FOR IMPACTS TO WATERWAYS AND WETLANDS

It is anticipated that a WDNR Utility Permit will be required for this Project. The WDNR permits required for construction of the facilities proposed in this Joint Application include:

- Chapter 30 permit to place temporary bridges in or adjacent to navigable waters, pursuant to Wis. Stat. § 30.123 and Wis. Admin. Code ch. 320;
- Chapter 30 permit to place miscellaneous structures within navigable waterways, pursuant to Wis. Stat. § 30.12 and Wis. Admin. Code ch. 329;
- Chapter 30 permit for grading on the bank of a navigable waterway, pursuant to Wis. Stat. § 30.19 and Wis. Admin. Code ch. 341;
- Wetland Individual permit, pursuant to Wis. Stat. § 281.36 and Wis. Admin. Code chs. NR 103 and 299;
- WPDES Storm Water Discharge permit pursuant to Wis. Stat. ch. 283 and Wis. Admin. Code ch. NR 216;
- Incidental Take permit pursuant to Wis. Stat. § 29.604 if the need is identified by WDNR; and
- Any other applicable permit which is required, if the need for that permit is identified by WDNR.

The documentation required by WDNR to review the Project in consideration of the above-referenced permits, except for the NR 216 and Incidental Take permits, is provided in the following section of the Joint Application and Appendix F. A Notice of Intent under NR 216 would be filed after a route is ordered and prior to construction of the Project. If an Incidental Take permit is required, additional information will be submitted to WDNR. Also included in Appendix F are Table 8 – WDNR Waterway/Wetland Impact Location Table and Table 9 – WDNR Waterway/Wetland Environmental Inventory Table.

Temporary Bridges

Temporary bridge crossings will be required at navigable waterways as described for each route in Section 6.5, Table 8 of Appendix F, and in Figures 4A and 4B. These crossings require approval by the WDNR under Wis. Stat. § 30.123. Except for O-R25 (Kickapoo River crossing along the Southern Route) and N-OR-R2 (Trempealeau River side channel along the Northern Route), all of the waterways are less than 35 feet wide. All bridge crossings less than 35 feet wide are designed to meet the standards and conditions for TCSB crossings in Wis. Admin. Code § NR 320.06. A clearance waiver, as authorized by Wis. Admin. Code § NR 320.04(3), will be requested once a route is ordered for those crossings that do not meet the clearance standard in Wis. Admin. Code § NR 320.04.

Due to the width of waterway O-R25 and N-OR-R2 (about 35 to 40 feet), and the apparent lack of access alternatives, it is anticipated the temporary bridge at these crossings will require a

support element below the OHWM. The Applicants are proposing to use a structural mid-stream support (e.g., a reinforced culvert, concrete block or similar material) for these bridges, which will be selected to minimize ecological and hydraulic effects.

Approximate channel dimensions are detailed for each proposed bridge crossing location (where access was allowed) in Table 9 of Appendix B for each route, and photographs are provided in Appendix F for those waterways observed in the field. A typical detail drawing for each of the two types of bridges proposed is provided in Appendix F.

Miscellaneous Structures

It is anticipated that construction equipment (wooden mats, and possibly piers, sheet piling or jersey barriers to support the mats) may need to be temporarily placed below the OHWM of several waterways to facilitate construction access, which would require approval under Wis. Stat. § 30.12. These waterways include N-R75 and N-R76 (New Lisbon Lake / Lemonweir River); N-R84, N-R85 and N-R85a (oxbows of the Lemonweir River); and H-R5a (UNT to Blass Lake), all of which occur along the Northern Route. For the New Lisbon Lake / Lemonweir River and oxbows of the Lemonweir River, it is anticipated that the equipment would be placed along the edges of these features to provide a suitable access path within the proposed ROW. For waterway H-R5a, matting may need to be placed in emergent marsh wetlands along the UNT to Blass Lake, which are presumably below the OHWM elevation of this feature. Specific details regarding structure placement below the OHWM at these locations will be determined during final design after a route is ordered.

Several wooded islands exist in the Wisconsin River between G-R1 (main channel of the Wisconsin River), and G-R2 and G-R3 (side channels of the river), which occur along both routes. It is likely the trees within the proposed ROW would need to be cleared and removed from these islands. Several options are being evaluated to provide access for clearing equipment to the islands, all of which would likely require temporary placement of structures below the OHWM of these waterways (requiring approval under Wis. Stat. § 30.12).

The preferred option for accessing the Wisconsin River islands for clearing activities involves using a barge to transport equipment to the larger island between G-R1 and G-R2. Depending upon water depth, matting or similar material may need to be placed below the OHWM of G-R1 to allow the equipment to be off-loaded from the barge to the island. The barge may also rest on the bed of this waterway during this time. Matting below the OHWM of G-R2 and G-R3, or driving equipment on the bed of these side channels, would also be required to access the smaller island and remove timber from this area.

An alternate option to using a barge for clearing trees from the Wisconsin River islands would be to grade a road on the south bank of the Wisconsin River near the interstate for equipment access. Similar to the barge option, matting below the OHWM of G-R2 and G-R3, or driving equipment across the bed of these side channels, would be required to clear the islands and remove the timber. Specific details regarding structure placement below the OHWM of these waterways will be determined during final design after a route is ordered.

Grading on the Banks

Grading in excess of 10,000 square feet is anticipated on the banks of the Wisconsin River waterways G-R1, -R2, and -R3, which would require approval under Wis. Stat. § 30.19. For the preferred option which utilizes a barge, several landing areas on the Wisconsin River are being considered. The WisDOT is currently repairing the interstate bridge supports at the Wisconsin River crossing, where an access road has been cleared on the north bank of the river and a work platform has been established in the river. If this road could be used to land the barge, additional grading on the banks exceeding 10,000 square feet would likely be required to improve the road and increase the work area on the bank. If this landing area cannot be used, another potential site about 1.2 miles south of the interstate crossing is also being considered, which would also likely require grading in excess of 10,000 square feet on the banks of the Wisconsin River.

The alternate option of grading a road on the south bank of the Wisconsin River would also require grading in excess of 10,000 square feet on the banks of this waterway. Specific details regarding grading on the banks of waterways G-R1, -R2, and -R3 will be determined during final design after a route is ordered.

In addition to the Wisconsin River and side channels along Segment G, grading in excess of 10,000 square feet on the banks of other waterways may be required during construction; however, the extent / location of this grading will not be determined until final design has started after a route is ordered. These areas will be identified in the Erosion Control Plan; however, probable areas where this may occur are identified in Appendix F, Table 8 for each route. Probable areas include waterways where structure placement below the OHWM is required or where multiple structures are required on the banks.

Discharges to Wetlands

Transmission structures to be placed in wetlands are summarized in Section 6.4. The proposed locations are specified and enumerated in Appendix F, Table 8 for each route, and the wetlands are shown in Appendix A, Figures 4A and 4B. Placement of fill in wetlands, including the temporary fill resulting from protective matting placement, may require approval under Section 404 of the Clean Water Act (CWA) from the USACE, water quality certification from the WDNR under Section 401 of the CWA, Wis. Stat. §§ 281.15, 281.31 and 281.36, and Wis. Admin. Code ch. NR 299.

In several areas along the proposed ROW for both routes, existing distribution lines are proposed to be buried (refer to Section 5.3.5). Some of these distribution lines may occur in wetlands. The Applicants are requesting WDNR approvals for that activity, as appropriate.

In addition, the Applicants are requesting authorization to temporarily exclude watercraft from operating in areas where wire stringing activity is occurring on larger waterway crossings (e.g., Wisconsin River, Black River and Lemonweir River), if necessary.

8.1 WDNR Tables for Wetlands and Waterways

As described in Section 8.0, a WDNR Waterway / Wetland Impact Location Table (Table 8) and an Environmental Inventory Table (Table 9) are provided for each route in Appendix F. In addition to wetlands and waterways encountered along both routes, Table 9 also includes upland natural communities which are referenced in other sections of the Joint Application (i.e., Section 6.3 – Forested Lands, and Sections 6.6 and 9.0 which are related to Endangered Resources and Natural Communities).

8.2 Wetland Practicable Alternatives Analysis

During route selection, environmental and other factors were evaluated along all potential routes as described in Section 5.1. Through this evaluation, the proposed routes were identified for further evaluation and refinement. Proposed alignments along these routes were also determined through the consideration of these factors.

The number of structures preliminarily determined to be placed in wetlands represents a conservative estimate based on the conceptual pole locations and is detailed by wetland location in Appendix F, Table 8 – WDNR Waterway/Wetland Impact Location Table. Upon route approval, the Applicants will attempt to further minimize wetland impacts in the final design.

Access through wetlands will be minimized to the extent practicable, and the use of heavy equipment in wetlands will also be minimized to the extent practicable. When wetland access is required, as described in Section 6.4, disturbance to wetlands will be reduced by one or more of the following: completing wetland construction during dry or frozen conditions; the use of equipment with low ground pressure tires or tracks; placement of construction matting to help minimize soil and vegetation disturbances; distributing axle loads over a larger surface area thereby reducing the bearing pressure on wetland soils; or the use of ice roads.

Upon completion of the transmission line, the Applicants will complete site restoration and revegetation consistent with the activities described in Section 6.9.

8.2.1 Corridor and Route Selection Process

The avoidance of wetlands was factored into the Project corridor and route selection process from its outset. A data layer indicating the location of wetlands within the Project area, as mapped by the WWI, was an integral component of the GIS mapping that was continually referenced as the number of potential corridors was narrowed down and route segments were defined and culled by the Project team. During each planning phase, potential wetland impacts were taken into consideration along with other environmental and social impacts, input from the preceding open houses, engineering feasibility and cost. These factors were evaluated along every line segment between the Briggs Road Substation and the Cardinal Substation, as described in Section 5.

Following the third round of open houses, two route alternatives (including three short common segments and two alternate segments) were identified for further evaluation and refinement. Segments comprising these routes are detailed in Sections 5.3 and 5.4. Proposed alignments along these routes were chosen based on a number of factors including landowner

input, engineering design criteria, impacts to residences, and impacts to environmental features including wetlands, waterways and forested areas.

8.2.2 Route Location and Design

All proposed route segments have been selected to avoid and minimize wetland impacts to the extent practicable. However, given the extent of wetlands in the Project area and structure spanning requirements, wetland impacts cannot be completely avoided by either route. Based on standard design elements, transmission structures will typically span about 600 to 1,000 feet. This distance is dependent upon several factors, including topography and ROW constraints. In combination, these factors can restrict the Applicants' flexibility to completely avoid structure placement in wetlands. In addition, many route segments occur along existing corridors, which reduces wetland impacts associated with this Project.

The number of structures preliminarily determined to be placed in wetlands represents a conservative estimate based on the conceptual pole locations, as discussed in Section 6.4, and is further detailed by wetland in Section 8.1 and Table 8 of Appendix F.

Upon route approval, the Applicants will attempt to further minimize wetland impacts in the final design. For example, where possible, efforts will be made to move structures near a wetland edge to outside of the wetland. However, based on the number and extent of wetlands along each route, complete avoidance of wetlands may not be practicable.

Access through wetlands will also be minimized to the extent practicable. For example, if construction occurs during periods when the ground is not frozen or dry, wetlands occurring along most roads will be accessed from the adjacent roads near the structure location. If practicable, this will eliminate the need for heavy equipment to access through the entire length of the wetland. However, it is unlikely that access to structures will be feasible from restricted access roadways such as I-90/94. In these instances, access through the entire length of these wetlands may be required unless other arrangements can be made with the WisDOT or the landowners.

8.2.3 Why Project Alternatives Are Not Practicable

The overall purpose of the Project is to construct a new 345 kV transmission line from NSPW's Briggs Road Substation in La Crosse County to ATC's Cardinal Substation in Dane County. In light of this overall purpose, a large number of factors was considered and applied at each decision point during the routing and siting process for this Project (as detailed in Section 5). During the routing and siting process, the factors that had to be considered included but were not limited to cost (relative to wetland avoidance and other environmental benefits, and in light of total Project budget), available technology (e.g., materials and construction methods that can be employed to minimize impacts to wetland), and logistics (weighing wetland avoidance with factors such as proximity to homes and other buildings, and regulation-based design guidelines). However, as with any linear project that traverses an expansive area of the landscape of Wisconsin, complete avoidance of wetlands is not physically possible due to the frequency of wetland occurrence and the many design-related and other logistics issues to consider in addition to wetland and other natural resource impact minimization. In other

words, in light of the overall project purpose, the scale of this project, and in consideration of a comprehensive list of practical limitations including but not limited to cost, available technology, and logistics, the Applicants were unable to identify a practicable alternative that would avoid wetland impacts.

8.2.4 Temporary and Permanent Impacts

A number of proven methods will be employed during construction to reduce impacts to those wetlands that will be intersected by the Project alignment. The primary means for wetland impact minimization will be to limit, to the extent practicable, the operation of heavy construction equipment in wetlands through the use of off-ROW access to structure sites. When construction access through a wetland cannot be avoided, disturbance to wetlands will be reduced by implementation of several specialized construction techniques described in Section 6.4.3. Other protective measures that would be developed after a specific route is ordered may include scheduling wetland construction activities so they take place during dry or frozen conditions, construction of ice roads, use of low ground pressure equipment, and/or construction matting materials to help minimize soil and vegetation disturbances.

Upon completion of the transmission line, the Applicants will complete site restoration and revegetation consistent with the activities described in Section 5.5.1 and 6.9.

8.3 Wetland Delineations

The Applicants' environmental consultant, Stantec Consulting Services Inc., completed wetland delineations in the field along segments where field access was allowed. Wetland delineations were completed from May through August of 2012, and from May through June of 2013, using the methods outlined in the USACE Wetland Delineation Manual (USACE 1987), subsequent guidance documents (USACE 1991, 1992), Guidelines for Submitting Wetland Delineations in Wisconsin to the St. Paul District Corps of Engineers (USACE 1996), and the Midwest and Northcentral / Northeast Regional Supplements to the 1987 Manual. The wetland boundaries were mapped using a Global Positioning System (GPS) unit (sub-meter accuracy).

Field access was limited to the existing ROW (ATC and NSPW transmission lines and public ROW) along the routes. For areas extending outside the existing ROW, the wetland boundaries were conservatively estimated from field observations and by interpretation of aerial photographs (2010 Wisconsin Regional Orthophotography Consortium photos and 2012 / 2013 photos viewed in Pictometry), soil survey information, WWI maps, and additional wetland signatures identified from the WDNR's Surface Water Data Viewer – Wetlands and Wetland Indicators. The use of Pictometry allowed for closer examination of areas to more accurately refine wetland boundaries based on wetland signature. For shared ROW segments, the boundaries extending beyond the ROW were sketched onto aerial photographs in the field and were digitized into a GIS system.

Along unshared segments (e.g. portions of Segment O and Segment F), wetland boundaries were conservatively estimated using the sources identified in the preceding paragraph. In addition, wetlands were viewed from public roads in areas where the unshared segments

crossed roads, which allowed for a refinement of the boundary and general characterization of the feature. Remotely identified wetland boundaries were digitized into a GIS system.

Wetlands identified during the field and off-site investigations are shown in Appendix A, Figures 4A and 4B. The Wetland Delineation Report is included in Appendix J, Exhibit 3.

8.4 Wetland and Waterway Crossings

Refer to Appendix A, Figures 4A and 4B for recent aerial photographs overlaid with the following features: proposed transmission line routes, preliminary locations of transmission line structures, waterways, WWI wetlands, delineated wetlands, hydric soils, proposed temporary bridge locations, locations of other Chapter 30 activities and proposed off-ROW access routes.

9.0 ENDANGERED, THREATENED, SPECIAL CONCERN SPECIES AND NATURAL COMMUNITIES

As noted in Section 6.6, an ER Review has been completed and submitted, and a public version is provided in Appendix J, Exhibit 1.

9.1 WDNR-Endangered Resource Review

A proposed ER Review was submitted to the WDNR for review and is included in Appendix J. Due to confidentiality requirements for NHI data, a redacted version of these documents is located in Appendix J, Exhibit 1.

9.2 Maps and Data Files Showing NHI Occurrences

Figures 3a-d of the ER Review show all NHI element occurrence records. This is based on a WDNR query of the NHI database provided to the Applicants on March 6, 2013. These figures are included in the ER Review provided to the WDNR Energy, Transportation and Environmental Analysis Bureau, and to the Commission.

9.3 Assessment and Biological Surveys for Proposed Routes

In-field habitat characterization was conducted during the 2012 and 2013 field seasons along route segments where access was available. For those segments where access was not available, the habitat characterization was conducted using a combination of aerial photographs, Pictometry and targeted in-field verification from the nearest publically accessible road or ROW crossing. Habitat assessment results are summarized by segment in Table 9 of Appendix F. The results have been, and will continue to be, used in consultation with the WDNR to identify biological field survey needs, and to follow-up on required and recommended actions identified in the ER Review. Based on pre-application consultation with the WDNR, the Applicants completed rare bird surveys along portions of some segments during the 2013 field season per WDNR recommendations. Results from the 2013 bird surveys are being compiled and will be submitted at a later date. Additional biological surveys and refined habitat assessments, if necessary, will be conducted in consultation and coordination with the WDNR and PSCW, and the results will be provided upon completion. Once a route is selected, the habitat assessment and biological survey results will be used at a site specific level along the ordered route to guide implementation of required and recommended follow-up actions outlined by species in the ER Review.