CARDINAL-HICKORY CREEK 345 kV TRANSMISSION LINE PROJECT MACRO-CORRIDOR STUDY

Submitted to: United States Department of Agriculture's Rural Utilities Service ("RUS")

Applicant to RUS: Dairyland Power Cooperative

Other participating utilities in the Cardinal-Hickory Creek Transmission Line Project:

- American Transmission Company LLC, by its corporate manager ATC Management Inc.
- ITC Midwest LLC

September 28, 2016

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Page No.

LIST OF TABLES

Page No.

LIST OF FIGURES

Page No.

LIST OF ABBREVIATIONS

Abbreviation	Term/Phrase/Name
ACA	Alternative Crossings Analysis
ACA Study Area	Area shown on Figure 3-1
AES	Alternatives Evaluation Study
ATC	together, American Transmission Company LLC by its corporate manager, ATC Management Inc.
CFR	Code of Federal Regulations
CPCN	Certificate of Public Convenience and Necessity
CTH	County Highway
Dairyland	Dairyland Power Cooperative
DATCP	Department of Agriculture, Trade and Consumer Protection
EIS	Environmental Impact Statement
Exhibit D	RUS Staff Instructions, Part 1970-O, Environmental--Miscellaneous Resources, (April 1, 2016), Exhibit D, Guidance for Creating a Macro-Corridor Study,
FAA	Federal Aviation Administration
Futures	Future Scenarios
Galena 161 kV Line	Potential river crossing location at the Dubuque to Galena 161 kV line crossing in Dubuque, Iowa
GMP	General Management Plan
Highway 151 Bridge	Potential river crossing location at the Highway 61/151 crossing in Dubuque, Iowa
INHF	Iowa Natural Heritage Foundation
Iowa DNR or IDNR	Iowa Department of Natural Resources
IUB	Iowa Utilities Board
Iowa SHPO	Iowa State Historic Preservation Office
ITC Midwest	ITC Midwest LLC

Abbreviation	Term/Phrase/Name
Julien Dubuque Bridge	Potential river crossing location at the Julien Dubuque Bridge/Highway 20 crossing in Dubuque, Iowa
kV	Kilovolt
L&D 10	Potential river crossing location at the Lock and Dam No. 10 in Guttenberg, Iowa
L&D 11	Potential river crossing location at the Lock and Dam No. 11 in Dubuque, Iowa
MCS	Macro-Corridor Study
MISO	Midcontinent Independent System Operator Inc.
MTEP	MISO Transmission Expansion Plan
MVP	Multi-Value Project
MVP Portfolio	A Portfolio of 17 MVPs
Nelson Dewey	Potential river crossing location at the Turkey River Substation to the Nelson Dewey Power Plant crossing in Cassville, Wisconsin
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corporation
New Rules	81 Fed. Reg. 11032-11047
NLCD	National Land Cover Dataset
NPDES	National Pollutant Discharge Elimination System Permit
NPS	National Park Service
NRHP	Nation Register for Historic Places
NTAs	Non-Transmission Alternative(s)
Portfolio	MVP Portfolio
Project	Cardinal-Hickory Creek Transmission Line Project
Project Study Area	Area shown on Figure 1-2
PSCW	Public Service Commission of Wisconsin

Abbreviation	Term/Phrase/Name
Refuge	Upper Mississippi National Wildlife and Fish Refuge
RPSs	Renewable Portfolio Standards or Goals
ROW	Right-of-Way
RUS	Rural Utilities Service
RUS Guidance	RUS Staff Instructions, Part 1970-O, Environmental--Miscellaneous Resources, (April 1, 2016).
SH	State Highway
SHPO	State Historic Preservation Office
SNA	State Natural Areas
SPCC	Spill Prevention Control and Countermeasures
Stoneman	Potential river crossing location at the Millville to Stoneman 69 kV transmission line and Turkey River to Stoneman 161 kV line crossing (co-located) in Cassville, Wisconsin
USACOE	United States Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
US GS	United States Geologic Services
Utilities	collectively, Dairyland, ITC Midwest, & ATC
WDNR	Wisconsin Department of Natural Resources
WisDOT	Wisconsin Department of Transportation
WSHS	Wisconsin State Historical Society
USH	United States Highway

1.0 INTRODUCTION

1.1 Basis for this Macro-Corridor Study

Dairyland Power Cooperative ("Dairyland"), a cooperative organized under the laws of Wisconsin; American Transmission Company LLC by its corporate manager, ATC Management Inc., (together, "ATC"), and ITC Midwest LLC ("ITC Midwest") (all collectively, "Utilities"), propose to construct and own a 345 kilovolt ("kV") transmission line connecting northeast Iowa and south-central Wisconsin called the Cardinal – Hickory Creek Transmission Line Project ("Project"). This Project meets multiple needs:

- Addresses reliability issues on the regional bulk transmission system;
- Cost-effectively increases transfer capacity to enable additional renewable generation needed to meet state renewable portfolio standards and support the nation's changing energy mix;
- Alleviates congestion on the transmission grid to reduce the overall cost of delivering energy; and
- Responds to public policy objectives aimed at enhancing the nation's transmission system and reducing carbon-dioxide emissions.

Dairyland plans to request financing from the Rural Utilities Service ("RUS") and RUS has determined that funding of Dairyland's ownership interest in the Project would be a federal action and therefore subject to review under National Environmental Policy Act ("NEPA"), 42 United States Code ("U.S.C.") § 4321. See also 7 Code of Federal Regulations ("C.F.R.") § 1970.8.

RUS has determined that it will prepare an Environmental Impact Statement ("EIS") for the Project to comply with its environmental review requirements under NEPA. On March 2, 2016, RUS published new NEPA rules. See 81 Fed. Reg. 11032-11047 ("New Rules"). On April 1, 2016, RUS created a guidance requiring the submission of a Macro-Corridor Study ("MCS") as a preliminary routing study that is completed before the RUS initiates its NEPA process (RUS, 2016, RD Instruction 1970-O, Exhibit D, Guidance for Creating a Macro-Corridor Study, "Exhibit D").

According to this new guidance, the purpose of the MCS is:

> …to identify areas that appear to be suitable for siting electric transmission facilities based on regulatory, environmental, engineering, and economic constraints. Such a study is conducted to identify routing options for a particular line, and how those options might be planned to avoid or minimize problems, impacts, delays, and unnecessary expense in development of a proposed project (RUS, 2016, Exhibit D, § 1.2).

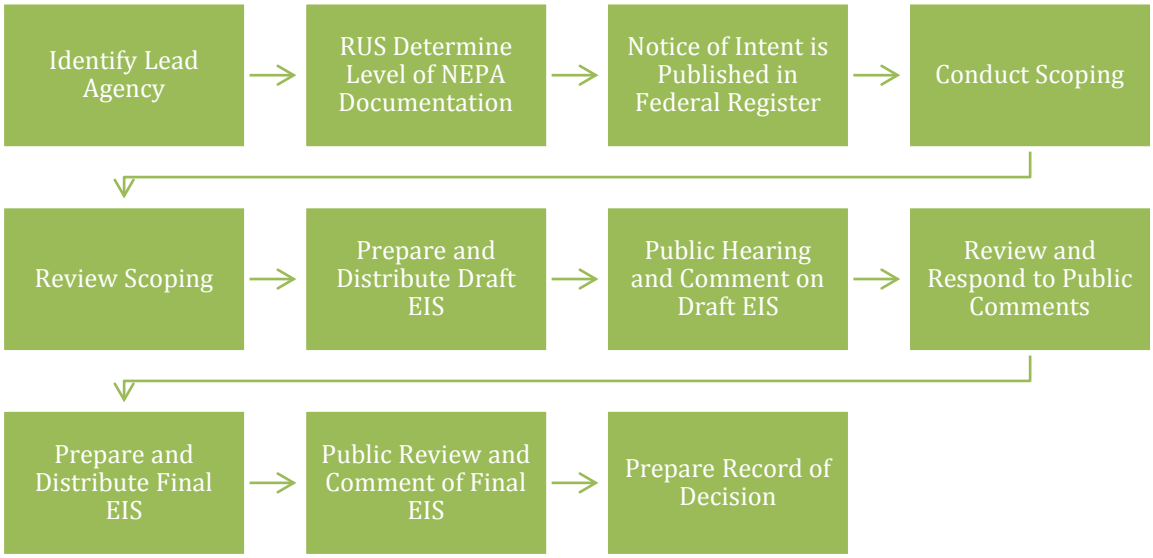
This MCS was developed in accordance with the requirements set forth in the new RUS guidance ("RUS Guidance") (RUS, 2016, Exhibit D).

1.2 Environmental Review Requirements and Process

RUS is the lead federal agency and will conduct its NEPA review pursuant to the RUS regulations outlined in 7 C.F.R. § 1970 et seq. The RUS NEPA process will evaluate a broad range of environmental issues including potential impacts to residences, farmland, threatened and endangered species, wetlands, floodplains, forested areas, climate change, public health and safety, air quality, and cultural and historic resources. The NEPA process will also identify measures to mitigate potential adverse impacts of the Project and evaluate other alternatives that meet the identified purpose and need for the Project. RUS will also consider socioeconomic and environmental justice issues.

Figure 1-1 illustrates the steps in the RUS NEPA process for developing an EIS. The scoping process includes a notice in the Federal Register, public scoping meetings, and agency consultation. Based on the input that RUS receives from the public scoping process and on materials developed by the Utilities including this MCS, RUS will determine the scope of the EIS.

Figure 1-1: RUS NEPA Process for Developing an EIS



Source: RUS, 2009, p. 1-4.

The Project will involve federal lands and will require permits from other federal agencies. Two agencies, the United States Fish and Wildlife Service ("USFWS") and the U.S. Army Corps of Engineers ("USACOE"), have agreed to participate in RUS's NEPA process as cooperating agencies. Additional

cooperating agencies may be identified. While RUS and these cooperating agencies will work together to prepare the EIS, each federal agency will independently develop its own decision document.

1.3 Project Overview

The Project would create a 345 kV transmission line connection between the Hickory Creek Substation in Dubuque County, Iowa, with the Cardinal Substation in the Town of Middleton, Wisconsin (near Madison, Wisconsin) and include the following facilities[1]:

- A new 345 kV terminal within the existing Hickory Creek Substation[2] in Dubuque County, Iowa;
- A new intermediate 345/138 kV substation near the Village of Montfort in either Grant or Iowa County, Wisconsin;
- A new 345 kV terminal within the existing Cardinal Substation in the Town of Middleton in Dane County, Wisconsin;
- A new 45- to 65-mile (depending on the final route) 345 kV transmission line between the Hickory Creek Substation and the intermediate substation;
- A new 45- to 60-mile (depending on the final route) 345 kV transmission line between the intermediate substation and the existing Cardinal Substation;
- A rebuild of the Mississippi River Crossing at Cassville to accommodate a section of the 345 kV transmission line between Hickory Creek and the intermediate substation, and Dairyland's 161 kV transmission line;
- A short, less than one-mile, 69 kV line in Iowa to enable the removal of the 69 kV line that crosses the Mississippi River at Cassville;
- Facility reinforcement needed in Iowa and Wisconsin due to the addition of the Hickory Creek Substation/Cardinal Substation 345 kV transmission line and the removal of the existing 69 kV Mississippi River crossing at Cassville; and
- Rebuild of the Turkey River Substation in Dubuque County, Iowa with two 161/69 kV transformers, four 161 kV circuit breakers, and three 69 kV circuit breakers.

The Midcontinent Independent System Operator, Inc. ("MISO"), the regional transmission organization, has approved the Project. MISO approved this Project together with a number of other projects (called Multi-Value Projects or MVPs) based on planning analysis showing that it provided multiple benefits

[1] ITC Midwest owns the existing Hickory Creek Substation. ATC owns the Cardinal Substation and would also own the new intermediate substation. Dairyland would own an undivided minority interest in all of the new 345 kV line. The majority interest in the new 345 kV line will be split by ITC Midwest and ATC.
[2] The Hickory Creek Substation was energized on October 30, 2015.

(economics, reliability, and public policy) to the region. Specifically, MISO applied three criteria to develop the MVPs:

- Criterion 1: The MVP must enable the transmission system to deliver energy reliably and economically in support of documented Federal or state energy policy mandates or laws.
- Criterion 2: The MVP must provide multiple types of economic value across multiple pricing zones with a total cost/benefit ratio prescribed in Attachment FF of the Tariff.
- Criterion 3: The MVP must address at least one transmission issue associated with a projected violation of a North American Electric Reliability Corporation ("NERC") or Regional Entity standard and at least one economic-based transmission issue that provides economic value across multiple pricing zones (MISO, 2012, § 3.1).

Depending on the Mississippi River crossing location that is ultimately selected for this Project, the 345 kV line would be approximately 125 miles long. The typical right-of-way ("ROW") width for the Project would be 200 feet in Iowa and 150 feet in Wisconsin. In addition, unique ROW widths have been developed in certain areas to mitigate potential impacts to sensitive resources, such as avian species at the Upper Mississippi National Wildlife and Fish Refuge ("Refuge") crossing locations. Descriptions of and figures for the typical transmission line structures are found in Appendix A. The study area for the Project is presented in Figure 1-2 ("Project Study Area").

1.4 Overview of Utilities' Development of a Study Area, Macro-Corridors and Alternative Corridors

The operator of the regional transmission grid ("MISO") approved the two end-points and intermediate substation. The Mississippi River and the Refuge lie between the two end-point substations. Because crossing the Mississippi River and the Refuge are the most significant siting constraints for this Project, the Utilities began their macro-corridor analysis by determining feasible locations for crossing the Mississippi River and potentially the Refuge.

After an in-depth evaluation of seven alternative crossing locations, the Utilities determined that five of the locations were not technically and economically feasible. The two remaining crossings for the Project are located near Cassville, Wisconsin. Both locations cross through the Refuge and would require USFWS approval. Based on this conclusion, the Utilities developed the overall Project Study Area, which is shown in Figure 1-2.

While additional justification is provided in Section 3.2.1, Table 1-1 provides a summary of the key factors that were analyzed to determine the feasibility for each alternative crossing location.

Table 1-1: Feasibility Review of the ACA Crossing Locations

Crossing Location	Existing Linear Infrastructure Present	Feasibility Review – Key Factors
L&D 11	Existing Lock and Dam; no overhead transmission lines	• Safety and technical engineering considerations prohibit construction of transmission facilities on or near Lock and Dam No. 11, per USACE review. • If selected, the existing 161 kV and 69 kV lines through the Refuge at Stoneman would remain in place. • The L&D 11 crossing would be located on lands outside of Refuge boundaries. • The crossing would require routing through urban residential development and downtown Dubuque, and the City of Dubuque has said this Project would not be permittable within the City limits. • The ACA route would cross numerous residential properties. All trees within the ROW would need to be removed. • There are no existing overhead transmission corridors across the Mississippi River at or near Lock and Dam No. 11. • The crossing presents technical challenges; it would require a 3,200-foot crossing of the Mississippi River with projected structure heights of 250 to 300 feet with permanent lighting. • The Project would be visible from multiple viewpoint locations at Eagle Point Park. • Lock and Dam No. 11 is a listed site on the National Register of Historic Places (NRHP); there are visual/scenic considerations related to the NRHP listing.
Dubuque-Wisconsin Bridge **&** **Julien Dubuque Bridge**	Existing bridges; no overhead transmission lines	• IDOT stated that it would not be able to issue a permit for attachment of the transmission line to either bridge. • IDOT would not be able to safely perform ongoing routine bridge maintenance while the transmission line is energized. As a result, the line would need to be de-energized during these maintenance activities, which would not allow for the reliable use of a transmission line at these locations and would not meet the purpose and need of the Project. • Unresolvable engineering conflicts with bridge safety prohibit construction of transmission facilities on both bridges, per IDOT review of the Project. • If selected, the existing 161 kV and 69 kV lines through the Refuge at Stoneman would remain in place. • Both bridge crossings are located on lands outside the Refuge. • The crossings require routing through urban residential development and downtown Dubuque; the City of Dubuque has said this Project would not be permittable within the City limits.. • Corridors to both locations would cross numerous residential properties. All trees within the easement area would need to be removed. • At these locations, the Project would result in shutdown or disruption of traffic flow on major bridges between Iowa and Wisconsin/Illinois during construction and maintenance of the transmission line. • Neither bridge location has existing overhead transmission lines.
Galena 161 kV	Existing 161 kV transmission line	• If selected, the existing 161 kV and 69 kV lines through the Refuge at Stoneman would remain in place. • The crossing would be located on lands outside the Refuge. • The crossing requires routing through urban residential development and downtown Dubuque. The City of Dubuque has said this Project would not be permittable within the City limits. • The corridor would cross numerous residential properties. All trees within the ROW would need to be removed. • Requires routing new 345 kV line through Schmitt Island and Riverview Park; the new line would cross recreational fields for which federal funds were obtained, the use of which may limit or prohibit redevelopment of these areas. • It provides an opportunity to co-locate with an existing 161 kV overhead line.
L&D 10	Existing Lock and Dam; no overhead transmission lines.	• Safety and technical engineering considerations prohibit construction of transmission facilities on or near Lock and Dam No. 10, per USACE review. • If selected, the existing 161 kV and 69 kV lines through the Refuge at Stoneman would remain in place. • Crosses within the Refuge managed by USFWS and USACE.1 • Would require routing in immediate proximity of the Refuge, which contains cultural resources. Any excavation or removal of archeological resources activities within the Refuge would require an Archaeological Resources Protection Act of 1979 (ARPA) permit. • Guttenberg, Iowa has more than 350 recorded historic-aged resources including three NRHP districts and several individually-listed NRHP properties (including Lock and Dam No. 10 itself). • No existing utility ROWs are located at or near the L&D 10 crossing or on the Wisconsin side of this crossing location; the Wisconsin side is primarily mature woodlands and agricultural fields. • Alternative crossing locations immediately upstream and downstream of L&D 10 are limited by proximity to a private airfield to the north of L&D 10 and Goetz Island, Swift Slough, and Guttenberg Ponds Sanctuary within the Refuge to the south. • The L&D 10 ACA route is the longest compared to all other ACA routes.

Crossing Location	Existing Linear Infrastructure Present	Feasibility Review – Key Factors
Stoneman	Existing 161 and 69 kV transmission lines.	• It crosses lands within the Refuge, which is designated as a Wetland of International Importance (Ramsar) and a GIBA. • The crossing would require routing through Refuge lands, which include cultural resources. Any excavation or removal of archeological resources within the Refuge would require an ARPA permit. • The crossing presents an opportunity to co-locate new 345 kV line with an existing 161 kV corridor across the Refuge. • The existing 69 kV transmission line would be removed, reducing the current design at Stoneman from two separate transmission corridors to a single corridor for the entire length through the Refuge. • The new consolidated facilities would use low-profile structures that place all conductors on one horizontal plane and the shield wire would be marked with avian flight diverters, which are not present on the existing line. The larger structures would provide a more visible structure for avian species; the reduced span length and use of flight diverters would limit avian interactions by increasing overall visibility of the transmission line. • The crossing requires routing through urban/residential development in Cassville, Wisconsin. Residences, schools, daycares, places of worship, airports, or businesses are in immediate proximity to the Stoneman crossing location in Cassville. • Alternative alignments at the Stoneman location are limited by the presence of the Cassville Municipal Airport. Transmission line structures located in the airport's conical surface would likely require additional design and evaluation by the FAA, and may be limited in height. • There is an existing retired power plant, a substation, and municipal infrastructure located on the Wisconsin side.
Nelson Dewey	Oak Road, existing power plant, substation, and 161 kV and 69 kV lines.	• Crosses lands within the Refuge, which is designated as a Wetland of International Importance (Ramsar) and a Globally Important Bird Area (GIBA). • Provides an opportunity to relocate the existing 161 kV transmission line and ROW from the Stoneman crossing to the Nelson Dewey crossing to co-locate with the new 345 kV for this Project. • The existing 69 kV transmission line would be removed. This would allow for the natural revegetation (in consultation with the USFWS) of the existing 161 kV and 69 kV transmission corridors present at the existing Stoneman crossing through the Refuge. • Would include the use of low-profile structures that place all conductors on a single horizontal plane in addition to a marked shield wire, which is not present on the existing lines through the Refuge. The larger structures would provide a more visible structure for avian species; the reduced span length and use of flight diverters would limit avian interactions by increasing overall visibility of the transmission line. • Requires crossing fewer acres of ROW through Refuge lands compared to the Stoneman crossing location. • Would require routing through Refuge lands, which include cultural resources. Any excavation or removal of archeological resources within the Refuge would require an ARPA permit. • Existing infrastructure at this location includes Oak Road within the Refuge on the Iowa side. On the Wisconsin side, there is an existing retired power plant, a substation, and access to existing 161 kV, 138 kV, and 69 kV transmission corridors.

1 – L&D 10 crossing location (Guttenberg, Iowa) includes lands managed and operated under a 2001 cooperative agreement between the USACE and the USFWS (USFWS 2006). Although there is a 'break' in the Refuge where Lock and Dam No. 10 crosses the Mississippi River, this 'break' relates specifically to the management and operation of the lock and dam facility and does not include a gap in the overall Refuge boundaries at this location (as compared to the gap in the Refuge at Dubuque, Iowa). As a result, the Lock and Dam No. 10 is considered by the Utilities as a Refuge crossing alternative. Although L&D 11 also includes a break in Refuge lands, the L&D 11 crossing location is within the City of Dubuque at the same general location of the remaining non-Refuge locations.

As explained in Section 5.3 of this MCS, the Utilities collected data and feedback from numerous sources including, but not limited to, federal, state and local agencies, public officials, landowners, utilities, the general public, and other interested parties both for the study area and for potential macro-corridors. Additional data and feedback was collected allowing the Utilities to finalize the study area and the macro-corridors that were presented in a series of public open houses in May 2016. Based on this additional feedback and continued analysis of corridor constraints, the Utilities narrowed the macro-corridors to the alternative corridors that are presented in Section 7 of this MCS.

ALLAMAKEE COUNTY
CRAWFORD COUNTY
RICHLAND COUNTY
SAUK COUNTY
DANE COUNTY
GRANT COUNTY
IOWA COUNTY
LAFAYETTE COUNTY
CLAYTON COUNTY
DUBUQUE COUNTY

WISCONSIN
IOWA
ILLINOIS

Lynxville
Harpers Ferry
Steuben
Eastman
Boscobel
Wauzeka
Woodman
Prairie du Chien
McGregor
Wisconsin River
Mount Hope
Patch Grove
Clayton
Bagley
Bloomington
Lancaster
Blue River
Muscoda
Avoca
Lone Rock
Spring Green
Sauk City
Arena
Mazomanie
Black Earth
Cross Plains
Middleton
Madison
Verona
Highland
Fennimore
Montfort
Cobb
Linden
Livingston
Rewey
Platteville
Belmont
Dodgeville
Gov. Dodge State Park
Blue Mound State Park
Barneveld
Blue Mounds
Mount Horeb
Ridgeway
Mineral Point
Hollandale
Blanchardville
New Glarus
Belleville
Darlington
Darlington
Shullsburg
Benton
Cuba City
Hazel Green
Dickeyville
Sherrill
Rickardsville
Durango
Sageville
Asbury
Dubuque
Graf
Centralia
Dyersville
Guttenberg
Osterdock
Millville
Cassville
North Buena Vista
Potosi
Tennyson
Balltown
Luxemburg
Holy Cross
Mississippi River

PROPOSED SUBSTATION SITING AREA
CARDINAL SUBSTATION
HICKORY CREEK SUBSTATION

CARDINAL-HICKORY CREEK TRANSMISSION LINE PROJECT

FIGURE 1-2
PROJECT STUDY AREA

Project Study Area
Outside Project Study Area
Substation Siting Area
Substation
Interstate, US or State Highway
State Boundary
County Boundary
City / Village
Open Water

MINNESOTA
WISCONSIN
IOWA
ILLINOIS
Lake Michigan
Map Area Shown in Red

N W E S
0 1 2 3 4 5
Miles

AMERICAN TRANSMISSION COMPANY®
ITC
DAIRYLAND POWER COOPERATIVE
A Touchstone Energy® Cooperative

F:\Projects\C-HC\Mxds\MCS\Figure 1-2 Project Study Area.mxd

Data Sources: ATC, DPC, IDOT, IDNR, ITC, USGS, WDNR, WDOT. 7/29/16

1.5 Purpose and Need

In addition to an MCS, the RUS Guidance also requires the submission of an Alternatives Evaluation Study ("AES"), which identifies the electrical need and evaluates different alternatives for meeting that need. The AES for the Project was submitted to RUS in July 2016. While the purpose and need for this Project is described in depth in Chapter 2 of that AES, a brief summary is provided below.

The Utilities are transmission-owning members of MISO. In 2011, as part of the 2011 MISO Transmission Expansion Plan ("MTEP"), MISO designated the Project an MVP as part of a portfolio of transmission projects developed to provide economic, reliability, and public policy benefits across what was then the entire MISO footprint -- all or portions of 13 states and one Canadian province.[3] MISO developed a portfolio of 17 MVPs ("Portfolio" or "MVP Portfolio") through a comprehensive and broad stakeholder analysis and confirmed the Portfolio's benefits in the 2014 MTEP Triennial MVP Review (MISO, 2014).

This MVP Project, among other things, is intended to enhance the reliability of the regional bulk transmission system and to cost-effectively enable the delivery of renewable energy necessary to satisfy state renewable portfolio standards or goals ("RPSs"). The Project is also designed to relieve congestion on the transmission system to reduce the overall cost of delivering energy. In addition, the Project would respond to public policy objectives aimed at enhancing the nation's transmission system and reducing carbon-dioxide emissions.

1.6 Outreach Process

Beginning in 2012, the Utilities began a comprehensive outreach program to inform and solicit input from numerous parties, including federal, state, and local agencies, tribal nations, public officials, landowners, utilities, and the general public. At different times, information was provided to and feedback sought from these groups. After refining their proposal, the Utilities presented their proposed revisions and solicited further feedback. Based on this iterative and consultative process, the Utilities were able to complete the following steps:

- Develop an Initial Study Area (Figure 5-1)
- Develop a Mississippi River crossing study area ("ACA Study Area") (Figure 3-1)
- Develop the Project Study Area (Figure 1-2)

[3] The MISO footprint is currently comprised of all or portions of 15 states and one Canadian province (MISO, 2014).

- Develop Potential Macro Corridors (Figure 6-1)
- Finalize Macro-Corridors (Figure 3-3)
- Finalize Alternative Corridors (Figure 7-1)

This extensive outreach program is described in-depth in Section 5.3.

1.7 Required Permits and Approvals

The Utilities will be required to obtain approvals from multiple federal and state agencies prior to constructing the Project. For the Mississippi River crossing, the Project must obtain approvals from multiple federal agencies that must complete environmental reviews under NEPA. The Project must also obtain authorizations from the states of Iowa and Wisconsin. Tables 1-2, 1-3, and 1-4 identify the primary permits and other approvals that may be required by federal agencies, the state of Wisconsin and the state of Iowa, respectively. This preliminary listing of regulatory requirements is subject to change as the Project proceeds.

Table 1-2: Federal Approvals and Other Compliance Requirements

Agency	Permits or Other Compliance
U.S. Department of Agriculture, Rural Utilities Service	NEPA compliance as lead agency, including National Historic Preservation Act – Section 106, tribal consultation.
U.S. Fish and Wildlife Service	Use authorization if right-of-way required on National Wildlife Refuge or Wetland Management District lands and Special Use Permit if crossing National Wildlife Refuge; May need Incidental Take or Non-Purposeful Take Permit under Section 7 of Endangered Species Act of 1973 if impacts to endangered/threatened species cannot be avoided; If constructing near an active eagle nest, Non-Purposeful Take Permit under the Bald and Golden Eagle Protection Act.
U.S. Army Corps of Engineers ("USACOE")	Section 10 Permit of the Rivers and Harbors Act of 1899. Nationwide permit or individual permit under Section 401 and Section 404 of the Clean Water Act of 1977 ("CWA"); If USACOE land is crossed, an easement will be required and if a civil works project is impacted, a permit under Section 14 of the Rivers and Harbors Act of 1899, codified in 33 U.S.C. § 408 (commonly referred to as "Section 408") may also be required.
U.S. Coast Guard	Authorization for Structures or Work in or Affecting Navigable Waters of the United States.
Federal Aviation Administration	Form 7460-1 Objects Affecting Navigable Airspace.
Federal Highway Administration	Permit required to cross federal highways and interstate highways (usually coordinated through state department of transportation).
U.S. Environmental Protection Agency	A spill prevention, control, and countermeasure ("SPCC") plan for the intermediate substation.
National Park Service ("NPS")	Land and Water Conservation Fund ("LWCF") approval may be required if LWCF-funded lands are crossed.
Natural Resources Conservation Service ("NRCS")	Easement on property encumbered by NRCS obtained/managed conservation easement.

Table 1-3: State of Wisconsin Approvals and Other Compliance Requirements

Agency	Permit, Regulatory Compliance, or other Coordination
Public Service Commission of Wisconsin ("PSCW")	Certificate of Public Convenience and Necessity ("CPCN").
Wisconsin Department of Natural Resources ("WDNR")	Endangered Resource Review, which may result in Incidental Take Authorization if impacts to endangered/threatened species cannot be avoided; Construction Site Erosion Control and Stormwater Discharge Permit; General Utility Crossings Permit; CWA Section 401 Water Quality Certification (if CWA Section 404 permit is required by USACE); 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.
Wisconsin Department of Transportation ("WisDOT")	Application to Construct and Operate and Maintain Utility Facilities on Highways Rights-of-Way (Form DT1553); Access Driveway Permit (may be required); Drainage Permit (may be required); Road Crossing Authorization; Oversize Loads or Excessive Weights on Highways.
Wisconsin State Historical Society/Office of Preservation Planning ("WSHS")	National Historic Preservation Act, Section 106 consultation.
Wisconsin Department of Agriculture, Trade and Consumer Protection ("DATCP")	Agricultural Impact Statement.

Table 1-4: State of Iowa Approvals and Other Compliance Requirements

Agency	Permit, Regulatory Compliance, or other Coordination
Iowa Utility Board ("IUB") and Iowa municipality, if crossed	Electric Transmission Line Franchise.
Iowa Department of Natural Resources ("Iowa DNR")	CWA § 401 Water Quality Certification (if CWA Section 404 permit is required by the U.S. Army Corps of Engineers); National Pollutant Discharge Elimination System ("NPDES") Permit; Flood Plain Development Permit; Sovereign Land Construction Permit.
Department of Transportation	Utility Accommodation Permit; Work within Right-of-Way Permit.
Iowa Historical Society/Office of Preservation Planning	National Historic Preservation Act, Section 106 consultation (if CWA Section 404 permit is required by the USACOE)

2.0 TECHNICAL ALTERNATIVES UNDER EVALUATION

In this Section 2, the Utilities provide a summary of the technical alternatives that were evaluated in the AES. Each alternative was evaluated for its ability to fulfill the purpose and need for the Project. (See subsection 1.5 above for a brief description of the Project's purpose and need.) For efficiency purposes, information contained in the AES is presented only in summary form in this MCS. For a thorough discussion of these technical alternatives, please see the AES.

2.1 Transmission Alternatives – Both High and Low Voltage

This Project is one of 17 MVPs that MISO developed between 2008 and 2011 (AES, § 2.1). At the request of several Midwestern governors, MISO evaluated the most cost effective way that all of the MISO states could comply with their respective RPSs.

To accomplish this, MISO ran multiple scenarios. In one scenario, MISO assumed each state built enough in-state renewables to comply with its respective RPSs and then built the attendant transmission, *i.e.* MISO assumed a large amount of renewable generation within each state. In another scenario, MISO assumed that states would purchase the most economical renewables regardless of location and would build the required transmission. Through this iterative process, MISO tested whether local renewables alone were more or less expensive than a mix of local renewables with renewables from the wind-rich upper Great Plains (AES, § 3.1.1). During this time, MISO produced three high-voltage solutions: a portfolio of 345 kV lines, a portfolio of 765 kV lines, and a portfolio of high-voltage direct current lines. MISO and stakeholders agreed that a portfolio of 345 kV lines should be considered for further analysis (AES, § 3.3.2).

While MISO's initial study focused on the ability to transmit renewables, it expanded its analysis during the MVP process to evaluate which lines, when considered with a whole portfolio, would provide reliability benefits to and reduce congestion on the regional grid. MISO conducted these analyses assuming four separate future scenarios ("Futures"):

- Business as Usual with Mid-Low Demand and Energy Growth Rates;
- Business as Usual with Historic Demand and Energy Growth Rates;
- Carbon Constraint; and
- Combined Energy Policy (MISO, 2011, Executive Summary, p. 7).

Each Future had differing assumptions for each variable such as how quickly demand for electricity would grow and the price of natural gas (AES, § 3.3.3).

In 2011, MISO and stakeholders selected (by near consensus) a 345 kV portfolio. Stakeholders agreed these 17 MVPs were "no regrets" projects, namely, they provided a robust solution to a number of challenges (AES, § 3.3.3). MISO recently reconfirmed this robustness in its Triennial Review of the 345 kV Portfolio (MISO, 2014, p. 9). This entire process took hundreds of hours of high-powered computer time and months of working with stakeholders. Indeed, MISO spent approximately 35,000 hours of staff time and convened more than 200 stakeholder meetings (Rauch, Direct Testimony, p. 19r:18-22).

The Utilities have also considered whether any other high-voltage alternative could meet the purpose and need of this Project (AES, § 3.3.4). Any high-voltage alternative to this Project must stand in the shoes of this Project independently and in the context of the overall Portfolio. MISO approved a line connecting the Hickory Creek 345 kV substation on the Salem – Hazelton 345 kV transmission line in Iowa to the Cardinal Substation in Wisconsin because of the dominant west-to-east flows of renewable energy across the footprint. Given there are limited connection points to the regional grid in northeast Iowa and southwestern and south-central Wisconsin and since the proposed Project takes a route that is relatively direct between the available connection points, any other high-voltage alternative connecting northeast Iowa to south-central Wisconsin would necessarily be longer and would still have to traverse the Mississippi River. Because it would be longer, that alternative would be more expensive than this Project (AES, § 3.3.4).

Alternatives considered in the MVP process had to meet MISO's purpose and need: reliability reinforcement, congestion relief, increasing transfer capability for RPS compliance and meeting public policy needs. RPS compliance was not only a requirement, it was a primary purpose for starting the MVP process. Accordingly, MISO only studied an alternative if it allowed the MISO states to meet their RPSs. A portfolio of low-voltage alternatives could not meet this fundamental requirement. Therefore, MISO did not study an entire portfolio of low-voltage alternatives during the MVP process (AES, § 3.3.5).

While MISO did not consider an entire portfolio of low-voltage alternatives, it did consider whether portions of the MVP Portfolio could be low-voltage. In relation to this Project, MISO considered whether rebuilding the overloaded 138 kV lines between northeastern Iowa and southwestern Wisconsin would be better than a 345 kV line (MISO, 2012, p. 29). MISO rejected this lower-voltage alternative because the estimated cost was greater than the Project and it would not provide the same level of benefits (AES, § 3.3.5).

In sum, there are no reasonable transmission alternatives to this Project; neither high nor low voltage alternatives meet the Project's purpose and need of the Project.

2.2 Non-Transmission Alternatives

One of the main objectives of this Project is to support the transfer of renewable energy from Iowa to Wisconsin through increasing the transfer capability between the two states. Put simply: only transmission can provide a permanent increase in transfer capability between Iowa and Wisconsin. Because non-transmission alternatives ("NTAs") cannot meet the objectives specified by MISO, MISO did not evaluate NTAs during the MVP process. Nevertheless, pursuant to the RUS Guidance, NTAs must be considered. Accordingly, the AES evaluated generation, storage, energy efficiency and demand response as NTAs.

As to generation as an NTA, MISO found that a mix of regional and local renewable generation was the most cost-effective because the Project was required to convey regional renewables into load centers. An alternative with mainly local renewable generation was rejected by MISO as not cost effective (AES, § 3.4.1.1.1).

Similarly, storage would not be a cost effective alternative. The only available storage in Wisconsin would be batteries. Battery storage is not a cost-effective alternative at this time due to the large amount of storage capacity that would be required to match the beneficial impacts of the Cardinal-Hickory Creek Project (AES, § 3.4.1.2).

MISO considered energy efficiency in all four of its Futures and found that energy efficiency could not eliminate the need for the Project. To replace this Project with energy efficiency, energy efficiency efforts would have to eliminate demand to a level that all the RPSs would be met with existing renewable resources and the reliability and congestion benefits would be achieved through a dramatic reduction in flows on the regional grid. Such an increase in energy efficiency is simply not possible (AES, § 3.4.1.3).

Lastly, demand response (load reduction and load shifting) would neither provide the reliability benefits of this Project nor would it increase the transfer capability between Iowa and Wisconsin (AES, § 3.4.1.4). In sum, NTAs are not feasible alternatives to this Project.

2.3 No-Action Alternative

Under a no-action alternative, the Utilities would construct neither the Project nor any alternative to the Project. The no-action alternative would not fulfill the purpose and need to enhance regional reliability, increase economic benefits through alleviating transmission congestion, increase transfer capability between Iowa and Wisconsin to ensure compliance with existing RPSs and increase flexibility to address other public policies (AES, § 3.5). The purpose and need of the Project cannot be met by a no-action alternative.

3.0 THE UTILITIES' MCS METHODOLOGY

3.1 Overview of MCS Requirements

According to the RUS Guidance,

> …the MCS identifies where on the ground the linear infrastructure could be constructed. Specifically, it identifies the study area encompassing the end points of a proposed line and develops large corridor options for locating the facilities. It provides information on environmental, social, and cultural factors for the macro-corridor options within the study area (RUS, 2016, Exhibit D, § 1.2).

The RUS Guidance provides specific steps to develop macro-corridors.

> The macro-corridor selection process should be accomplished in phases to systematically narrow the number of alternatives. In the first analysis, resource data are analyzed to identify suitable areas (opportunities) for siting and unsuitable areas (constraints) to be excluded or avoided. In further phases of the siting process, tighter environmental and engineering constraints can be applied to further narrow potential transmission corridors and corridor options as appropriate (RUS, 2016, Exhibit D, § 3.2).

3.2 The Utilities' Application of the MCS Requirements

The following methodology allowed the Utilities to systematically investigate and narrow the size and number of corridor alternatives for the Project.

3.2.1 Identification and Evaluation of Mississippi River Crossing Locations

Connecting the Hickory Creek Substation with the intermediate substation requires a crossing of the Mississippi River at a location included within the USFWS-managed Refuge, the longest linear refuge in the United States. The Refuge extends north to south through Minnesota, Wisconsin, Iowa, and Illinois for approximately 260 river miles and has 240,000 acres of Mississippi River floodplain (USFWS, 2006, pp. 1-2). The Utilities have been meeting with the USFWS since April 2012 to discuss a potential crossing of the Refuge as part of the Mississippi River crossing required for the Project.

At the same time that the Utilities were conducting initial meetings with USFWS, ITC Midwest was conducting a preliminary routing analysis for the Iowa portion of the Project between the Hickory Creek Substation and the Turkey River Substation. For purposes of this preliminary routing analysis, ITC Midwest defined an initial study area between the Hickory Creek Substation in Dubuque County north to the Turkey River Substation in Clayton County. One of the primary objectives of this preliminary routing analysis was to determine whether or not a prospective route for the Project could be located and potentially-constructed within this initial study area. ITC Midwest viewed the existing Millville to Stoneman 69 kV transmission line and Turkey River to Stoneman 161 kV line crossing (co-located) just

east of the existing Turkey River Substation as a potential crossing for the Project. Although discussions with the USFWS were ongoing at the time, ITC Midwest needed to determine if a prospective constructible route could be located within this initial study area, should this general crossing location be identified as feasible for the Project. As part of this routing analysis, ITC Midwest sent letters to federal, state, and local agencies in July 2013 requesting assistance in identifying human, cultural, and natural resources located within the initial study area in Iowa. A copy of this letter and the responses received from these agencies is included in Appendix H.

The Utilities continued meeting with USFWS in 2013 and during that time the USFWS requested a thorough written analysis from the Utilities of all existing infrastructure crossings of the Mississippi River that could potentially meet the Project's need, and in particular, those that provided options for avoiding the Refuge. Based on this request, the Utilities completed an examination of potential Mississippi River and Refuge crossing locations. To comply with the USFWS's request, the Utilities first defined northern and southern boundaries for their Mississippi River crossing analysis using the following criteria, not listed in order of importance:

- Meet the Project's purpose and need;
- Provide multiple opportunities on the Iowa side which requires that route planning begin with routes near and parallel to roads, railroad rights-of-way, or division lines of land. Iowa Code § 478.18(2) and 199 Iowa Administrative Code [IAC] 11.1(7));
- Provide multiple opportunities on the Wisconsin and Illinois side to follow existing utility corridors, highways, railroad corridors, and recreational trails in accordance with the state's routing priorities. Wis. Stat. § 1.12(6); Ill. Stat. 220 ILCS 5/8-406.1;
- Allow adequate area for routing to avoid municipalities, where possible;
- Allow adequate area for routing to avoid conservation areas and sensitive habitats, where possible;
- Allow for multiple potential crossing locations of the Mississippi River with existing linear infrastructure present; and
- Provide opportunities to limit impacts to densely populated areas.

Utilities' delineation of the river crossing study area was presented in the Alternative Crossings Analysis ("ACA") report submitted to USFWS in April 2016 (ACA, § 3.1). Based on the above criteria and with input from USFWS, the Utilities defined the northern boundary along the river as Guttenberg and the southern boundary as Dubuque. The Utilities then delineated a river-crossing study area referred to as the "ACA Study Area" (ACA, § 3.2).

Within the ACA Study Area, the Utilities identified seven alternative crossing locations for evaluation, all at existing infrastructure crossings of the Mississippi River. Locating the Project near existing infrastructure would reduce the need for new corridors and reduce new environmental and human impacts. These seven crossing locations listed from north to south are:

- Lock and Dam No. 10 in Guttenberg, Iowa ("L&D 10");
- Turkey River Substation to the Nelson Dewey Power Plant crossing in Cassville, Wisconsin ("Nelson Dewey");
- Millville to Stoneman 69 kV transmission line and Turkey River to Stoneman 161 kV line crossing (co-located) in Cassville, Wisconsin ("Stoneman");
- Lock and Dam No. 11 in Dubuque, Iowa ("L&D 11");
- Highway 61/151 crossing in Dubuque, Iowa ("Highway 151 Bridge");
- Dubuque to Galena 161 kV line crossing in Dubuque, Iowa ("Galena 161 kV Line"); and
- Julien Dubuque Bridge/Highway 20 crossing in Dubuque, Iowa ("Julien Dubuque Bridge").

A map of the seven river crossing locations is set forth below as Figure 3-1.

Four of these crossings were located outside of the Refuge boundaries (Lock and Dam No. 11, Highway 151 Bridge, Galena 161 kV Line, Julien Dubuque Bridge) and three were located within the Refuge (Lock and Dam No. 10, Stoneman, and Nelson Dewey). At USFWS staff's request, the Utilities assessed the engineering constraints and potential environmental and social impacts of conceptual routes to the four non-Refuge crossing locations and of conceptual routes to the three Refuge crossings (ACA, Chapter 5).

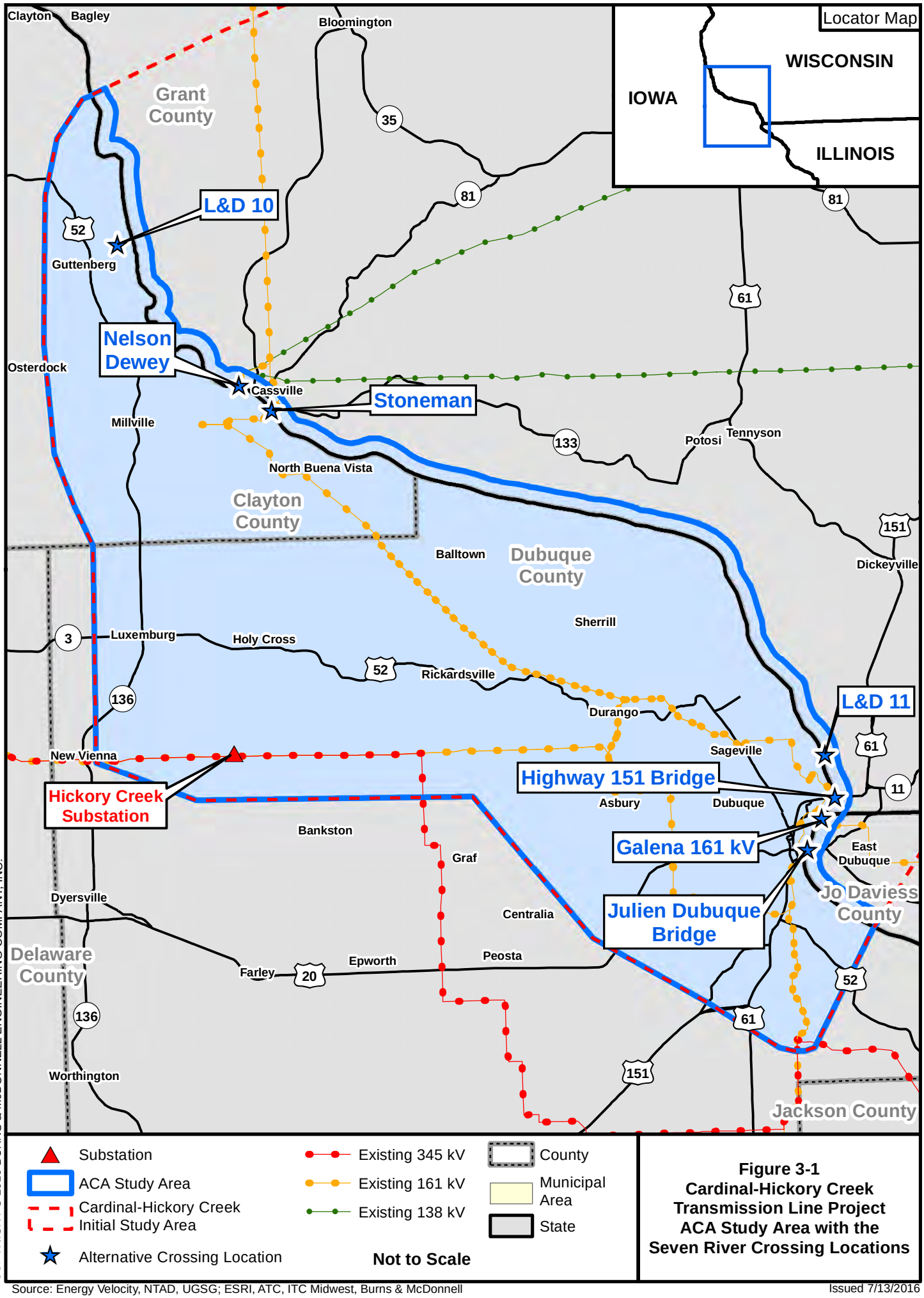


Figure 3-1
Cardinal-Hickory Creek Transmission Line Project
ACA Study Area with the Seven River Crossing Locations

Source: Energy Velocity, NTAD, UGSG; ESRI, ATC, ITC Midwest, Burns & McDonnell

Issued 7/13/2016

Consistent with the USFWS Mitigation Policy, the Utilities examined whether there were feasible alternatives to avoid impacts to the Refuge. The Utilities provided information to and sought analyses from federal, state, and local entities with permitting authority over the relevant crossing locations (ACA, Chapter 7). Some entities informed the Utilities that the non-Refuge alternatives conflicted with technical engineering requirements of existing infrastructure and others indicated that they would not issue the necessary permits because of conflicts with the requirements of local ordinances (ACA, § 5.6.1.2.1, 5.6.1.2.4, 5.6.2.2.1, 5.6.2.2.3, 5.6.3.2.1, 5.6.3.2.2, 5.6.4.2.2). Based on the thorough analysis contained in the ACA, the Utilities determined that all of the crossing locations outside of the Refuge are not feasible for the Project (ACA, § 5.6.5).

As to the crossing alternatives located within the Refuge, the Utilities concluded that one of the crossings within the Refuge, Lock and Dam No. 10, would have extensive impacts to the human and natural environments, including impacts to the City of Guttenberg (ACA, § 5.7.1). The USACOE also evaluated this crossing and informed the Utilities that it could not approve a crossing on or by the dam due to conflicts with dam operations and safety concerns (ACA, § 5.7.1.2.1). The Utilities eliminated Lock and Dam 10 from further consideration because it was deemed not feasible due to these considerations.

The only crossing locations that were found worthy of additional analysis are located within the Refuge, both near Cassville, Wisconsin: (1) Nelson Dewey and (2) Stoneman (ACA, §§ 5.7.2-5.7.3). Use of either of these crossing locations for the Project would require approval from the USFWS, the USACOE, state authorities, and, depending on the specific locations, local Iowa authorities.

The Utilities are proposing the use of structures within the Refuge that would minimize the potential future impact on resources and habitats within Refuge lands (ACA, § 8.2.1 to 8.2.3). The Utilities are presenting a 345 kV/345 kV design, but would operate the lines at 345 kV/161 kV until system conditions warranted operating the facility at 345 kV/345 kV. While the current needs are for a 345 kV line and a 161 kV line, the increase in voltage capability of the second circuit is a prudent and cost-effective investment to accommodate additional transmission facilities in a manner that would avoid future impacts to the Refuge if another 345 kV transmission line between Iowa and Wisconsin is needed in the future. See Appendix A for a description of the structures that would be used within the Refuge and that would cross the Mississippi River. The low-profile design of the 345 kV/ 345 kV structure proposed by the Utilities is designed to minimize avian impacts by matching the length of the insulators on both circuits and by reducing the number of planes of wires for birds to avoid. The USFWS has not yet provided the Utilities with a determination regarding whether the proposed transmission line can be constructed within the Refuge.

3.2.2 Development of the Project Study Area Based on Feasible River Crossing Locations, the Two End Points, and an Intermediate Substation.

The goal when developing the Project Study Area is to outline a small enough area to encompass only reasonable alternatives (i.e., based on engineering and cost considerations that meet the purpose and need), but large enough to include an adequate number of alternative corridors (RUS, 2016, § 3.1). After eliminating the five infeasible Mississippi River locations from further consideration, the Utilities developed a study area based on the Stoneman and Nelson Dewey crossings. The Project Study Area encompasses these two river crossings and the two end-point substations that were approved by MISO. (See Figure 1-2 for the Project Study Area.)

The northern boundary of the Project Study Area was established in part due to the location of the Wisconsin River. During the development of the Project Study Area, the Utilities determined that including areas north of the Wisconsin River would add a second and third major river crossing to the Project and would encounter additional civic and environmental sensitivities, like the community of Spring Green and the Lower Wisconsin Riverway. For these reasons, the Project Study Area boundary does not include the Wisconsin River, or lands north of it. The Utilities defined the Project Study Area as shown in Figure 1-2 with sufficient size to allow for evaluation of areas with differing environmental, engineering and regulatory constraints (RUS, 2016, § 3.1).

The MISO-approved design for the Project included an intermediate substation in the vicinity of Montfort, Wisconsin. The potential siting area for this intermediate substation location was developed by evaluating a number of siting criteria including suitable topography, the locations of existing transmission lines that provide routing opportunities for the new line, the locations of the existing lower voltage lines that would need to interconnect with this substation, and the avoidance of siting constraints that occur in the area. The resulting siting area for this intermediate substation is shown below in Figure 3-2 ("Montfort Substation Siting Area").

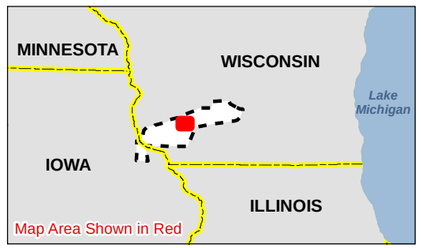
CARDINAL-HICKORY CREEK TRANSMISSION LINE PROJECT

FIGURE 3-2
MONTFORT SUBSTATION SITING AREA

Macro-Corridors

- Project Study Area
- Outside Project Study Area
- Substation Siting Area

- Substation
- Wind Turbine
- 69 kV Transmission Line
- 138 kV Transmission Line
- US Highway
- County Highway
- Road
- State Boundary
- City / Village
- County Boundary
- Open Water



0 1,000 2,000 3,000 4,000
Feet

AMERICAN TRANSMISSION COMPANY®

ITC

DAIRYLAND POWER COOPERATIVE
A Touchstone Energy® Cooperative

F:\Projects\C-HC\Mxds\MCS\Figure 3-2 Montfort Substation Siting Area.mxd

Data Sources: ATC, USGS, WDNR, WDOT 7/15/16

3.2.3 Collect Data and Receive Feedback about the Project Study Area

The Utilities continue to collect data and information about the Project Study Area to help identify and analyze areas of routing opportunities and constraints (RUS, 2016, Exhibit D, § 3.2). The Utilities collected data regarding the land use, natural resources, and human environment. The Utilities collected this data from a variety of federal, state, local agencies, units of government, independent experts, landowners, NGO's, utilities, other interested parties, and the general public. The data collected included such information as historical and cultural resources, recreation areas, airports, existing utility and transportation corridors, geology, soil types, wetlands, water resources, flood hazard areas, environmentally sensitive areas, wildlife resources, existing land uses, land cover, and socioeconomic data such as, population characteristics, employment statistics, and racial/ethnic demographics, all of which are discussed in Section 4. Appendices B and C, respectively, provide tables listing the databases utilized and field reconnaissance that has been conducted to date. Appendix D summarizes the public outreach that has been completed. The data was compiled in a GIS database and/or a stakeholder-relationship management software and used to support development and refinement of the macro-corridors.

3.2.4 Define Macro-Corridors

Once the Project Study Area was defined, the Utilities began to investigate potential macro-corridors. The RUS Guidance defines "macro-corridor" as follows:

> …broad linear area of land within which the alternative corridors can be located for further study and comparison. This area encompasses the end points of a proposed transmission corridor and is located within the larger study area. The macro-corridor may consist of one contiguous broad area within which many alternative corridors could be located or more than one broad linear area each providing an alternative corridor possibility (*i.e.*, each macro-corridor could become a corridor alternative but much wider) (RUS, 2016, § 3.1).

The Utilities focused on several overarching objectives to identify potential macro-corridors, including the following:

- Compliance with Wisconsin and Iowa laws regarding the routing of transmission lines. In Wisconsin, this includes maximizing opportunities to use existing utility and transportation rights-of-way. In Iowa, this requires that the planning for a route begins with routes that are near or parallel to roads, railroad rights-of-way, or division lines of land;
- Compliance with North American Electric Reliability Corporation ("NERC") electrical system planning standards;
- Compliance with the RUS Guidance; and

- Minimization of environmental, cultural, engineering, economic, socioeconomic, and land use impacts.

Field reconnaissance was conducted to verify information for the Project Study Area and to refine the potential macro-corridors. (See Appendix C listing the field reconnaissance activities.) More detailed analysis of constraints and the mitigation potential of possible adverse impacts also helped reduce the number of reasonable corridors. This required the collection of more detailed (location-specific) data. After developing the macro-corridors, the Utilities sent a letter to tribal nations requesting input. See Appendix E regarding Tribal outreach.[4] The Utilities also held open houses in May 2016 to seek feedback to further refine these corridors (Figure 3-3). Appendix F provides a report on the 2016 open houses and a summary of the public comments received.

3.2.5 Refine Macro-Corridors into Alternative Corridors

Input from federal, state, and local agencies, utilities, landowners, and other interested parties was key to enabling the Utilities to winnow the macro-corridors to alternative corridors. The RUS defines "alternative corridors" as follows:

> …linear areas within a macro-corridor that are deemed most suitable for placement of the proposal when the natural environment, built (man-made) environment, and engineering requirements are considered. The width of the corridor must be large enough to allow latitude in specifically locating the transmission line but not so broad as to be meaningless (RUS, 2016, § 3.1).

Based on additional feedback, the Utilities selected two alternative corridors in Wisconsin and a refined alternative corridor in Iowa; these alternative corridors are described in Section 7.

3.2.6 Based on State Law Requirements, Select Two Alternative Routes in Wisconsin and One Alternative Route in Iowa

Based on state law requirements, the Utilities will ultimately be submitting two alternative routes in Wisconsin to the PSCW for consideration and one route in Iowa to the IUB. The RUS Guidance defines "route" as "a constructible right-of-way (ROW) within an alternative corridor" (RUS, 2016, § 3.1). The Utilities anticipate submitting their applications to the PSCW and IUB, in 2018 and 2019 respectively.

[4] As of the filing of this MCS, the Utilities have not received any input from tribal nations.

ALLAMAKEE COUNTY
RICHLAND COUNTY
SAUK COUNTY
CRAWFORD COUNTY
WISCONSIN
DANE COUNTY
IOWA COUNTY
GRANT COUNTY
CLAYTON COUNTY
LAFAYETTE COUNTY
DUBUQUE COUNTY
IOWA
ILLINOIS
Harpers Ferry
McGregor
Clayton
Guttenberg
Osterdock
Millville
North Buena Vista
Balltown
Luxemburg
Holy Cross
Rickardsville
Sherrill
Durango
Sageville
Asbury
Dubuque
Graf
Centralia
Dyersville
Darlington
Blue Mound State Park
Gov. Dodge State Park
Wisconsin River
Mississippi River
CARDINAL SUBSTATION
PROPOSED SUBSTATION SITING AREA
HICKORY CREEK SUBSTATION

CARDINAL-HICKORY CREEK TRANSMISSION LINE PROJECT

FIGURE 3-3
MACRO-CORRIDORS

MINNESOTA
WISCONSIN
IOWA
ILLINOIS
Lake Michigan
Map Area Shown in Red

Macro-Corridors
Project Study Area
Outside Project Study Area
Substation Siting Area
Environmentally Sensitive Lands*
* Includes Federal Wildlife Refuges, State Fishery Areas, Managed Forests, Natural Areas, Parks, Waterfowl/Wetland Management Areas, Wildlife Refuges, County Parks, and Municipal Parks.
Substation
Interstate, US or State Highway
State Boundary
City / Village
County Boundary
Open Water

0 1 2 3 4 5
Miles

AMERICAN TRANSMISSION COMPANY®
ITC
DAIRYLAND POWER COOPERATIVE
A Touchstone Energy® Cooperative

F:\Projects\C-HC\Mxds\MCS\Figure 3-3 Macro-Corridors.mxd

Data Sources: ATC, DPC, IDOT, IDNR, ITC, USGS, WDNR, WDOT. 9/08/16

3.2.7 Reasonable Alternative Corridors for the Scoping Process

Utilities have identified the alternative corridors described in Section 7 and determined they are reasonable for the development and evaluation of alternatives for this Project and should be presented as part of the Project scoping process. These alternative corridors should be included in the Notice of Intent so that they can be studied during the RUS scoping process. The Utilities recognize that, through its NEPA process, the RUS and cooperating agencies will be evaluating whether any additional alternative corridors should be evaluated in the federal EIS.

4.0 PROJECT STUDY AREA CHARACTERISTICS

Data were collected for Project Study Area resources likely to be affected by construction, maintenance, and operation of the Project. Summaries of the data for resources within the Project Study Area are presented below for each state (Wisconsin and Iowa).

4.1 Physiography and Geology

4.1.1 Physiography

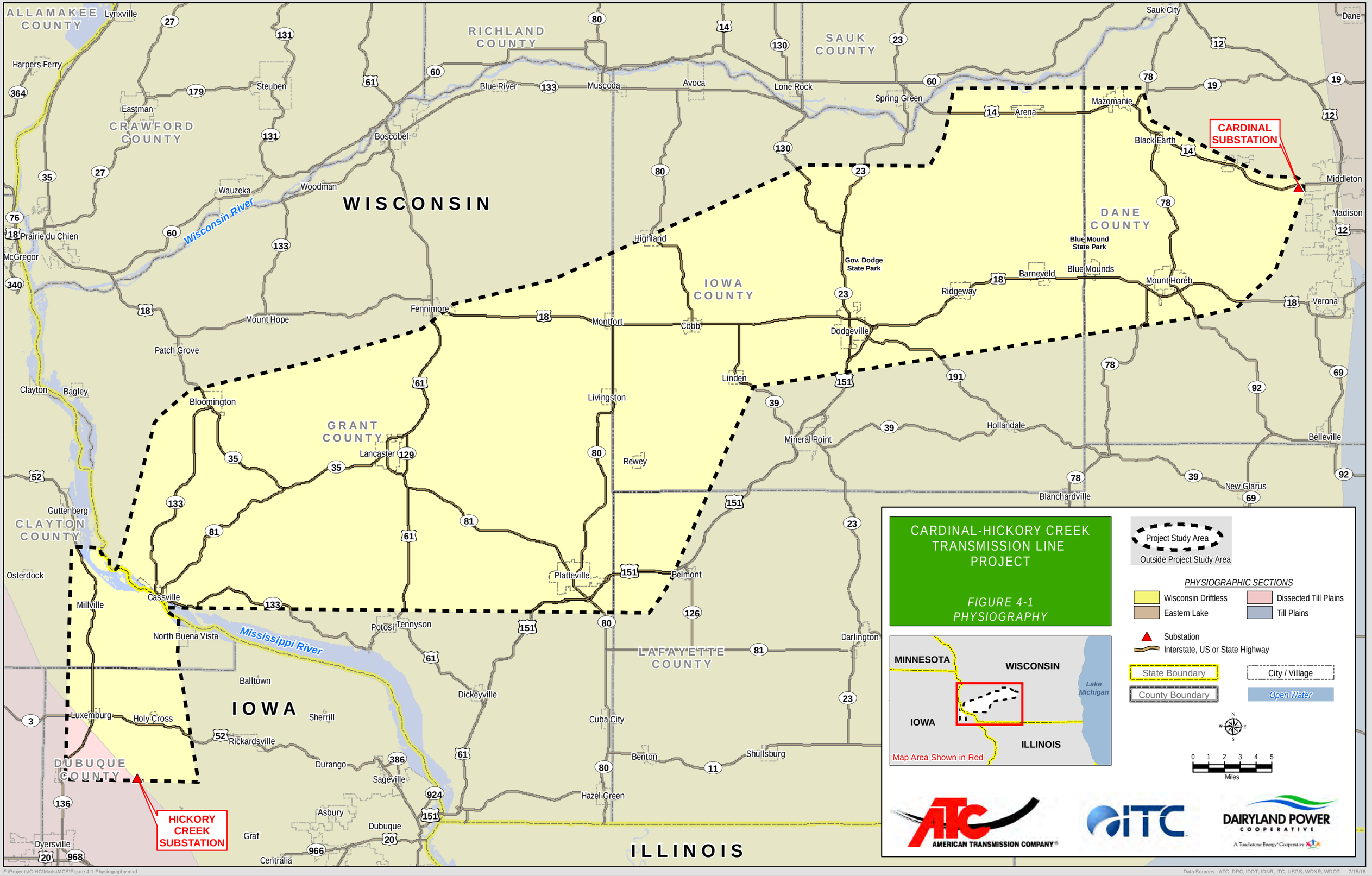
The Project Study Area is within the Central Lowland physiographic province. Physiographic regions are broad divisions of land based on terrain, rock type, and geologic formations and history. The Central Lowland physiographic province is a part of the Interior Plains division and is divided into several different sections in Iowa. The Project Study Area is located at the interface of the Dissected Till Plains section and the Wisconsin Driftless section. The Dissected Till Plains area was flattened by the most recent glaciation, resulting in the gently rolling hills and fertile soils. The Wisconsin Driftless section, however, contains areas of rough terrain that was unglaciated. These areas are dissected by tributaries of the Mississippi River, creating great relief in some areas along its banks (USGS, 2003; USGS and NPS, 2000).

The entire Wisconsin portion of the Project Study Area is within the Wisconsin Driftless section. The Iowa portion of the Project Study Area contains both the Dissected Till Plains section and the Wisconsin Driftless section. The Project Study Area physiography is depicted on Figure 4-1.

The Project Study Area includes several areas that contain known algific slopes. This landform, also known as a cold air slope, is very rare and is only found in the ‘Driftless Area’ of Iowa, Wisconsin, Illinois, and Minnesota. Algific slopes stay cool on hot summer days as a result of their geologic and topographical formation.

4.1.2 Geology

The geology of the Project Study Area is dominated by sedimentary formations impacted by previous glacial activity in the Till Plains and dissected by erosion in the Driftless Area. The primary sedimentary formations include dolostone (dolomite) with some shale and sandstone. The acreages of the geologic types found within the various counties in the Project Study Area are listed in Table 4-1. The distribution of geologic types within the Project Study Area is depicted in Figure 4-2.



F:\Projects\C-HC\Mxds\MCS\Figure 4-1 Physiography.mxd

Data Sources: ATC, DPC, IDOT, IDNR, ITC, USGS, WDNR, WDOT. 7/15/16

Table 4-1: Geologic Types by County – Wisconsin and Iowa

State/County	Rock Type	Acres
Wisconsin		
Dane	dolostone (dolomite)	53,498
Dane	sandstone	41,614
Dane	shale	1,118
Grant	dolostone (dolomite)	254,667
Grant	sandstone	78,630
Grant	shale	548
Iowa	dolostone (dolomite)	195,066
Iowa	sandstone	88,406
Iowa	shale	1,058
Lafayette	dolostone (dolomite)	16,316
Lafayette	sandstone	1,930
Lafayette	shale	3,463
Iowa		
Clayton	dolostone (dolomite)	19.914
Clayton	shale	6,184
Dubuque	dolostone (dolomite)	32,053
Dubuque	shale	3,416

ALLAMAKEE COUNTY
Lynxville
Harpers Ferry
CRAWFORD COUNTY
Eastman
Steuben
Boscobel
RICHLAND COUNTY
Blue River
Muscoda
Avoca
Lone Rock
SAUK COUNTY
Spring Green
Sauk City
Dane
Arena
Mazomanie
Black Earth
Middleton
Madison
DANE COUNTY
CARDINAL SUBSTATION
WISCONSIN
Wauzeka
Woodman
Wisconsin River
Prairie du Chien
McGregor
Highland
Gov. Dodge State Park
Blue Mound State Park
Barneveld
Blue Mounds
Mount Horeb
Ridgeway
IOWA COUNTY
Verona
Fennimore
Mount Hope
Montfort
Cobb
Dodgeville
Patch Grove
Clayton
Bagley
Bloomington
GRANT COUNTY
Lancaster
Livingston
Linden
Rewey
Mineral Point
Hollandale
Belleville
Blanchardville
New Glarus
Guttenberg
CLAYTON COUNTY
Osterdock
Millville
Cassville
Platteville
Belmont
Potosi
Tennyson
North Buena Vista
Mississippi River
Darlington
LAFAYETTE COUNTY
Balltown
Dickeyville
Luxemburg
Holy Cross
Sherrill
Cuba City
Rickardsville
Durango
Sageville
Benton
Shullsburg
DUBUQUE COUNTY
HICKORY CREEK SUBSTATION
Asbury
Dubuque
Hazel Green
Graf
Dyersville
Centralia
ILLINOIS

CARDINAL-HICKORY CREEK TRANSMISSION LINE PROJECT

FIGURE 4-2
GEOLOGY

Project Study Area
Outside Project Study Area

GEOLOGY
Dolostone (dolomite)
Shale
Sandstone

Substation
Interstate, US or State Highway

State Boundary
City / Village
County Boundary
Open Water

MINNESOTA
WISCONSIN
Lake Michigan
IOWA
ILLINOIS
Map Area Shown in Red

0 1 2 3 4 5
Miles

AMERICAN TRANSMISSION COMPANY®
ITC
DAIRYLAND POWER COOPERATIVE
A Touchstone Energy® Cooperative

F:\Projects\C-HC\Mxds\MCS\Figure 4-2 Geology.mxd

Data Sources: ATC, DPC, IDOT, IDNR, ITC, USGS, WDNR, WDOT. 7/15/16

4.2 Land Use and Land Cover

Land use and land cover data was obtained from United States Geologic Service ("USGS") National Land Cover Dataset ("NLCD") (USGS, 2011). Land cover data are derived from satellite imagery and describe general categories of land use. Figure 4-3 depicts land use and land cover classes within the Project Study Area. Table 4-2 provides definitions for land cover classes as defined by NLCD.

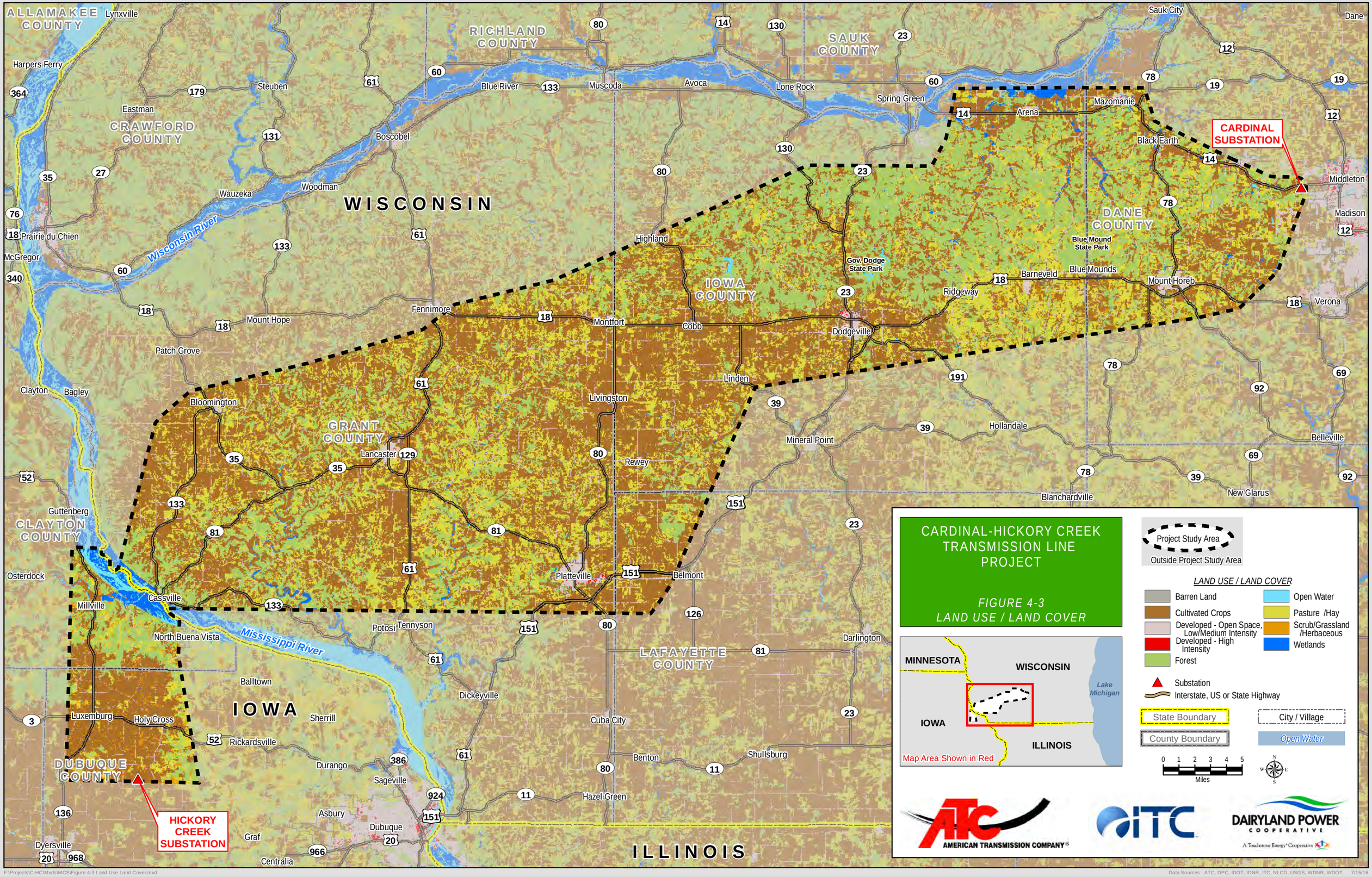
The Utilities assessed land-cover classes that would be generally compatible with transmission line construction and operation. Opportunity land-cover classes include property, field, or survey lines associated with cultivated crops and pasture/hay as well as barren, scrub, and grassland categories. Developed areas classified as developed-medium intensity, developed-low intensity, and developed-open space were also considered as more compatible with transmission line construction and operation than developed-high intensity areas.

The Utilities also assessed some land-cover classes as avoidance areas because they may present challenges to transmission line routing. When possible, areas identified by NLCD as open water, forest, wetlands and developed-high intensity, were assessed as avoidance areas, except where utility corridors already exist in Wisconsin. In areas where avoidance is not possible, appropriate agency consultation will be made and applicable mitigation measures taken.

4.2.1 Land Use and Land Cover - Wisconsin

In Wisconsin, a large portion of the Project Study Area is covered by cultivated crops and pasture/hay with forest interspersed throughout. Grassland/herbaceous cover type occurs, but to a lesser extent. Forest areas are often associated with water and wetlands. Forested areas are more prevalent near the Mississippi and Wisconsin Rivers with primarily agricultural land cover seen throughout the rest of the Project Study Area. Developed areas are primarily associated with the communities of Dodgeville, Platteville, Mount Horeb, and Lancaster, but are also scattered throughout the region in smaller communities. Wetlands are most prevalent in drainages and in-and-around the Mississippi and Wisconsin Rivers, but occur throughout the Project Study Area.

Land cover types within the Wisconsin portion of the Project Study Area include land classified as: open water; developed-open space; developed-low intensity; developed-medium intensity; developed-high intensity; barren land; emergent and woody wetlands; deciduous, evergreen, and mixed forest; grassland/herbaceous; pasture/hay; cultivated crops; and shrub/scrub land.



CARDINAL-HICKORY CREEK TRANSMISSION LINE PROJECT

FIGURE 4-3
LAND USE / LAND COVER

Project Study Area
Outside Project Study Area

LAND USE / LAND COVER

- Barren Land
- Cultivated Crops
- Developed - Open Space, Low/Medium Intensity
- Developed - High Intensity
- Forest
- Open Water
- Pasture /Hay
- Scrub/Grassland /Herbaceous
- Wetlands

- Substation
- Interstate, US or State Highway

State Boundary
County Boundary
City / Village
Open Water

0 1 2 3 4 5 Miles

AMERICAN TRANSMISSION COMPANY®
ITC
DAIRYLAND POWER COOPERATIVE
A Touchstone Energy® Cooperative

F:\Projects\C-HC\Mxds\MCS\Figure 4-3 Land Use Land Cover.mxd

Data Sources: ATC, DPC, IDOT, IDNR, ITC, NLCD, USGS, WDNR, WDOT. 7/15/16

Table 4-2: NLCD Definitions for Land Cover Classes

Class (Number)	NLCD Definition
Barren (31)	Barren areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, sand dunes, strip mines, gravel pits, and other accumulations of earthen material. Generally, vegetation accounts for less than 15% of total cover.
Shrub/Scrub (52)	Areas dominated by trees generally greater than 5 meters tall and greater than 20% of total vegetation cover. More than 75% of the tree species maintain their leaves all year. Canopy is never without green foliage.
Grassland/ Herbaceous (71)	Areas dominated by grammanoid or herbaceous vegetation, generally greater than 80% of total vegetation. These areas are not subject to intensive management such as tilling, but can be utilized for grazing.
Pasture/Hay (81)	Areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20% of total vegetation.
Cultivated Crops (82)	Areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and cotton, and also perennial woody crops such as orchards and vineyards. Crop vegetation accounts for greater than 20% of total vegetation. This class also includes all land being actively tilled.
Developed- Low Intensity (22)	Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20–49% of total cover. These areas most commonly include single family housing units.
Developed- Medium Intensity (23)	Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50–79% of the total cover. These areas most commonly include single-family housing units.
Developed- Open Space (21)	Includes areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20% of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.
Open Water (11)	All areas of open water, generally with less than 25% cover of vegetation or soil.
Deciduous Forest (41)	Areas dominated by trees generally greater than 5 meters tall and greater than 20% of total vegetation cover. More than 75% of the tree species shed foliage simultaneously in response to seasonal change.
Evergreen Forest (42)	Areas dominated by trees generally greater than 5 meters tall and greater than 20% of total vegetation cover. More than 75% of the tree species maintain their leaves all year. Canopy is never without green foliage.
Mixed Forest (43)	Areas dominated by trees generally greater than 5 meters tall and greater than 20% of total vegetation cover. Neither deciduous nor evergreen species are greater than 75% of total tree cover.
Woody Wetlands (90)	Areas where forest or shrubland vegetation accounts for greater than 20% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.
Emergent Herbaceous Wetlands (95)	Areas where perennial herbaceous vegetation accounts for greater than 80% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.
Developed- High Intensity (24)	Includes highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses, and commercial/industrial. Impervious surfaces account for 80–100% of the total cover.

4.2.2 Land Use and Land Cover - Iowa

Generally, the land cover types within the Iowa portion of the Project Study Area are similar to those in Wisconsin, with the exception that mixed forest is not present in Iowa. The area is covered predominantly by cultivated crops and pasture/hay with forest interspersed throughout. The areas around the Mississippi River are heavily wooded in Iowa with large areas of deciduous forest. Developed areas are primarily associated with the communities of Millville, Luxemburg, and Holy Cross.

4.3 Sensitive Areas

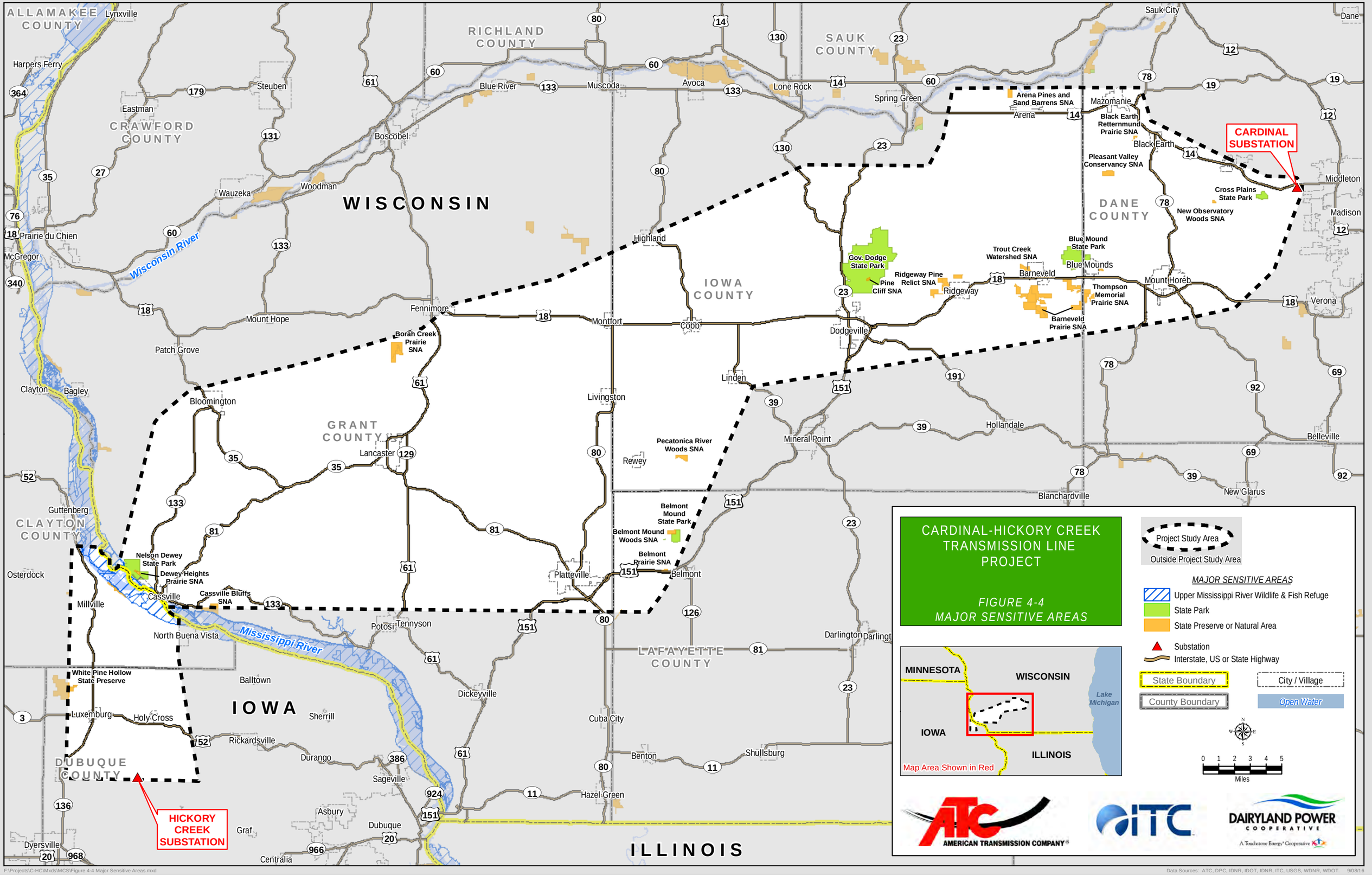
When routing a transmission line, the goal is to minimize potential effects to sensitive areas as much as feasible. The following sections summarize some of the major sensitive areas, which are protected environmental areas with significant permitting challenges and/or encompassing a large geographic expanse, within the Project Study Area. These major sensitive areas are depicted below on Figure 4-4.

4.3.1 Sensitive Areas – Wisconsin

4.3.1.1 Ice Age Trail and the Ice Age Complex at Cross Plains

The Ice Age Trail is a National Scenic Trail located entirely within Wisconsin. The Ice Age Trail crosses the eastern edge of the Project Study Area, west of the Cardinal Substation in Dane County. The trail is also one of 42 designated Wisconsin state trails and the only one specifically designated as a "State Scenic Trail." From Interstate State Park on the Minnesota border to Potawatomi State Park on Lake Michigan, the Ice Age Trail winds for more than 1,000 miles, following the edge of the last continental glacier in Wisconsin.

The Ice Age Trail goes through several state and federal lands in Wisconsin, including traveling many miles through county and private lands. In addition to the state parks and forests listed below (from west to east along the trail), the Ice Age Trail travels through many state wildlife and fishery areas and some state natural areas (WDNR-b, 2015).



F:\Projects\C-HC\Mxds\MCS\Figure 4-4 Major Sensitive Areas.mxd

Data Sources: ATC, DPC, IDNR, IDOT, IDNR, ITC, USGS, WDNR, WDOT. 9/08/16

In 2001, Congress appropriated funds for the acquisition of specific lands in the Cross Plains unit of the Ice Age Reserve for an Ice Age National Scenic Trail Interpretive Site, called the Ice Age Complex. The Ice Age Complex at Cross Plains is a unit of the National Park Service ("NPS") located west of Madison, southeast of Cross Plains, and south of Highway 14. The Ice Age Complex at Cross Plains contains lands owned and managed by the NPS, the WDNR, Dane County Parks, the USFWS, and private citizens. The Ice Age Complex is what is referred to as an Affiliated Area by the NPS. The NPS developed a General Management Plan ("GMP") for the lands within the boundaries of the Complex.

4.3.1.2 State Natural Areas

State natural areas ("SNAs") protect outstanding examples of Wisconsin's native landscape of natural communities, significant geological formations, and archeological sites. They are valuable for research and educational use, for the preservation of genetic and biological diversity and for providing benchmarks for determining the impact of use on managed lands. They also provide some of the last refuges for rare plants and animals (WDNR, 2016). Several SNAs are located within the Project Study Area, including the Arena Pines and Sand Barrens SNA, Barneveld Prairie SNA, Belmont Mound Woods SNA, Belmont Prairie SNA, Cassville Bluffs SNA, Dewey Heights Prairie SNA, Ipswich Prairie SNA, Military Ridge Prairie Fee SNA, Pine Cliff SNA, Pleasant Valley Conservancy SNA, Ridgeway Pine Relict SNA, and Thompson Memorial Prairie SNA.

4.3.1.2.1 Governor Dodge State Park

Located outside of Dodgeville in Iowa County, Governor Dodge State Park is one of the state's largest parks, with 5,350 acres of steep hills, bluffs, and deep valleys plus two lakes and a waterfall. Located in the Wisconsin's Driftless Area, it is home to numerous species of wildlife and over 150 species of birds. Additionally, the tremendous variations in topography, exposures to sunlight and soil types provide a diverse array of habitats that support hundreds of plant species. The forests are oak-hickory in type, with many dozens of other tree species and shrubs mixed in. The sandstone areas support white pine (*Pinus strobus*), red pine (*Pinus resinosa*), and Jack pine (*Pinus banksiana*), and the spring wildflowers of the forests include bloodroot (*Sanguinaria Canadensis*), hepatica (*Hepatica nobilis*) and Dutchman's breeches (*Dicentra cucullaria*). The soil slopes produce almost solid communities of ferns, including giant interrupted ferns (*Osmunda claytoniana L.*) (WDNR, 2014).

4.3.1.2.2 Blue Mound State Park

Located near the Village of Blue Mounds in Dane and Iowa Counties, Blue Mound State Park sits atop the largest hill in the southern half of Wisconsin and features observation towers affording views of the Wisconsin River Valley and Baraboo Range to the north, the buttes, mounds, and forests of the Driftless

Area to the south and west, and the glacial plains and City of Madison to the east. It is home to numerous species of wildlife, over 150 species of birds, and an abundance of flowering plant life (WDNR-a, 2015).

4.3.2 Sensitive Areas – Iowa

4.3.2.1 Merritt Forest State Preserve

Clayton County, Iowa contains the 20-acre Merritt Forest State Preserve, which is located on the northwest boundary of the Project Study Area. This old-growth forest contains several trees that are over 300 years old. Tree species primarily include white oak (*Quercus alba*) and red oak (*Quercus rubra*), sugar maple (*Acer saccharum*), and basswood (*Tilia Americana*), while blue beech (*Fagus grandifolia*), witch hazel (*Hamamelis Virgininca*), alternate-leaved dogwood (*Cornus alternifolia*), and leatherwood (*Dirca palustris*) make up the understory of the forest.

Several dozen bird species have been sighted on the preserve and nearly 200 different plant species have been identified in the forest (IDNR, no date-a).

4.3.2.2 Turkey River Mounds State Preserve

Turkey River Mounds State Preserve, a 62-acre area containing ancient Native American mounds, is also located within Clayton County. A total of 43 effigy mounds are located in the vicinity, with 38 mounds being located within the state preserve. These mounds were used as burial sites and ceremonial places between 500 BC and AD 900, and range in height from 1.3- to 6- feet tall. The conical mounds range from 20 to 100 feet in diameter, while linear mounds are anywhere from 80- to 175- feet long. The preserve is also home to a wide variety of plant communities that inhabit its ridge, cliffs, and slopes (IDNR, no date-a).

4.3.2.3 White Pine Hollow State Preserve

White Pine Hollow State Preserve is located in northwest Dubuque County, approximately two miles northwest of Luxemburg. This 712-acre preserve is located in the western portion of the Paleozoic Plateau landform region along the Silurian Escarpment. This area is deeply dissected, with steep rock bluffs and outcroppings dominating its landscape. With its highest point being 320 feet above its lowest elevation, this preserve has a wide variety of habitats that support hundreds of plant and animal species (IDNR, no date-a).

4.3.3 Upper Mississippi River National Wildlife and Fish Refuge

There are several important conservation properties within the Project Study Area. The most notable conservation area is the Refuge. Established in 1924, the Refuge is approximately 260 river-miles long,

stretching from the confluence of the Chippewa River in Wisconsin to Rock Island, Illinois. The Refuge has 240,000 acres of Mississippi floodplain throughout four states along the Mississippi River: Minnesota, Wisconsin, Iowa, and Illinois. It is an important habitat for migratory birds, fish, and other wildlife, as well as many species of plants (USFWS, 2013-a). Over 306 species of birds visit the Refuge for its habitat, and 119 species of fish and 42 species of mussels live in the waters of the Refuge. In addition to these species, 51 species of mammals have been spotted on the Refuge. The Refuge is designated as a Wetland of International Importance (Ramsar) and a Globally Important Bird Area. Up to 40 percent of North American waterfowl utilize the river during annual migration. Some species in particular are more reliant on the Refuge. For example, approximately 50 percent of all canvasback ducks (*Aythya valisineria*) stop in the Refuge during their migration. Tundra swans (*Cygnus columbianus*) are also common visitors to the Refuge, with approximately 20 percent of the eastern United States population using the Refuge every year. Bald eagles (*Haliaeetus leucocephalus*) are a common sight during certain months as well. There have been 167 active eagle nests in recent years and approximately 2,700 bald eagles visit the Refuge during their spring migration. The Refuge is also an important area for tourists. The area receives nearly 3.7 million annual visits (USFWS, 2006). These visitors enjoy the scenic river overlooks from 500-foot-high bluffs, as well as exploring the river, its backwaters, and its islands. Tourists can also enjoy views from the National Scenic Byways located on either side of the Refuge.

The Refuge management is headquartered in Winona, Minnesota, and has four administrative districts: Winona District, La Crosse District, McGregor District, and the Savanna District. There are 11 locks and dams within the Refuge, and the districts are divided by river pools that are created by the locks and dams. As of 2006, the Refuge had 37 permanent employees and an annual base budget of $3.1 million. The headquarters also coordinate the Trempealeau and Driftless Area National Wildlife Refuges (USFWS, 2006). In 2006, the Refuge published a Comprehensive Conservation Plan ("CCP") to set goals for the next 15 years after publication. The CCP delineated 43 objectives and strategies created to "help the Refuge achieve its purposes and contribute to the mission and policies of the National Wildlife Refuge System, while being sensitive to the needs of partner states and agencies, conservation organizations, communities, and the general public" (USFWS, 2006, p. v). The CCP also noted that "staff may be confronted with health, safety, or societal needs which must be addressed. Examples include a right of way expansion for a utility…" (USFWS, 2006, p. 160).

4.4 Wildlife Resources

The Project Study Area includes areas providing valuable habitat for a number of terrestrial and avian species, including migratory birds that frequent wildlife conservation areas in the Project Study Area.

Typical animal species found in the Project Study Area include cottontail rabbit (*Sylvilagus floridanus*), the white-tailed deer (*Odecoileus virginianus*), badger (*Taxidea taxus*), coyotes (*Canis latrans*), raccoons (*Procyon lotor*), gray wolf (*Canis lupis*), blue jay (*Cyanocitta cristata*), American robins (*Turdus migratorius*), mallard duck (*Anas platyrynchos*), wild turkey (*Meleagris gallopavo*), ring-necked pheasant (*Phasianus colchicus*), the bobwhite quail (*Colinus virginianus*), gray (Hungarian) partridge (*Perdix perdix*), mourning dove (*Zenaida macroura*), bald eagle, barn owl (*Tyto alba*), osprey (*Pandion haliaetus*), beaver (*Castor canadensis*), and gray squirrel (*Sciurus carolinensis*), as well as a wide variety of fish, amphibians, reptiles, and plants.

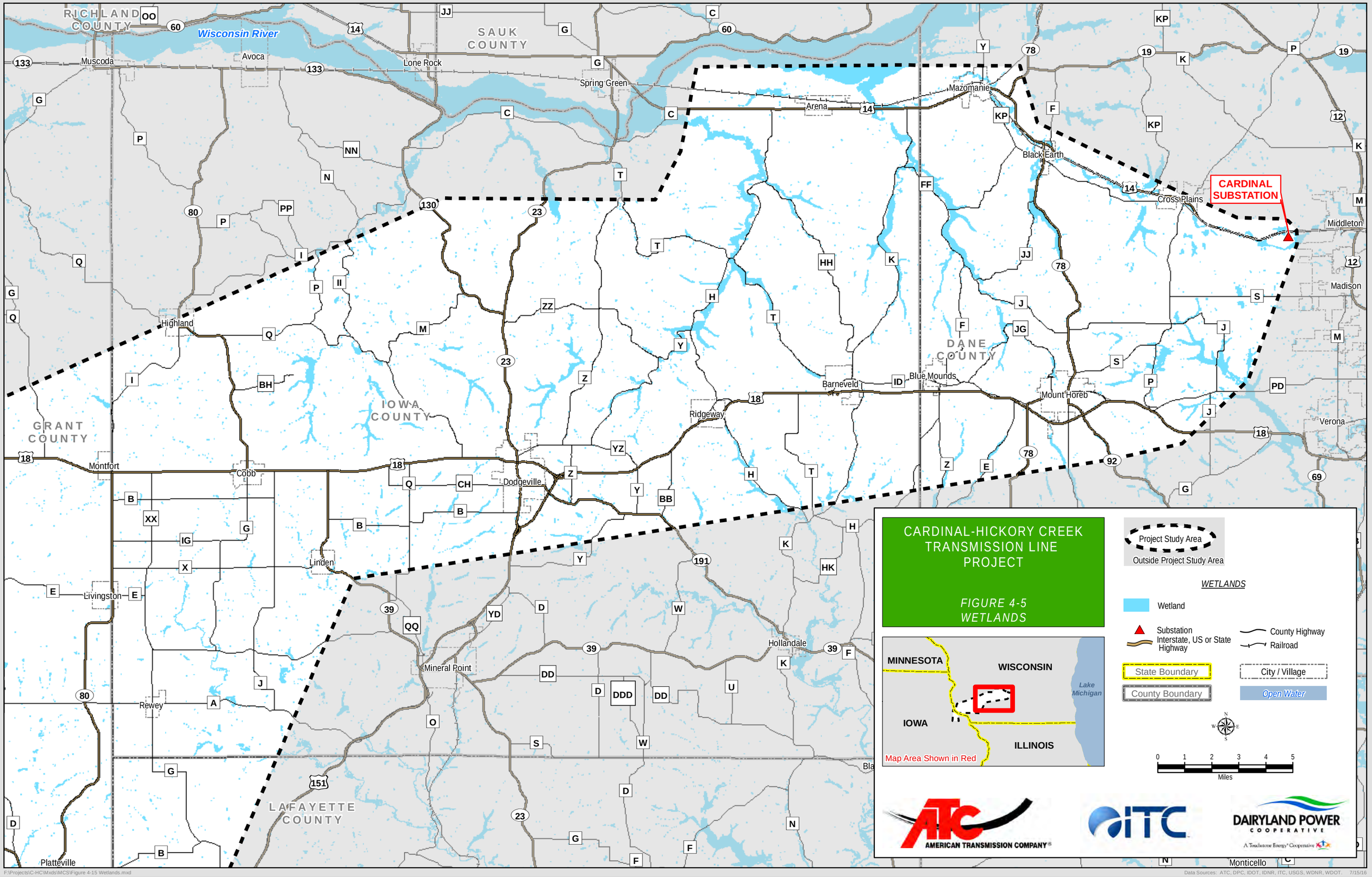
4.5 Wetlands

Wetlands are assessed as avoidance areas to minimize impacts on these environmentally sensitive resources. Wetlands are considered a valuable resource because they clean water, recharge water supplies, reduce flood risks, and provide habitat for many species of wildlife and vegetation (EPA, 2001). Executive Order 11990, Protection of Wetlands (May 24, 1977), directs all federal agencies to issue or amend existing procedures to ensure consideration of wetlands protection during decision-making processes and to ensure the evaluation of the potential impacts of any new construction proposed in a wetland. In addition, wetlands that are "waters of the U.S." are under USACE jurisdiction, and activities that may impact such wetlands are subject to additional permitting requirements. If wetlands cannot be avoided, the appropriate agencies will be consulted and required permits will be obtained prior to construction.

Figure 4-5 shows the wetlands in the eastern half of the Project Study Area, and Figure 4-6 shows wetlands in the western half.

4.5.1 Wetlands - Wisconsin

Data for Wisconsin wetlands were obtained from the Wisconsin Wetlands Inventory. Wetlands are concentrated along the Mississippi and Wisconsin Rivers and their tributaries. Small, isolated wetlands are also mapped throughout the Project Study Area. Wetlands occur throughout the Project Study Area and will be avoided where possible through line routing and by careful structure placement.

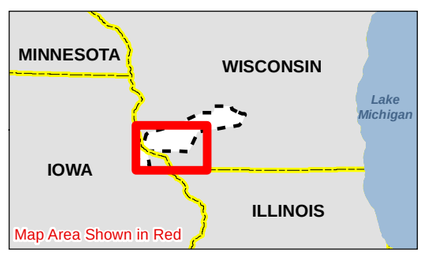


F:\Projects\C-HC\Mxds\MCS\Figure 4-15 Wetlands.mxd

Data Sources: ATC, DPC, IDOT, IDNR, ITC, USGS, WDNR, WDOT. 7/15/16

CARDINAL-HICKORY CREEK TRANSMISSION LINE PROJECT

FIGURE 4-6
WETLANDS



Project Study Area
Outside Project Study Area

WETLANDS
Wetland

Substation
Interstate, US or State Highway
County Highway
Railroad

State Boundary
County Boundary
City / Village
Open Water

0 1 2 3 4 5
Miles

AMERICAN TRANSMISSION COMPANY®
ITC
DAIRYLAND POWER COOPERATIVE
A Touchstone Energy® Cooperative

F:\Projects\C-HC\Mxds\MCS\Figure 4-6 Wetlands.mxd

Data Sources: ATC, DPC, IDOT, IDNR, ITC, USGS, WDNR, WDOT. 7/15/16

4.5.2 Wetlands - Iowa

Data for Iowa wetlands were also obtained from the National Wetlands Inventory. Wetlands in the Iowa portion of the Project Study Area are also mainly concentrated along the Mississippi River and small, isolated wetlands are also mapped throughout the Project Study Area. Although, occurrence of wetlands in Iowa is less concentrated than in Wisconsin, they will be treated similarly and will be avoided, where possible, by structure placement in siting the proposed transmission lines.

4.6 Cultural Resources

Historic districts and historic sites that are registered with the National Register for Historic Places ("NRHP"), including landmarks, districts, and monuments, were assessed as areas to avoid. Avoidance is preferred, but if a new corridor is developed that contains large historic districts or sites, appropriate steps will be taken to address concerns regarding potential adverse impacts. Data on cultural and historic resources in the Project Study Area were obtained from NRHP (2009). The NRHP districts and sites are listed in Table 4-3 and shown in Figures 4-7 and 4-8. In addition to data collected from the NRHP, a review of data from the state historic preservation offices ("SHPO") was conducted to identify state-designated cultural sites and resources that might be considered for NRHP registration.

4.6.1 Cultural Resources - Wisconsin

Data from the Wisconsin State Historical Society ("WSHS") determined that there are archaeologically sensitive areas throughout the Project Study Area in Wisconsin including, but not limited to, the following: cabins, campsites/villages, cemeteries/burial grounds, quarries, rock art, and workshop sites. If routes impacting them are chosen, these sites would require verification and investigation with the WSHS prior to construction. The sites identified by the WSHS have not been evaluated to determine their eligibility for listing on the NRHP.

4.6.2 Cultural Resources - Iowa

Among other areas, the Iowa SHPO identified archaeologically sensitive areas at the Nelson Dewey/Stoneman crossing alternative, on the Iowa side of the Mississippi River, as it would cross in proximity to one mound group, thought to be from the Woodland period. This mound group has only been investigated through archival research and thus its integrity is unknown. If either of these crossing alternatives were chosen, the mound group location would need to be verified and its integrity investigated with Iowa SHPO and State Archeologist prior to start of construction activities. This site has not been evaluated to determine its eligibility for listing on the NRHP.

Table 4-3: Historic Districts and Places by County – Wisconsin and Iowa

State/Type	County	Name
Wisconsin		
Historic District or Area	Dane	Mazomanie Downtown Historic District
Historic District or Area	Grant	Bayley Avenue Historic District
Historic District or Area	Grant	Courthouse Square Historic District
Historic District or Area	Grant	Division Street Historic District
Historic District or Area	Grant	Main Street Commercial Historic District
Historic District or Area	Grant	West Main Street Historic District
Historic District or Area	Iowa	Grove Street Historic District
Historic District or Area	Iowa	Hyde Chapel
Historic District or Area	Iowa	Iowa Street Historic District
Historic Place	Dane	Dahle, Henry L. and Sarah, House
Historic Place	Dane	Dahle, Herman B. and Anne Marie, House
Historic Place	Dane	Heiney's Meat Market
Historic Place	Dane	Hoff Department Store
Historic Place	Dane	Lie, Aslak, Cabin
Historic Place	Dane	Little Norway
Historic Place	Dane	Mazomanie Town Hall
Historic Place	Dane	Mount Horeb Public School
Historic Place	Dane	Mt. Horeb Opera Block
Historic Place	Dane	Skindrud, Eric and Jerome, Farm
Historic Place	Grant	Agriculture and Manual Arts Building/Platteville State Normal School
Historic Place	Grant	Arthur, L. J., House
Historic Place	Grant	Ballantine, James, House
Historic Place	Grant	Beebe House
Historic Place	Grant	Denniston House
Historic Place	Grant	Evans, Jonathan H., House
Historic Place	Grant	First Congregational Church
Historic Place	Grant	Grant County Courthouse
Historic Place	Grant	Kinney, Patrick and Margaret, House
Historic Place	Grant	Lancaster Municipal Building
Historic Place	Grant	Lancaster Post Office
Historic Place	Grant	Mitchell-Rountree House
Historic Place	Grant	Rountree Hall
Historic Place	Grant	Rountree, J. H., Mansion

State/Type	County	Name
Historic Place	Grant	Stonefield
Historic Place	Grant	Stonefield
Historic Place	Iowa	Adler, Emanuel D., House
Historic Place	Iowa	Brisbane, William Henry, House
Historic Place	Iowa	Cassidy Farmhouse
Historic Place	Iowa	Dodge Mining Camp Cabin
Historic Place	Iowa	Harris House
Historic Place	Iowa	Ihm House
Historic Place	Iowa	Iowa County Courthouse
Historic Place	Iowa	Jones, David J. and Maggie, House
Historic Place	Iowa	Kittleson House
Historic Place	Iowa	Linden High School
Historic Place	Iowa	Linden Methodist Church
Historic Place	Iowa	Old Rock School
Historic Place	Iowa	Plum Grove Primitive Methodist Church
Historic Place	Iowa	Roberts House
Historic Place	Iowa	Roethlisberger House
Historic Place	Iowa	Thomas Stone Barn
Historic Place	Lafayette	First Capitol
Iowa		
Historic Place	Clayton	Seventeen places on INHF Lands
Historic Place	Clayton	Round Barn, Millville Township
Historic Place	Clayton	Stonefield
Historic Place	Clayton	Stonefield
Historic Place	Dubuque	Western Hotel

CARDINAL-HICKORY CREEK TRANSMISSION LINE PROJECT

FIGURE 4-7
HISTORIC PLACES

Project Study Area
Outside Project Study Area

HISTORIC PLACES

or Historic Place
or Historic District or Area

Substation
Interstate, US or State Highway
County Highway
Railroad

State Boundary
County Boundary
City / Village
Open Water

MINNESOTA
WISCONSIN
IOWA
ILLINOIS
Lake Michigan
Map Area Shown in Red

0 1 2 3 4 5
Miles

AMERICAN TRANSMISSION COMPANY®
ITC
DAIRYLAND POWER COOPERATIVE
A Touchstone Energy® Cooperative

Wisconsin River
RICHLAND COUNTY
SAUK COUNTY
DANE COUNTY
IOWA COUNTY
GRANT COUNTY
LAFAYETTE COUNTY
Muscoda
Avoca
Lone Rock
Spring Green
Arena
Mazomanie
Black Earth
Cross Plains
Middleton
Madison
Verona
Monticello
Highland
Montfort
Cobb
Dodgeville
Linden
Livingston
Rewey
Platteville
Hyde Chapel
Barneveld
Ridgeway
Blue Mound State Park
Blue Mounds
Mount Horeb
Hollandale
Blanchard
Mineral Point
Gov. Dodge State Park
Taliesin
Mazomanie Downtown Historic District
Grove Street Historic District
Iowa Street Historic District
Mineral Point Historic District
Foster Park Historic District
CARDINAL SUBSTATION

F:\Projects\C-HC\Mxds\MCS\Figure 4-7 Historic Places.mxd

Data Sources: ATC, DPC, IDNR, IDOT, INHF, ITC, NPS, USGS, WDNR, WDOT. 7/15/16

Wyalusing State Park Mounds Archeological District

Front Street (River Park Drive) Historic District

Guttenberg National Fish Hatchery and Aquarium Historic District

St. Mary's Catholic Church Historic District

St. Boniface of New Vienna Historic District

Courthouse Square Historic District

Bayley Avenue, Division Street, Main Street Commercial, and West Main Street Historic Districts.

Mineral Point Historic District

Foster Park Historic District

Four Mounds Estate Historic District

Lock and Dam No. 11 Historic District

Holy Ghost Catholic Historic District

Cathedral, Dubuque Millworking, Jackson Park, Langworthy, Old Main, Upper Central Avenue Commercial, Upper Main Street, Washington Street and East 22nd Street, and West Eleventh Street Historic Districts.

HICKORY CREEK SUBSTATION

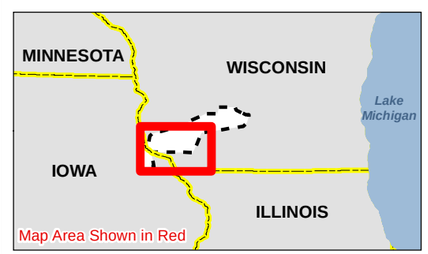
Fennimore
Mount Hope
Patch Grove
Bagley
Clayton
Bloomington
Lancaster
Montfort
Cobb
Dodgeville
Linden
Livingston
Rewey
Mineral Point
Platteville
Belmont
Guttenberg
Millville
Cassville
North Buena Vista
Potosi
Tennyson
Balltown
Dickeyville
Sherrill
Luxemburg
Holy Cross
Rickardsville
Durango
Sageville
Dubuque
New Vienna
Dyersville
Bankston

GRANT COUNTY
CLAYTON COUNTY
DUBUQUE COUNTY
IOWA COUNTY
IOWA

Mississippi River

CARDINAL-HICKORY CREEK TRANSMISSION LINE PROJECT

FIGURE 4-8
HISTORIC PLACES



Project Study Area
Outside Project Study Area

HISTORIC PLACES

or Historic Place
or Historic District or Area
Substation
Interstate, US or State Highway
County Highway
Railroad
State Boundary
City / Village
County Boundary
Open Water

0 1 2 3 4 5
Miles

AMERICAN TRANSMISSION COMPANY®
ITC
DAIRYLAND POWER COOPERATIVE
A Touchstone Energy® Cooperative

F:\Projects\C-HC\Mxds\MCS\Figure 4-8 Historic Places.mxd

Data Sources: ATC, DPC, IDNR, IDOT, INHF, ITC, NPS, USGS, WDNR, WDOT. 7/15/16

4.7 Hydrology (Open Water, Streams, Floodplains)

The hydrologic features in the Project Study Area are depicted in Figure 4-9.

4.7.1 Hydrology - Wisconsin

There are multiple waterways that flow through the Wisconsin portion of Project Study Area. The most dominant waterway is the Mississippi River, which separates Wisconsin and Iowa. The largest water body is Black Hawk Lake in Iowa County, Wisconsin. There are numerous unnamed water bodies that are in the Wisconsin portion of the Project Study Area as well.

4.7.2 Hydrology - Iowa

As stated above, the most dominant waterway in the Project Study Area is the Mississippi River. There are a few unnamed water bodies in the Iowa portion of the Project Study Area.

4.7.3 Floodplains

In January 2015, Presidential Executive Order ("E.O.") 13690 was issued to create a new flood risk reduction standard. The Federal Flood Risk Management Standard ("FFRMS") is designed to be a flexible framework to increase resiliency against flooding and to help preserve the natural values of floodplains. Specifically, the FFRMS creates a national minimum flood risk management standard to ensure that federal actions located in or near a floodplain, when there are no other practical alternatives, last as long as intended by considering risks, changes in climate, and vulnerability.

The original E.O. on floodplains analysis in NEPA – E.O. 11988 – was revised in 2015 to address E.O. 13690. According to the revised implementation guidelines, a higher flood elevation and corresponding horizontal floodplain than the 100-year floodplain are required to be used for federally funded projects. The revised implementation guidelines contain other requirements for federal actions that include projects that require a federal permit (FEMA, 2015).

There are a number 100-year floodplains located within the Project Study Area, which are shown below on Figure 4-10. The most prominent floodplain in the Project Study Area is the Mississippi River floodplain in the Refuge, which has been designated as a Wetland of International Importance and a Globally Important Bird Area. Floodplains have been and will continue to be considered during the routing process and any federal requirements will be followed.

ALLAMAKEE COUNTY
Lynxville
Harpers Ferry
CRAWFORD COUNTY
Eastman
Steuben
Boscobel
RICHLAND COUNTY
Blue River
Muscoda
Avoca
Lone Rock
SAUK COUNTY
Spring Green
Sauk City
Dane
Arena
Mazomanie
Black Earth
CARDINAL SUBSTATION
Middleton
Madison
DANE COUNTY
Blue Mound State Park
Gov. Dodge State Park
Barneveld
Blue Mounds
Mount Horeb
Ridgeway
Verona
WISCONSIN
Wauzeka
Woodman
Prairie du Chien
McGregor
Wisconsin River
Highland
IOWA COUNTY
Fennimore
Mount Hope
Patch Grove
Montfort
Cobb
Dodgeville
Linden
Livingston
Clayton
Bagley
Bloomington
GRANT COUNTY
Lancaster
Rewey
Mineral Point
Hollandale
Belleville
New Glarus
Blanchardville
Guttenberg
CLAYTON COUNTY
Osterdock
Millville
Cassville
North Buena Vista
Mississippi River
Potosi
Tennyson
Platteville
Belmont
LAFAYETTE COUNTY
Darlington
Balltown
Dickeyville
Cuba City
Benton
Shullsburg
Hazel Green
IOWA
Luxemburg
Holy Cross
Sherrill
Rickardsville
Durango
Sageville
DUBUQUE COUNTY
New Vienna
HICKORY CREEK SUBSTATION
Asbury
Dubuque
Graf
Centralia
Dyersville
ILLINOIS

CARDINAL-HICKORY CREEK TRANSMISSION LINE PROJECT

FIGURE 4-9
HYDROLOGY

Project Study Area
Outside Project Study Area

HYDROLOGY
Major River
Open Water

Substation
Interstate, US or State Highway

State Boundary
City / Village
County Boundary

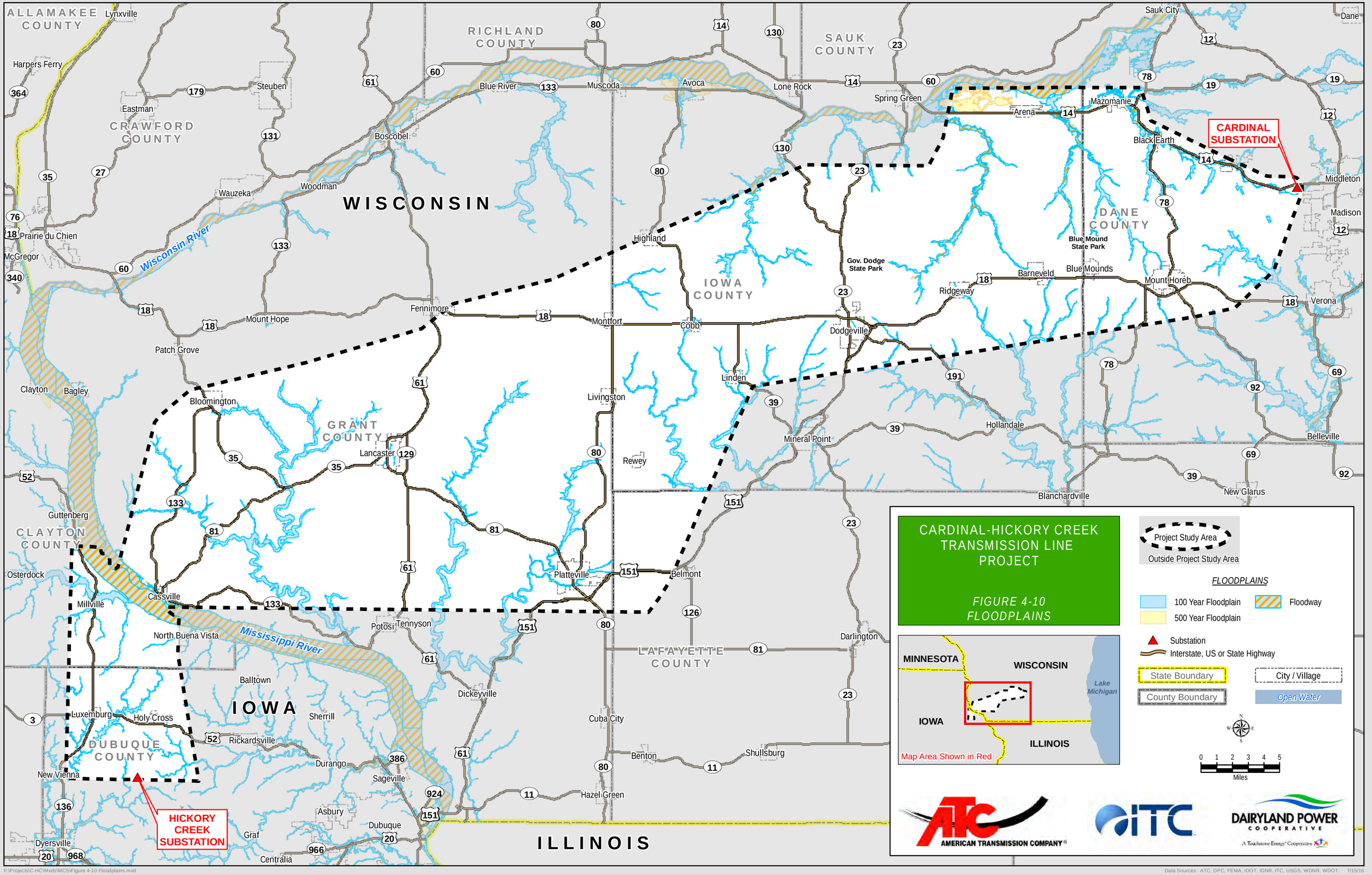
MINNESOTA
WISCONSIN
Lake Michigan
IOWA
ILLINOIS
Map Area Shown in Red

0 1 2 3 4 5
Miles

AMERICAN TRANSMISSION COMPANY®
ITC
DAIRYLAND POWER COOPERATIVE
A Touchstone Energy® Cooperative

F:\Projects\C-HC\Mxds\MCS\Figure 4-9 Hydrology.mxd

Data Sources: ATC, DPC, IDOT, IDNR, ITC, USGS, WDNR, WDOT. 7/15/16



F:\Projects\C-HC\Mxds\MCS\Figure 4-10 Floodplains.mxd

Data Sources: ATC, DPC, FEMA, IDOT, IDNR, ITC, USGS, WDNR, WDOT. 7/15/16

4.7.4 Outstanding and Exceptional Waters

In Wisconsin, waters designated as Outstanding Resource Waters or Exceptional Resource Waters are surface waters that provide outstanding recreational opportunities, support valuable fisheries and wildlife habitat, have good water quality, and are not significantly impacted by human activities. There are approximately 21 Outstanding and Exceptional Resource Waters located within the Wisconsin portion of the Project Study Area as shown on Figure 4-11. This portion of Wisconsin is also known for trout streams.

The Iowa DNR manages the Outstanding Iowa Waters program. This program gives certain surface waters the classification as outstanding state resource waters based on water quality standards, thereby warranting special protection (IDNR, 2010). No current Outstanding Iowa Waters are located within the Project Study Area.

4.8 Transportation Corridors and Sites (Major Highways, Rail, Airports)

4.8.1 Major Highways

There are several federal, state, and county highways that occur within the Project Study Area as well as railroads and aviation facilities. There are numerous U.S. highways ("USH"), state highways ("SH") and county highways ("CTH") in the Project Study Area. Highways are a transmission line siting opportunity in Wisconsin and are identified as the second-highest priority corridor. In Iowa, planning for a route must begin with routes near and parallel to roads, railroad rights-of-way, or division lines of land. Roads include, but are limited to, county roads and federal and state highways.

The highways found within the Project Study Area in Wisconsin are listed by county in Table 4-4. The highways in Iowa are listed in Table 4-5. The transportation corridors found within Wisconsin and Iowa are depicted in Figures 4-12 and 4-13, respectively.

CARDINAL-HICKORY CREEK TRANSMISSION LINE PROJECT

FIGURE 4-11
OUSTANDING AND EXCEPTIONAL WATER RESOURCES

CARDINAL SUBSTATION

HICKORY CREEK SUBSTATION

WISCONSIN

IOWA

ILLINOIS

ALLAMAKEE COUNTY

CRAWFORD COUNTY

RICHLAND COUNTY

SAUK COUNTY

DANE COUNTY

GRANT COUNTY

IOWA COUNTY

LAFAYETTE COUNTY

CLAYTON COUNTY

DELAWARE COUNTY

DUBUQUE COUNTY

Wisconsin River

Mississippi River

Blue River

Little Platte River

Galena River

Cass Valley Creek

Lee Creek

Harker Creek

Martin Creek

Borah Creek

Trout Creek

Ryan Creek

Elvers Creek

Garfoot Creek

BlackEarth Creek

Sugar River

Schlapbach Creek

Fryes Feeder

Deer Creek

Gordon Creek

Strutt Creek

Love Creek

Project Study Area

Outside Project Study Area

Outstanding and Exceptional Water Resources

Substation

Interstate, US or State Highway

State Boundary

County Boundary

City / Village

Open Water

Map Area Shown in Red

Miles

AMERICAN TRANSMISSION COMPANY®

ITC

DAIRYLAND POWER COOPERATIVE

F:\Projects\C-HC\Mxds\MCS\Figure 4-11 OEWR.mxd

Data Sources: ATC, DPC, IDOT, IDNR, ITC, USGS, WDNR, WDOT. 7/26/16

Table 4-4: Highways in Wisconsin by County

County	Road Type	Road Name
Dane	County Highway	CTH ID
Dane	County Highway	CTH JG
Dane	County Highway	CTH Z
Dane	County Highway	CTH F
Dane	County Highway	CTH E
Dane	County Highway	CTH J
Dane	County Highway	CTH P
Dane	County Highway	CTH Y
Dane	County Highway	CTH KP
Dane	County Highway	CTH JJ
Dane	County Highway	CTH PD
Dane	County Highway	CTH S
Dane	County Highway	CTH FF
Dane	State Highway	STH 19
Dane	State Highway	STH 78
Dane	State Highway	STH 92
Dane	U.S. Highway	USH 14
Dane	U.S. Highway	USH 18
Grant	County Highway	CTH U
Grant	County Highway	CTH A
Grant	County Highway	CTH D
Grant	County Highway	CTH F
Grant	County Highway	CTH I
Grant	County Highway	CTH E
Grant	County Highway	CTH VV
Grant	County Highway	CTH J
Grant	County Highway	CTH K
Grant	County Highway	CTH Y
Grant	County Highway	CTH B
Grant	County Highway	CTH G
Grant	County Highway	CTH N
Grant	County Highway	CTH XX
Grant	County Highway	CTH V
Grant	County Highway	CTH O
Grant	State Highway	STH 129

County	Road Type	Road Name
Grant	State Highway	STH 133
Grant	State Highway	STH 35
Grant	State Highway	STH 80
Grant	State Highway	STH 81
Grant	U.S. Highway	USH 151
Grant	U.S. Highway	USH 18
Grant	U.S. Highway	USH 61
Iowa	County Highway	CTH ID
Iowa	County Highway	CTH A
Iowa	County Highway	CTH Z
Iowa	County Highway	CTH Q
Iowa	County Highway	CTH F
Iowa	County Highway	CTH I
Iowa	County Highway	CTH E
Iowa	County Highway	CTH X
Iowa	County Highway	CTH J
Iowa	County Highway	CTH P
Iowa	County Highway	CTH K
Iowa	County Highway	CTH Y
Iowa	County Highway	CTH B
Iowa	County Highway	CTH T
Iowa	County Highway	CTH HHH
Iowa	County Highway	CTH H
Iowa	County Highway	CTH CH
Iowa	County Highway	CTH G
Iowa	County Highway	CTH YZ
Iowa	County Highway	CTH M
Iowa	County Highway	CTH XX
Iowa	County Highway	CTH HH
Iowa	County Highway	CTH FF
Iowa	County Highway	CTH ZZ
Iowa	County Highway	CTH BB
Iowa	County Highway	CTH IG
Iowa	County Highway	CTH II
Iowa	County Highway	CTH BH
Iowa	State Highway	STH 130

County	Road Type	Road Name
Iowa	State Highway	STH 191
Iowa	State Highway	STH 23
Iowa	State Highway	STH 39
Iowa	State Highway	STH 80
Iowa	U.S. Highway	USH 14
Iowa	U.S. Highway	USH 151
Iowa	U.S. Highway	USH 18
Lafayette	County Highway	CTH X
Lafayette	County Highway	CTH B
Lafayette	County Highway	CTH G
Lafayette	County Highway	CTH XX
Lafayette	U.S. Highway	USH 151

Table 4-5: Highways in Iowa by County

County	Road Type	Road Name
Clayton	U.S. Highway	USH 52
Dubuque	State Highway	SH 3
Dubuque	State Highway	SH 136
Dubuque	U.S. Highway	USH 52

CARDINAL-HICKORY CREEK TRANSMISSION LINE PROJECT

FIGURE 4-12
TRANSPORTATION

Project Study Area
Outside Project Study Area

TRANSPORTATION

- US Highway
- State Highway
- County Highway
- Road
- Railroad
- Public Airport
- Private Airport or Airfield
- Heliport

State Boundary
County Boundary
City / Village
Open Water

MINNESOTA
WISCONSIN
IOWA
ILLINOIS
Lake Michigan
Map Area Shown in Red

0 1 2 3 4 5
Miles

AMERICAN TRANSMISSION COMPANY
ITC
DAIRYLAND POWER COOPERATIVE
A Touchstone Energy® Cooperative

RICHLAND COUNTY
SAUK COUNTY
IOWA COUNTY
GRANT COUNTY
LAFAYETTE COUNTY
DANE COUNTY

Wisconsin River
Muscoda
Avoca
Lone Rock
Spring Green
Arena
Mazomanie
Black Earth
Cross Plains
Middleton
Madison
Verona
Blue Mound State Park
Blue Mounds
Barneveld
Mount Horeb
Ridgeway
Dodgeville
Gov. Dodge State Park
Highland
Montfort
Cobb
Linden
Livingston
Mineral Point
Rewey
Platteville
Hollandale
Blanchardville
Monticello

MIDDLETON MUNICIPAL AIRPORT
CARDINAL SUBSTATION
SOUTHWIND AIRPORT
PIERICK AIRPORT
DODGEVILLE MUNICIPAL AIRPORT
MEMORIAL HOSPITAL HELIPORT
IOWA COUNTY AIRPORT
TUSCHEN AIRPORT
JIM BENSON FIELD
DESMET AIRPORT
ATKINS RIDGE AIRPORT
BAKERS FIELD
DOCKEN FIELD
HECKLERS' STRIP
SUGAR RIDGE AIRPORT

F:\Projects\C-HC\Mxds\MCS\Figure 4-11 Transportation.mxd

Data Sources: ATC, DPC, FAA, IDOT, IDNR, ITC, USGS, WDNR, WDOT. 7/15/16

STUPEK FARMS
C JEIDY FARMS AIRPORT
GAA PRIVATE AIRPORT
WALTERS HELIPORT
CASSVILLE MUNICIPAL AIRPORT
LANCASTER MUNICIPAL AIRPORT
MARTIN FIERRO AIRPORT
RIGDON AIRPORT
ANDERSON AIRPORT
HICKORY CREEK SUBSTATION
MEMORIAL HOSPITAL HELIPORT
IOWA COUNTY AIRPORT
JIM BENSON FIELD

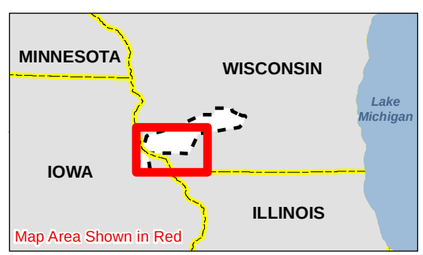
Mount Hope
Patch Grove
Bagley
Clayton
Bloomington
Lancaster
Montfort
Cobb
Dodgeville
Linden
Livingston
Mineral Point
Rewey
Guttenberg
Platteville
Belmont
Millville
Cassville
North Buena Vista
Potosi
Tennyson
Balltown
Dickeyville
Luxemburg
Holy Cross
Sherrill
Rickardsville
Durango
Sageville
Asbury
Dubuque
New Vienna
Dyersville
Bankston

GRANT COUNTY
IOWA COUNTY
CLAYTON COUNTY
DUBUQUE COUNTY
IOWA

Mississippi River

CARDINAL-HICKORY CREEK TRANSMISSION LINE PROJECT

FIGURE 4-13
TRANSPORTATION



Project Study Area
Outside Project Study Area

TRANSPORTATION

US Highway
State Highway
County Highway
Road
Railroad
Public Airport
Private Airport or Airfield
Heliport

State Boundary
County Boundary
City / Village
Open Water

0 1 2 3 4 5
Miles

AMERICAN TRANSMISSION COMPANY®
ITC
DAIRYLAND POWER COOPERATIVE
A Touchstone Energy® Cooperative

F:\Projects\C-HC\Mxds\MCS\Figure 4-13 Transportation.mxd

Data Sources: ATC, DPC, FAA, IDOT, IDNR, ITC, USGS, WDNR, WDOT. 7/27/16

4.8.2 Railroads

There are three active railroads that occur within the Project Study Area: one near the Cardinal Substation that generally follows USH 14 along the northern boundary of the Project Study Area, and one on each bank of the Mississippi River. The railroad along the northern boundary of the Project Study Area is owned by Wisconsin and Southern Railroad. The railroad on the east bank of the Mississippi River is owned by Burlington Northern and Santa Fe Railway. The railroad on the west bank of the Mississippi River is owned by Canadian Pacific Railway. Figures 4-12 and 4-13 depict railroad corridors within the Project Study Area.

4.8.3 Airports

Airports and heliports are potential constraints to transmission line routing depending on the proximity to the airport or heliport and the transmission structure height. The permitted height of a transmission structure located in proximity to a public airport is determined by the classification of the airport, and the location of the proposed structure relative to the airport and the regulated airport imaginary surfaces. The imaginary surfaces are defined and regulated at a federal level by the Federal Aviation Administration ("FAA") and further regulated at the state level by the Wisconsin and Iowa Departments of Transportation. Federal regulations apply only to public use airports; each state has regulations that apply to both public and private airports.

There are several airports and heliports within the Project Study Area. Public airports include the Cassville and Lancaster Municipal Airports. Private airfields include the Dodgeville Municipal Airport, Pierick Airport, C Jeidy Farms, Docken Field, Martin Fierro, and Southwind. There is one heliport located at Dodgeville Memorial Hospital. Public and private airports, and heliports are shown on Figures 4-12 and 4-13. Site-specific analysis of routing near airports and heliports was conducted during the corridor-development process.

4.9 Socioeconomic Characteristics

While the Project Study Area includes highly populated areas such as Dane County, the macro-corridors and alternative corridors traverse through relatively low-population areas. For instance, in Wisconsin, the Villages of Cassville and Montfort have populations of less than 1,000 each, town of Middleton has a population of about 6,000 and Iowa and Grant counties have about a population of about 75,000 combined. In Iowa, Clayton and Dubuque counties have a population of around 114,000. Population estimates for 2015 show a decrease in population in Clayton County, Cassville, and Guttenberg since 2000. The county populations within the Project Study Area are listed in Table 4-6.

Table 4-6: Population by County – Wisconsin and Iowa

County	Population
Wisconsin	
Iowa	23,813
Grant	52,250
Lafayette	16,829
Dane	523,643
Iowa	
Dubuque	97,125
Clayton	17,644

The top employment industries in the Project Study Area include educational services, health care, social assistance, and manufacturing (U.S. Census Bureau, 2014 and 2015). The estimated unemployment rates from 2014 are listed by county in Table 4-7. The data shows that unemployment rates in the Project area were lower than the 6.2% national average for 2014 (BLS, 2014)

Table 4-7: Unemployment Rate by County – Wisconsin and Iowa

State/County	Unemployment Rate
Wisconsin	
Iowa	4.7 %
Grant	4.8 %
Lafayette	4.3 %
Dane	5.5 %
Iowa	
Dubuque	4.7 %
Clayton	5.2 %

According to U.S. Census data, the populations near the macro-corridors and alternative corridors are primarily White and primarily not Hispanic/Latino. Race and ethnicity found within the Project Study Area are listed in Table 4-8 by county.

Table 4-8: Race and Ethnicity by County – Wisconsin and Iowa

State & County	White Alone	Black or African American Alone	American Indian and Alaska Native alone	Asian Alone	Native Hawaiian and Other Pacific Islander Alone	Two or more Races	Hispanic or Latino
Wisconsin							
Iowa	97.1%	0.4%	0.2%	0.6%	0	1.0%	1.6%
Grant	96.8%	1.3%	0.2%	0.6%	0	0.9%	1.3%
Lafayette	96.8%	0.3%	0.4%	0.2%	0	0.7%	3.8%
Dane	84.9%	5.1%	0.2%	5.2%	0%	2.7%	6.1%
Iowa							
Dubuque	94.0%	1.6%	0.1%	1.4%	0.2%	2.8%	2.1%
Clayton	97.9%	0.1%	0.1%	0.4%	0%	1.3%	1.7%

Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations) requires all federal agencies to assess whether their programs, policies, and activities have disproportionately high and adverse human health or environmental effects on minority and low-income populations in the United States. The criteria for a finding of possible environmental justice issues is the occurrence of more than 50 percent of the population affected by the federal agency's proposed action being minority or low-income. Data was collected on the income and poverty status of the populations within the census tracts of the Project Study Area.

For the purposes of the analysis of environmental justice, minority refers to anyone who is racially classified as African American, Asian American, Native American or Alaskan Native, or Pacific Islander, anyone who self- classifies as "other" race, or two or more races, or anyone classified as Hispanic. Hispanic is considered an ethnicity, not a separate race; Hispanics are considered minorities regardless of their racial self-affiliation. A minority population is identified when the minority population of the potentially affected area is greater than 50 percent or meaningfully greater than the percentage of the minority population in the general population or other appropriate unit of geographical analysis. Low income is determined by a set of money-income thresholds that varies by family size and composition. If the total income for a family or unrelated individual falls below the relevant poverty threshold, then the family or unrelated individual is classified as low- income or "below the poverty level" at the time of the census (CEQ, 1997). None of the communities in the Project Study Area are areas of concern in relation to environmental justice issues.

4.10 Recreational Resources

Recreational resources are located throughout the Project Study Area. They include state, county, and municipal parks; trails; and SNAs in Wisconsin; and several state preserves and parks in Iowa. Some of the more prominent recreational areas in the Project Study Area are the Refuge, the Military Ridge State Trail, the Blue Mound State Park, the Governor Dodge State Park, the Turkey River Mounds State Preserve, and the White Pine Hollow State Preserve. The recreational areas found within the Project Study Area are listed in Table 4-9 and depicted on Figures 4-14 and 4-15.

Table 4-9: Recreational Areas by County – Wisconsin and Iowa

Name	County
Wisconsin	
American Legion Park	Dane
Barneveld Prairie State Natural Area	Dane
Black Earth Community Park	Dane
Black Earth Creek Fishery Area	Dane
Black Earth Creek Wildlife Area Sunnyside Unit	Dane
Blue Mound State Park	Dane
Boecks Park	Dane
Brigham County Park	Dane
Cave of the Mounds National Natural Landmark	Dane
Cedar Glen Conservancy	Dane
Cedar Glen Park	Dane
Cedar Hill Conservancy	Dane
Cherrywood Acres Oak Savannah Conservancy	Dane
Cherrywood Acres Park	Dane
Cherrywood Conservancy	Dane
Cross Plains State Park - IANSR	Dane
Dorothy Statz Conservancy	Dane
Duane R. Hofstetter Conservation Park	Dane
Festge County Park	Dane
Garfield Park	Dane
Gausewitz Park	Dane
Glacial Valley Park	Dane
Glaciers Edge Park	Dane
Goth Park	Dane
Grandma Foster Park	Dane
Grundahl Park	Dane

Name	County
Hickory Hills Park	Dane
Himsel Park	Dane
Holfelder Park	Dane
Ibinger Ridge Park	Dane
Ice Age National Scenic Trail - US National Park Service	Dane
Jaycee Park	Dane
Jerry Barsness Field	Dane
Liberty Park	Dane
Lions Park	Dane
Madison Bike Trail - Bike Lane or Paved Shoulder	Dane
Mazomanie Lion's Park	Dane
Mazomanie Lion's Park (Leased Area)	Dane
Mounds View Park	Dane
Municipal Park	Dane
Nesheim Park	Dane
Noll Valley (Oak Savanna) Conservancy	Dane
Pheasant Point Woods Conservancy	Dane
Pioneer Park	Dane
Pleasant Valley Conservancy	Dane
Pleasure Valley Natural Resource Area	Dane
Rem-Elvers Creek	Dane
Rem-Vermont Creek	Dane
Salmo Pond County Park	Dane
Stewart County Park	Dane
Stream Bank Protection Fee Program	Dane
Sugar River E-Way	Dane
Summer Frolic Sunrise Park	Dane
Sunny Field Park	Dane
Sutter Farm Park	Dane
Thompson Memorial Prairie	Dane
Veteran's Memorial Park	Dane
Vicki-Ann Park	Dane
Viking Park	Dane
Voss Park	Dane
Walking Iron County Park	Dane
Waltz Park	Dane

Name	County
Westview Conservancy	Dane
Westview Park	Dane
White Oak Woodland Conservancy	Dane
Zander Community Nature Park	Dane
Baus Park	Grant
Bell Park	Grant
Bloomington Ball Fields	Grant
Bloomington Fairgrounds	Grant
Cassville Bluffs	Grant
City Hall Park	Grant
Dewey Heights Prairie State Natural Area	Grant
Grant County Fairground	Grant
Harrison Park	Grant
Highland Park	Grant
Indian Park	Grant
Jenor Tower Park	Grant
Klondyke Park	Grant
Legion Park	Grant
Memorial Park	Grant
Miners Field	Grant
Montfort Ballfield	Grant
Montfort Swimming Pool	Grant
Mound View Park	Grant
MVC Borah Creek Prairie SNA	Grant
Nelson Dewey State Park	Grant
Oakwood Nature Park	Grant
Pool Park	Grant
Prairie View Park (Undeveloped)	Grant
Rem-Bailie Branch	Grant
Rem-Blue River	Grant
Rem-Borah Creek	Grant
Rem-Grant River	Grant
Rem-Little Grant River	Grant
Rem-Little Platte River	Grant
Rem-Martin Branch	Grant
Rem-Rogers Branch	Grant

Name	County
Riverside Park	Grant
Rollo Jamison	Grant
Ryland Park	Grant
School Community Playground	Grant
Schreiner Park	Grant
Sherman park	Grant
Skate Park	Grant
Smith Park	Grant
Sports Center	Grant
Tower Park	Grant
U.W. Platteville	Grant
U.W. Platteville Greenbelt Park	Grant
Upper Mississippi River National Wildlife and Fish Refuge	Grant
Valley View Park	Grant
Village Park	Grant
Westview Park	Grant
Arena Pines and Sand Barrens State Natural Area	Iowa
Arena Village Park	Iowa
Barneveld Memorial Park	Iowa
Barneveld Prairie State Natural Area	Iowa
Blue Mound State Park	Iowa
Centennial Park	Iowa
Cobb-Highland Nature Center	Iowa
Governor Dodge State Park	Iowa
Harris Park	Iowa
Highland Village Park	Iowa
Kittleson Krest Park	Iowa
Mecalf Park	Iowa
Military Ridge Prairie Fee	Iowa
Oakham Lawn Park	Iowa
Pecatonica River Woods	Iowa
Pine Cliff	Iowa
Quail Ridge Park	Iowa
Rem-Blue River	Iowa
Rem-Conley Smith Creek	Iowa
Rem-Dickinson Creek	Iowa

Name	County
Rem-Harker Creek	Iowa
Rem-Love Creek	Iowa
Rem-Otters Creek	Iowa
Ridgeway Pine Relict	Iowa
Ridgeway Pine Relict State Natural Area	Iowa
School Park	Iowa
Springer Park	Iowa
Stream Bank Protection Fee Program	Iowa
Thompson Memorial Prairie	Iowa
Trout Creek Fishery Area-Iowa	Iowa
Trout Creek Watershed	Iowa
Village Park	Iowa
Wilson Park	Iowa
Belmont Mound State Park	Lafayette
Belmont Mound Woods State Natural Area	Lafayette
Belmont Prairie State Natural Area	Lafayette
First Capitol State Park	Lafayette
Ipswich Prairie State Natural Area	Lafayette
Platte Mound Park	Lafayette
Iowa	
Driftless Area NWR	Clayton
Turkey River Mounds State Preserve	Clayton
Upper Mississippi River National Wildlife and Fish Refuge	Clayton
Bankston Park	Dubuque
Driftless Area NWR	Dubuque
Holy Cross City Park	Dubuque
Luxemburg City Park	Dubuque
White Pine Hollow State Preserve	Dubuque

CARDINAL-HICKORY CREEK TRANSMISSION LINE PROJECT

FIGURE 4-14
RECREATION

CARDINAL SUBSTATION

Lower Wisconsin River Road Scenic Byway

RICHLAND COUNTY
SAUK COUNTY
DANE COUNTY
IOWA COUNTY
GRANT COUNTY
LAFAYETTE COUNTY

Muscoda
Avoca
Lone Rock
Spring Green
Taliesin
House on the Rock
Arena
Mazomanie
Black Earth
Cross Plains
Middleton
Madison
Verona
Monticello
Highland
Gov. Dodge State Park
Blue Mound State Park
Barneveld
Blue Mounds
Mount Horeb
Ridgeway
Dodgeville
Cobb
Montfort
Linden
Livingston
Mineral Point
Rewey
Platteville
Hollandale

Ice Age Trail
Military Ridge State Trail

Project Study Area
Outside Project Study Area

RECREATION

Recreational Areas*

* Includes Federal and State Wildlife Refuges, State Fishery Areas, State Natural Areas, and Federal, State, County and Municipal Parks.

- Trail
- Cross Plains Ice Age Complex
- Ice Age Trail Corridor
- Substation
- Interstate, US or State Highway
- Scenic Byway
- Rustic Road
- County Highway
- Railroad
- State Boundary
- City / Village
- County Boundary
- Open Water

MINNESOTA
WISCONSIN
IOWA
ILLINOIS
Lake Michigan
Map Area Shown in Red

0 1 2 3 4 5
Miles

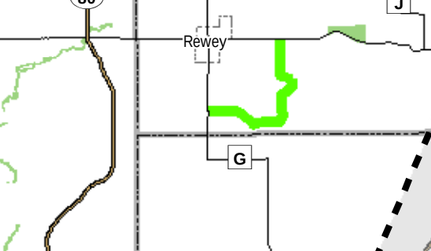
AMERICAN TRANSMISSION COMPANY®
ITC
DAIRYLAND POWER COOPERATIVE
A Touchstone Energy® Cooperative

F:\Projects\C-HC\Mxds\MCS\Figure 4-14 Recreation Resources.mxd

Data Sources: ATC, DPC, IDNR, IDOT, ITC, USGS, WDNR, WDOT. 9/08/16

CARDINAL-HICKORY CREEK TRANSMISSION LINE PROJECT

FIGURE 4-15
RECREATION



Project Study Area
Outside Project Study Area

RECREATION
Recreational Areas*

* Includes Federal and State Wildlife Refuges, State Fishery Areas, State Natural Areas, and Federal, State, County and Municipal Parks.

Ice Age Trail Corridor
Scenic Byway
Substation
Interstate, US or State Highway
Trail
Rustic Road
County Highway
Railroad
State Boundary
County Boundary
City / Village
Open Water

0 1 2 3 4 5
Miles

AMERICAN TRANSMISSION COMPANY®
ITC
DAIRYLAND POWER COOPERATIVE
A Touchstone Energy® Cooperative

F:\Projects\C-HC\Mxds\MCS\Figure 4-15 Recreation Resources.mxd

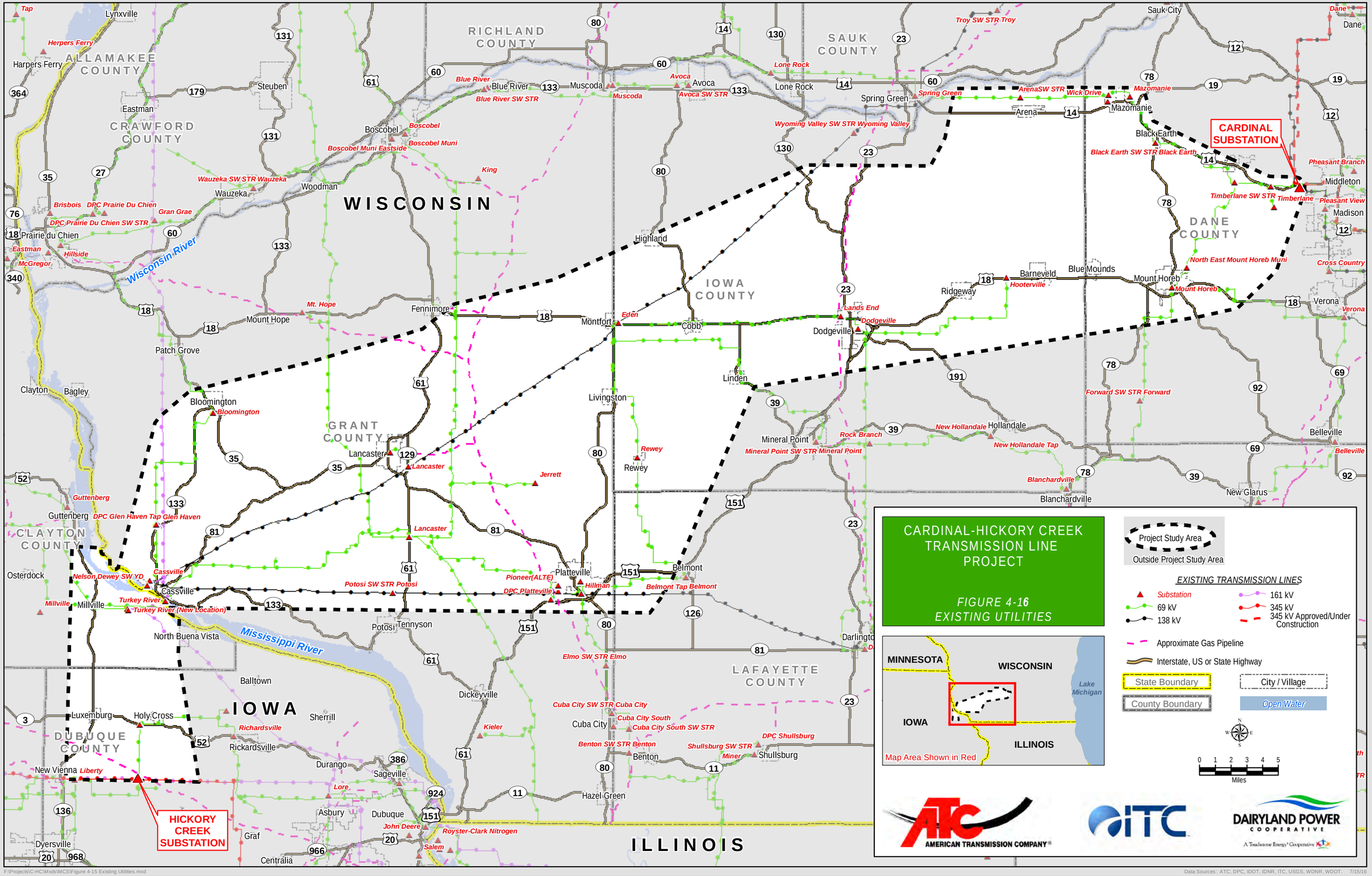
Data Sources: ATC, DPC, IDNR, IDOT, ITC, USGS, WDNR, WDOT. 7/27/16

4.11 Existing Transmission Lines

There are several 69 kV transmission lines that occur within the Project Study Area, a few 138 kV lines, a 161 kV line, and a 345 kV line. Also, other 345kV transmission lines connect to the Cardinal and Hickory Creek Substations from other directions. The existing transmission lines are depicted on Figure 4-16.

4.12 Other Utility Corridors

Other utility corridors including pipelines and distribution lines are abundant within the Project Study Area. Pipelines are also depicted on Figure 4-16.



CARDINAL-HICKORY CREEK TRANSMISSION LINE PROJECT

FIGURE 4-16
EXISTING UTILITIES

F:\Projects\C-HC\Mxds\MCS\Figure 4-15 Existing Utilities.mxd

Data Sources: ATC, DPC, IDOT, IDNR, ITC, USGS, WDNR, WDOT. 7/15/16

5.0 PROCESS THE UTILITIES USED TO DEVELOP THE MACRO-CORRIDORS

The Utilities developed their macro-corridors by first identifying numerous corridors that would qualify under the state siting laws. These corridors were subsequently narrowed and some revised or eliminated based on potential resource impacts and input from numerous parties.

5.1 State Routing Laws

Both Wisconsin and Iowa law specify how the Utilities must begin route planning and select their alternative routes for a new transmission line project.

5.1.1 Public Service Commission of Wisconsin

The PSCW and the WDNR work together to review and either approve or deny the required state approvals for proposed transmission projects in Wisconsin. The PSCW has jurisdiction over the CPCN that must be obtained by a public utility prior to constructing a transmission line that is 345 kV or greater in the state of Wisconsin. The WDNR issues permits for transmission line projects requiring a CPCN, including wetlands and storm water discharge permits. Wis. Stat. §§ 283.33(1)(a) or (am) and 281.36.

In determining the route, the PSCW must follow the Siting Priorities Law, which establishes priority transmission corridors. The Siting Priorities Law provides:

> (6) Siting of electric transmission facilities. In the siting of new electric transmission facilities, including high-voltage transmission lines, as defined in s. 196.491 (1) (f), it is the policy of this state that, to the greatest extent feasible that is consistent with economic and engineering considerations, reliability of the electric system, and protection of the environment, the following corridors should be utilized in the following order of priority:
>
> (a) Existing utility corridors.
> (b) Highway and railroad corridors.
> (c) Recreational trails, to the extent that the facilities may be constructed below ground and that the facilities do not significantly impact environmentally sensitive areas.
> (d) New corridors. (Wis. Stat. § 1.12(6)).

5.1.2 Iowa Utilities Board

The IUB is responsible for reviewing and granting approval for the Project in Iowa for any portion of the transmission line outside of municipal boundaries. (Iowa Code § 478.1). A franchise from the IUB must be obtained for each county traversed by a proposed transmission line of 69 kV or more before

construction can begin. (Iowa Code § 478.1(1)). The IUB must find that the proposed line is necessary to serve a public use and represents a reasonable relationship to an overall plan of transmitting electricity in the public interest.

Transmission line routes must comply with Iowa Code § 478.18(2) and 199 IAC 11.1(7), which require that the planning for routes begin with routes that are near or parallel to roads, railroad right-of-way, or division lines of land. "A transmission line shall be constructed near and parallel to roads, to the right-of-way of the railways of the state, or along the division lines of the lands, according to the government survey, wherever the same is practicable and reasonable, and so as not to interfere with the use by the public of the highways or streams of the state, nor unnecessarily interfere with the use of any lands by the occupant." (Iowa Code § 478.18(2)).

5.2 Electrical System Requirements

The Project must connect the Hickory Creek Substation in northeast Iowa to the Cardinal Substation in south-central Wisconsin, with both endpoints selected by MISO as part of the development and approval of the MVP Portfolio. To achieve the full benefits indicated by the MVP analysis, MISO also requires an intermediate substation, which is planned as a 345/138 kV substation near Montfort, Wisconsin (referred to as the "Montfort Substation Siting Area").

5.3 The Utilities' Comprehensive Outreach Program

Over the last four years, the Utilities provided information to and sought feedback from different groups. Below, the outreach efforts are described according to five categories: tribes, governmental agencies, public officials, utilities, and all other interested parties. Appendix D contains a summary of all public outreach.

5.3.1 Tribal Nations

Twenty Native American tribes were identified as having a potential interest in the Project. The Utilities sent letters to these tribes on May 11, 2016, providing information and maps regarding the Project and requesting input on the macro-corridors. The letter, which expressly stated it was not formal consultation, requested comments on the macro-corridors and offered to meet with the tribes. The letter and a list of tribal recipients are attached at Appendix E. To date, no comments have been received in response to this outreach.

5.3.2 Governmental Agencies

From 2012 up through the preparation of this MCS, the Utilities contacted federal, state, and local agencies to obtain baseline resource data and to discuss routing concerns and permitting requirements. Appendix G provides a list of all in-person outreach (substantive meetings and calls) with federal, state, and local agencies with jurisdiction over the Project. All federal, state, and local agency correspondence and substantive emails are attached at Appendix H.

5.3.3 Public Officials

The Utilities have conducted two waves of outreach to legislators (federal and state) as well as local public officials and staff (collectively "Public Officials"). In 2014, the Utilities sent letters to nearly 585 Wisconsin Public Officials having a jurisdiction within 1 mile of potential corridors that fell under Wisconsin Siting Priorities Law. The Utilities met with at least one local official from nearly all of 73 local units of government falling within that same area. The outreach conducted with Public Officials is listed in Appendix I. The outreach process used by the Utilities in Wisconsin followed ATC's standard procedures for such outreach.

In 2016, after the study area had been narrowed and the macro-corridors defined, the Utilities sent open house invitation letters to nearly 358 Wisconsin Public Officials having jurisdiction within 300 feet of the macro-corridors and met with at least one local official from nearly all of the 47 local units of government within that narrowed area. The Utilities also sent letters to 183 Wisconsin Public Officials who no longer had jurisdiction over the macro-corridors that were under consideration at that time, because the area the Public Officials represented was not within 300 feet of the macro-corridors.

In Iowa and Illinois, outreach with public officials was conducted over the same time period as in Wisconsin but was more focused on the Mississippi River crossing areas. Outreach was conducted with the cities of Dubuque and Guttenberg in Iowa as well as East Dubuque, Illinois. In addition, outreach was conducted with Clayton and Dubuque counties in Iowa.

Appendices F and J contain reports explaining how these Public Officials were identified and the outreach conducted. In addition to these two waves of outreach, the Utilities periodically receive and respond to requests or comments from Public Officials.

5.3.4 Utilities

As part of the outreach process, electric utilities, municipal utilities or cooperatives with service territories within the Initial Study Area and Project Study Area were contacted prior to public open houses so that they were aware of the Project and the upcoming public outreach. This practice helps inform utilities who

may get questions from their own electric customers located within the study areas. Appendix K lists the utility outreach conducted.

5.3.5 Other Interested Parties

The Utilities obtained input from other interested parties through several forums: conversations at open houses and other meetings; phone calls in response to open house invitations, newsletters, and media coverage; email; and mail. "Other Interested Parties" includes landowners and businesses near a corridor; the general public in a study area; non-governmental organizations (e.g. environmental groups, renewable energy advocates, hunting and fishing organizations, lake associations, snowmobile groups, all-terrain vehicle groups, trails groups, civic groups, and chambers of commerce); and any other party who has expressed an interest in this Project. Appendix K also lists the outreach conducted with non-governmental organizations.

5.3.5.1 Public Open Houses

The Utilities have hosted two rounds of open houses, which facilitate one-on-one exchanges between the Utilities and interested parties. Attendees could attend and participate any time during the hosted time frame, obtain information and visit the following key topic stations:

- Transmission Planning;
- Regulatory Review Process;
- Environmental;
- Engineering and Design;
- Real Estate and ROW; and
- Comments and Feedback.

Members of the Utilities' routing and siting teams, local relations, government affairs, and project managers also were available at meetings to discuss the Project with interested parties. In Wisconsin, GIS stations also were available at the 2016 open houses in order to provide detailed maps of macro-corridors for landowners and other interested parties.

In Iowa, public outreach is typically commenced with a formal public informational meeting conducted by the Iowa Utilities Board. (*See* Iowa Code § 478.2). Iowa code states that a utility cannot contact landowners regarding right-of-way acquisition until after this public informational meeting is held. (Iowa Code § 478.2(4)). However, for this Project, a public open house was held in May 2016 in Iowa to obtain landowner and stakeholder feedback on the macro-corridors for purposes of developing this MCS.

5.3.5.1.1 Open Houses in 2014

Open house meetings were held on October 6 to 9, 2014, only in Wisconsin in the communities of Lancaster, Belmont, Dodgeville, and Middleton.[5] In 2014, the Utilities were using the Initial Study Area, which is shown in Figure 5-1.

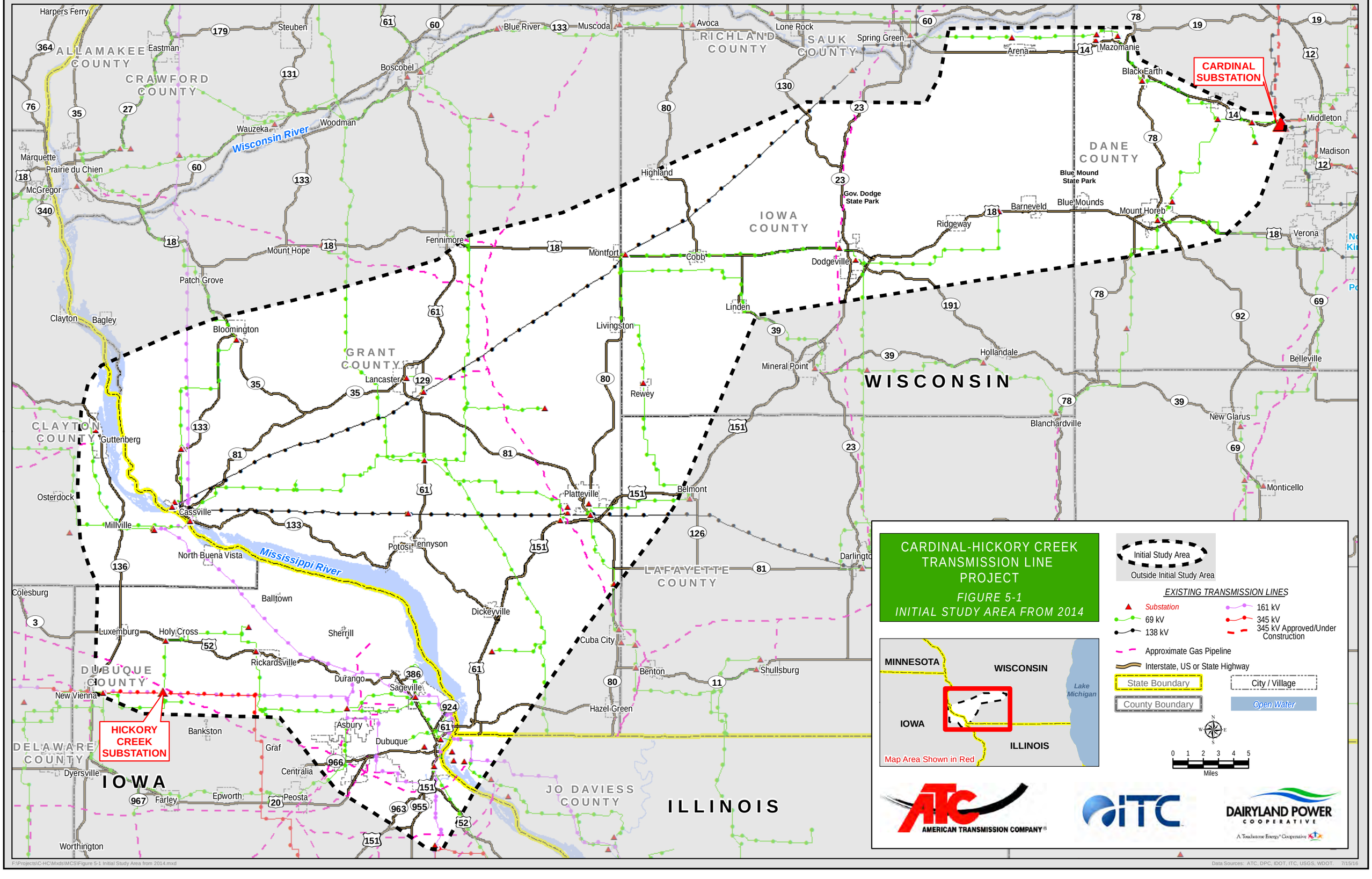
Invitations were sent to landowners within the Initial Study Area whose property was located within one mile of any existing corridor listed as a priority under Wisconsin law (viz., existing utility corridors, highway and railroad corridors, and recreational trails). Invitations also were sent to Public Officials in that same area and anyone the Utilities identified with a possible interest in the Project. The invitation included an invitation letter, a map of the Initial Study Area and a postage-paid self-mailer comment card for written comments. A total of 23,474 invitations were mailed for the 2014 open houses. Anyone receiving an invitation also received a reminder phone call. An explanation of these outreach activities can be found in the 2014 open house report attached at Appendix J.

A postal patron newsletter, media articles, and newspaper ads also included information about open house dates, times and locations.

At the open houses, attendees could provide comments either through written comment cards or entering them into computer kiosks. Comments also were received through the mail and the Project website. Comments about the Project were entered into the electronic stakeholder-relationship management system, reviewed by the Project team and used for routing and siting. These comments were used to help narrow the study area and define the macro-corridors.

Appendix J also includes a summary of the comments received through the 2014 open houses. The complete up-to-date compilation of the written comments will be submitted to RUS in late summer or early fall 2016.

[5] Open Houses were not held in Iowa in 2014 because of limitations contained in Iowa law on when utilities may contact landowners. (*See* Iowa Code § 478.2).



F:\Projects\C-HC\Mxds\MCS\Figure 5-1 Initial Study Area from 2014.mxd

Data Sources: ATC, DPC, IDOT, ITC, USGS, WDOT. 7/15/16

5.3.5.1.2 Open Houses in 2016

Between the first and second round of open houses, the study area was narrowed from the Initial Study Area (Figure 5-1) to the Project Study Area (Figure 1-2) and the macro-corridors were defined. The 2016 open houses were held May 16-19, 2016, in the communities of Platteville, and Barneveld, Wisconsin (in Barneveld two open house events were hosted back-to-back days), and Peosta, Iowa. Landowners and Public Officials within 300 feet of a macro-corridor, parties who had expressed an interest in the Project, and parties who had been previously identified by the Utilities as someone who may be interested in the Project received an invitation.

A postal patron newsletter, media articles, and newspaper ads also included information about open house dates, times, and locations.

In Wisconsin, attendees could obtain information at interactive GIS stations that contained satellite imagery reflecting specific parcels, areas of interest, and any macro-corridor. Similar to the 2014 open houses, written comments could be submitted at the open houses via mail, email, or the Project website. Appendix F also includes a summary of the comments received through the 2016 open houses.

Based on the input received at the 2016 open houses along with additional data and field reconnaissance, the Utilities further refined the macro-corridors into alternative corridors.

As summary of the locations, dates and attendance at the 2014 and 2016 open houses is displayed below as Table 5-1. The number of "individuals" counted in this table includes those who signed in and also attempted to capture those persons who did not sign in. (The Utilities had someone standing at the door counting people who walked past the sign-in sheets.)

Table 5-1: Location, Dates, and Attendance at Open Houses

Location	Date	Individuals
Round 1 Open Houses		
Grant City Fairgrounds Youth and Agriculture Center, 916 East Elm St, Lancaster, WI 53813	Monday, October 6, 2014	163
Belmont Convention Center and Banquet Hall, 102 W Mound View Ave, Belmont, WI 53510	Tuesday October 7, 2014	103
Dodger Bowl, 318 King St, Dodgeville, WI 53533	Wednesday, October 8, 2014	194
Marriott Madison West, 1313 John Q Hammons Dr, Middleton, WI 53562	Thursday, October 9, 2014	133
TOTAL Round 1		**593**

Location	Date	Individuals
Round 2 Open Houses		
Peosta Community Center, 7896 Burds Road, Peosta, IA 52068	Monday, May 16, 2016	37
Pioneer Lanes, 1185 US (Business) 151, Platteville, WI 52068	Tuesday, May 17, 2016	186
Deer Valley Lodge, 401 West Industrial Drive, Barneveld, WI 53507	Wednesday, May 18, 2016	262
Deer Valley Lodge, 401 West Industrial Dr, Barneveld, WI 53507	Thursday, May 19, 2016	198
TOTAL Round 2		**683**
TOTAL (Round 1 and 2 Combined)		**1,276**

5.3.5.2 Newsletters

Appendix L summarizes the public informational materials--such as newsletters, fact sheets, website, and maps--that have been released or distributed.

5.4 Identification of Opportunities and Constraints[6]

The criteria considered for routing transmission lines include routing opportunities (existing linear features as specified in Wisconsin and Iowa law) and routing constraints or sensitivities (elements of the human and natural environment that could conflict with the location of a transmission line). The subsections below summarize the routing criteria used for this Project.

5.4.1 Routing Opportunities Considered

RUS defines routing opportunities as areas that provide the highest potential for routing a line based on the presence of existing linear features, which allow for co-location and minimization of adverse impacts.[7] As discussed in section 5.1, the states of Wisconsin and Iowa both have transmission siting

[6] Section 5.4 does not apply to the potential river crossings, which were evaluated in the ACA. See Section 3.2.1, above.

[7] The RUS Guidance defines "opportunities" as follows:

> Areas within which transmission line construction would be more compatible with the current land use, or have a reduced likelihood of additional impacts, resulting in more efficient line operation and management. Potential opportunities include but are not limited to existing transmission line/utility corridors, transportation rights-of-way, industrial areas, National Corridors, or along property boundaries. (RUS, 2016, Exhibit D, Attachment D-2, p. 3).

laws specifying how route planning must be initiated (Iowa) and how routing opportunities must be considered.

Figure 5-2[8] presents a map illustrating the routing opportunities identified within the Project Study Area and the type of existing linear facility being utilized by each.

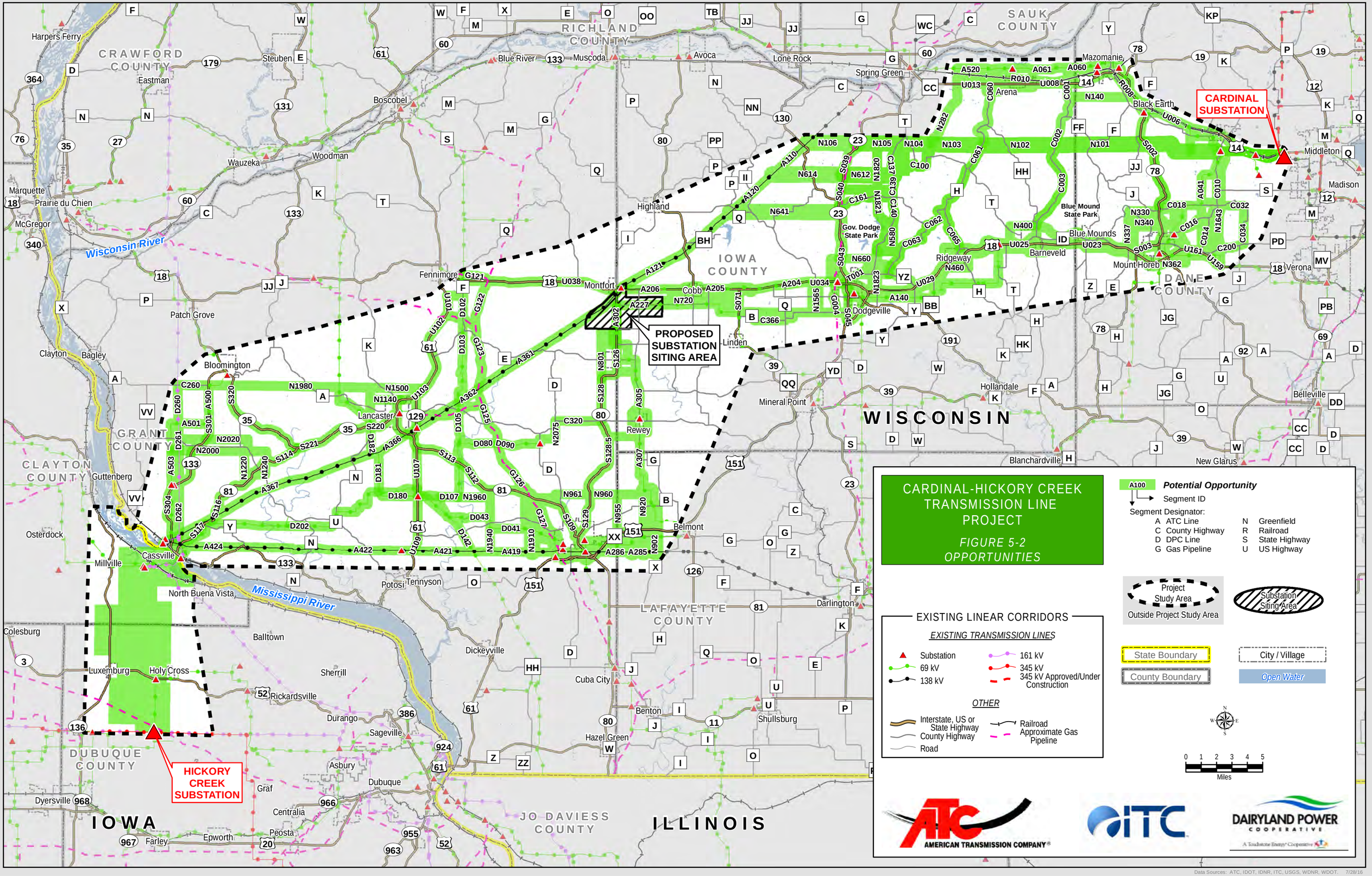
The following subsections describe why these linear features are considered opportunities and how the Utilities considered them in developing the macro-corridors.

5.4.1.1 Existing Utility Corridors

Under Wisconsin law, existing utility corridors are given top priority in locating a route for a new a transmission line. Several utility corridors exist within the Project Study Area in Wisconsin. Following or co-locating with these existing features minimizes aesthetic, land use, and environmental effects. In addition, these existing features are often considered opportunities because the surrounding properties have usually already been developed or adapted to the presence of a transmission line.

Smaller-scale utility facilities (electric/gas distribution lines) were not generally considered strong opportunities due to their location (because they serve individual customers these facilities are located nearby customers). Additionally, a larger amount of ROW in addition to the existing ROW would likely be needed to accommodate the Project.

[8] Naming Convention for the Maps: Each routing opportunity within the Project Study Area is identified with a segment letter and segment number. The segment letter corresponds to the type of linear feature that the routing opportunity follows: A - ATC transmission line; D – Dairyland transmission line; C - County highway; G - Gas pipeline; M - Major road; N – New (greenfield) corridors; O – Other; P – Public land survey system section line; R – Railroad; S - State highway; and U - Federal highway. Each segment is also given a unique number that is listed after the letter. For example, A100 denotes a unique segment that follows an existing ATC transmission line in the Project Study Area.


CARDINAL SUBSTATION
PROPOSED SUBSTATION SITING AREA
HICKORY CREEK SUBSTATION
Harpers Ferry
CRAWFORD COUNTY
Steuben
Eastman
Boscobel
Blue River
Muscoda
RICHLAND COUNTY
Avoca
Lone Rock
Spring Green
SAUK COUNTY
Mazomanie
Arena
Black Earth
Middleton
Madison
Marquette
Prairie du Chien
McGregor
Wisconsin River
Wauzeka
Woodman
Highland
Blue Mound State Park
Blue Mounds
Barneveld
Ridgeway
Mount Horeb
Verona
DANE COUNTY
Fennimore
Montfort
Cobb
Gov. Dodge State Park
Dodgeville
IOWA COUNTY
Patch Grove
Linden
Clayton
Bagley
Bloomington
Lancaster
Mineral Point
Hollandale
Belleville
WISCONSIN
GRANT COUNTY
CLAYTON COUNTY
Guttenberg
Rewey
Belmont
Blanchardville
New Glarus
Osterdock
Cassville
Millville
North Buena Vista
Mississippi River
Potosi
Tennyson
Darlington
LAFAYETTE COUNTY
Colesburg
Balltown
Dickeyville
Luxemburg
Holy Cross
Sherrill
Cuba City
Benton
Shullsburg
Rickardsville
Durango
Sageville
Hazel Green
DUBUQUE COUNTY
Asbury
Dubuque
Graf
Dyersville
Centralia
Peosta
Epworth
Farley
IOWA
JO DAVIESS COUNTY
ILLINOIS
CARDINAL-HICKORY CREEK TRANSMISSION LINE PROJECT
FIGURE 5-2
OPPORTUNITIES
A100 Potential Opportunity
Segment ID
Segment Designator:
A ATC Line
C County Highway
D DPC Line
G Gas Pipeline
N Greenfield
R Railroad
S State Highway
U US Highway
Project Study Area
Outside Project Study Area
Substation Siting Area
EXISTING LINEAR CORRIDORS
EXISTING TRANSMISSION LINES
Substation
69 kV
138 kV
161 kV
345 kV
345 kV Approved/Under Construction
OTHER
Interstate, US or State Highway
County Highway
Road
Railroad
Approximate Gas Pipeline
State Boundary
County Boundary
City / Village
Open Water
0 1 2 3 4 5
Miles
AMERICAN TRANSMISSION COMPANY®
ITC
DAIRYLAND POWER COOPERATIVE
A Touchstone Energy® Cooperative
Data Sources: ATC, IDOT, IDNR, ITC, USGS, WDNR, WDOT. 7/28/16

5.4.1.2 Transportation Corridors

In Wisconsin, transportation corridors are given second priority after existing utility corridors. In Iowa, route development must begin with routes that are near, among others, roads and active railroad corridors.

Accordingly, the Utilities identified existing federal, state and county highways as well as active railroad corridors in Wisconsin. In Iowa, the Utilities identified roads and active railroad corridors.

5.4.1.3 Division Lines of Land (Including Section, Quarter Section, and Quarter-Quarter Section Lines)

In Iowa, in addition to beginning route development with roads and railroad right-of-way, a utility must also start with division lines of land. The Utilities, therefore, identified division lines of land in Iowa. Wisconsin does not recognize land division lines in its Siting Priorities Law, so land division lines were only considered in Wisconsin when utilizing new corridors (see subsection 5.7.1.5).

5.4.1.4 Recreational Trails

In Wisconsin, recreational trails are third in the order of siting priority. Where primary and secondary opportunities were absent in Wisconsin, the Utilities explored nearby recreational trails.[9] The Utilities are not currently proposing that the Project co-locate with any recreational trails.[10]

5.4.1.5 New Corridors

If no other priority corridors are available in Wisconsin, then, and only then, may the Utilities look to new corridors. Where new corridors were considered in Wisconsin, the Utilities tried to follow section lines, quarter section lines, property lines, fence lines, and/or other linear features to the extent practicable. In Iowa, planning for a route must begin with routes that are near and parallel to roads, railroad rights-of-way, or division lines of land. When a route near and parallel to these features is not practicable and reasonable for engineering reasons, deviations may be proposed. In Iowa, although deviations based on landowner preference or minimizing interference with land use may be permitted, route planning must be shown to begin with a route or routes near and parallel to roads, railroad rights-of-way, or division lines of land.

[9] In some cases, the environmental constraints associated with a trail could prevent recreational trails from being utilized. The law also specifies that recreational trails are only a priority "to the extent that the facilities may be constructed below ground." Wis. Stat. § 1.12(6)(c).

[10] The Project parallels USH 151 and, for approximately 16.9 miles along this proposed corridor, the Military Ridge State Trail also generally parallels USH 151.

5.4.2 Routing Constraints Considered

Constraints are natural and human environmental factors that could conflict with constructing or operating a transmission line and/or could have more rigorous permitting or licensing requirements.[11] Routing constraints include, but are not limited to, those identified below (in no order of priority):

- Agricultural Lands of Statewide Importance;
- Airport Obstruction-Free Zones/Airport Approach Flight Paths;
- Airports (public and private);
- Archeological Sites;
- Center Pivot Irrigation Systems (where structures would interfere with irrigation);
- Confined Animal Feeding Operations ("CAFO");
- Conservation Easements;
- County Forests and Forest Management Areas;
- County Parks and Recreation Areas;
- Designated or Registered National Historic Districts;
- Existing Residential Areas;
- Federal, State, and County Land (not otherwise protected);
- Floodways/Floodplains;
- Geologically Unstable or Highly Erosive Areas;
- Hospitals/Nursing Homes;
- Landfills/Dumps;
- Licensed Day Cares;
- Memorial Parks/Cemeteries;
- Military Reservation/Installation;
- Mines, Quarries and Gravel Pits;

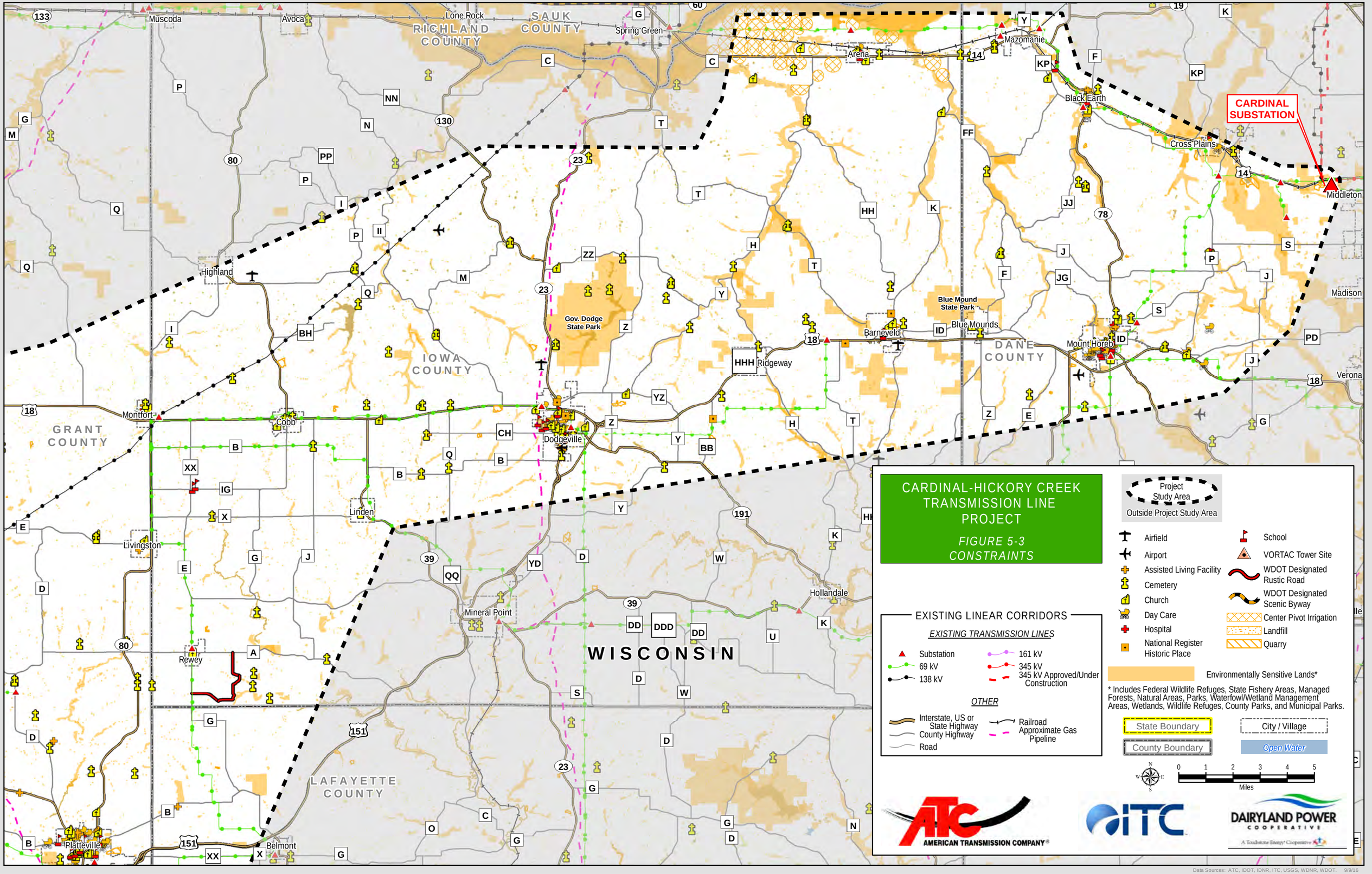
[11] RUS defines "constraints" as following:

> Areas having one or more physical, environmental, institutional or statutory impediments to corridor designation. Areas that may be crossed by corridors only if necessary, and if reasonable mitigation or avoidance of significant impacts can be obtained. Areas where the proposed action conflicts with existing land use, development, or resources. These areas should be avoided when other reasonable alternatives exist. In addition to resource and land use constraints, engineering and economic constraints must be considered (e.g., topography, span limitations, railroads/highway/river crossings, access roads, etc.) (RUS, 2016, Exhibit D, Attachment D-2, p. 1).

- Municipal Parks and Parks Owned or Administered by Other Governmental Subdivisions;
- National and State Wilderness Areas;
- National Forests;
- National Landmarks;
- National Monuments;
- National Recreation Areas;
- National Register Historic Sites;
- National Wild and Scenic Rivers;
- National Wildlife Refuges;
- Native American Tribal Land;
- Nature Conservancy Preserves;
- Occupied Buildings/Dwellings;
- Open Water Expanses greater than 1,000 Feet;
- Places of Worship;
- Planned Residential Areas (Reference: Smart Growth Legislation Definition) or other planned development;
- Playgrounds;
- Population Centers (incorporated and unincorporated municipalities);
- Prime Farmlands (ref. A-1 zoning);
- Reserve Program Lands (conservation, wetland);
- Scenic Areas/Hill Crossings at Crests;
- Scenic Travel Routes; i.e., designated rustic roads;
- Schools;
- State and National Recreation Trails;
- State Forests and Forest Management Areas;
- State Natural Areas;
- State Parks and Recreation Areas;
- State Scientific Areas;
- State Wildlife Refuges, Wildlife Areas, Game Management Areas;
- State-Designated Wild and Scenic Rivers;
- Threatened and Endangered Species Critical Habitat Areas (Federal and State)
- Unique Habitats (oak savanna, fen, prairie remnants, etc.);
- VORTAC Tower Sites;

- Waterfowl Nesting or Rearing Areas;
- Wellhead Protection Areas; and
- Wetlands considered Areas of Special Natural Resource Interest as well as other wetlands.

Figures 5-3 shows these constraints in the eastern and western halves of the Project Study Area, respectively.



CARDINAL-HICKORY CREEK TRANSMISSION LINE PROJECT

FIGURE 5-3
CONSTRAINTS

Project Study Area
Outside Project Study Area

- Airfield
- Airport
- Assisted Living Facility
- Cemetery
- Church
- Day Care
- Hospital
- National Register Historic Place
- School
- VORTAC Tower Site
- WDOT Designated Rustic Road
- WDOT Designated Scenic Byway
- Center Pivot Irrigation
- Landfill
- Quarry

Environmentally Sensitive Lands*

* Includes Federal Wildlife Refuges, State Fishery Areas, Managed Forests, Natural Areas, Parks, Waterfowl/Wetland Management Areas, Wetlands, Wildlife Refuges, County Parks, and Municipal Parks.

State Boundary
County Boundary
City / Village
Open Water

EXISTING LINEAR CORRIDORS

EXISTING TRANSMISSION LINES

- Substation
- 69 kV
- 138 kV
- 161 kV
- 345 kV
- 345 kV Approved/Under Construction

OTHER

- Interstate, US or State Highway
- County Highway
- Road
- Railroad
- Approximate Gas Pipeline

N W E S

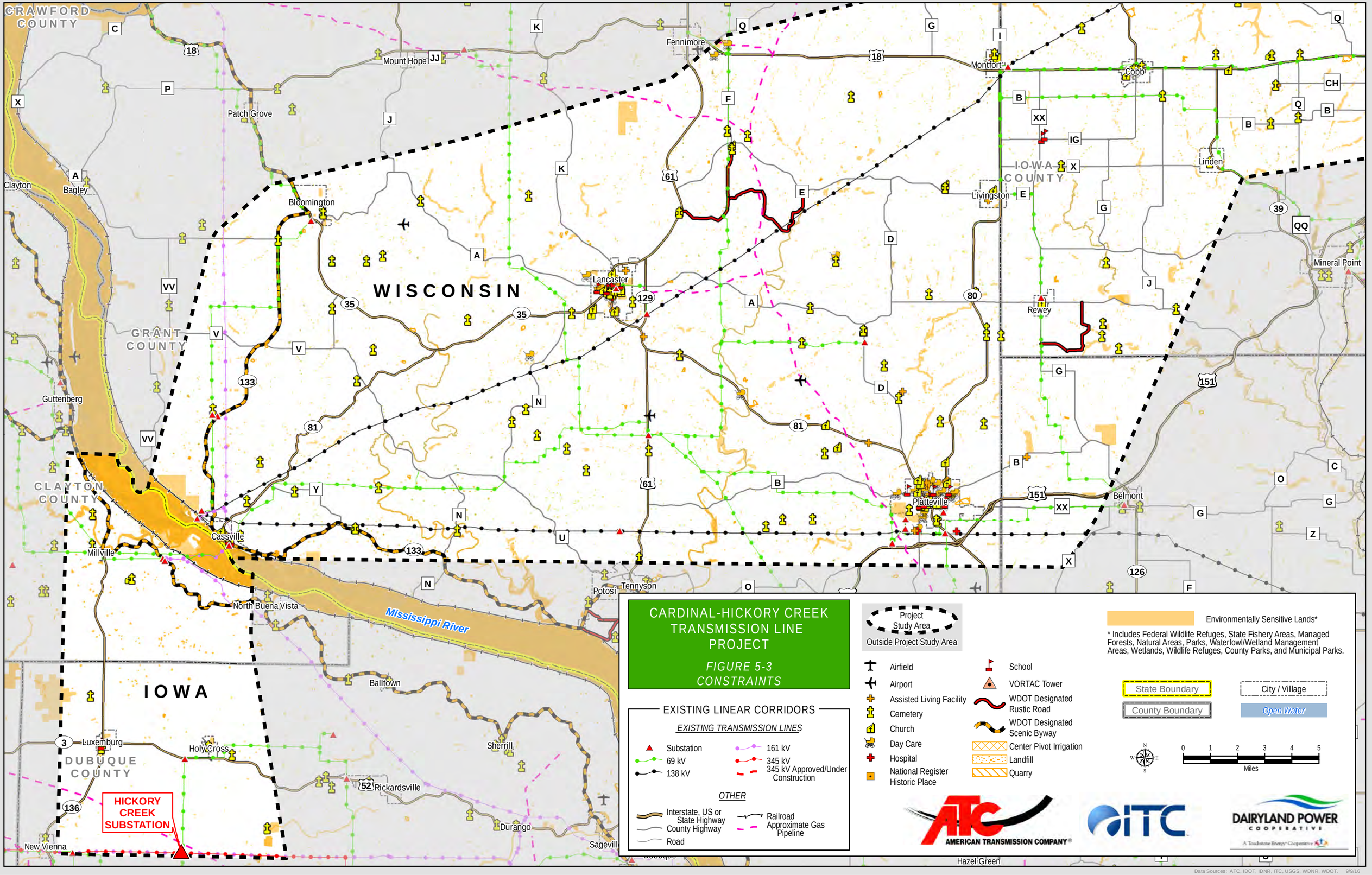
0 1 2 3 4 5 Miles

AMERICAN TRANSMISSION COMPANY®

ITC

DAIRYLAND POWER COOPERATIVE
A Touchstone Energy® Cooperative

Data Sources: ATC, IDOT, IDNR, ITC, USGS, WDNR, WDOT. 9/9/16


CRAWFORD COUNTY
GRANT COUNTY
CLAYTON COUNTY
DUBUQUE COUNTY
IOWA COUNTY
WISCONSIN
IOWA
Mississippi River
Fennimore
Mount Hope
Patch Grove
Clayton
Bagley
Bloomington
Lancaster
Montfort
Cobb
Linden
Livingston
Rewey
Mineral Point
Guttenberg
Cassville
Millville
North Buena Vista
Potosi
Tennyson
Platteville
Belmont
Balltown
Luxemburg
Holy Cross
Sherrill
Rickardsville
Durango
Sagevill
New Vienna
Hazel Green
HICKORY CREEK SUBSTATION
18
61
129
80
35
81
133
151
126
52
136
3
39
CARDINAL-HICKORY CREEK TRANSMISSION LINE PROJECT
FIGURE 5-3
CONSTRAINTS
EXISTING LINEAR CORRIDORS
EXISTING TRANSMISSION LINES
Substation
69 kV
138 kV
161 kV
345 kV
345 kV Approved/Under Construction
OTHER
Interstate, US or State Highway
County Highway
Road
Railroad
Approximate Gas Pipeline
Project Study Area
Outside Project Study Area
Airfield
Airport
Assisted Living Facility
Cemetery
Church
Day Care
Hospital
National Register Historic Place
School
VORTAC Tower
WDOT Designated Rustic Road
WDOT Designated Scenic Byway
Center Pivot Irrigation
Landfill
Quarry
Environmentally Sensitive Lands*
* Includes Federal Wildlife Refuges, State Fishery Areas, Managed Forests, Natural Areas, Parks, Waterfowl/Wetland Management Areas, Wetlands, Wildlife Refuges, County Parks, and Municipal Parks.
State Boundary
County Boundary
City / Village
Open Water
0 1 2 3 4 5
Miles
AMERICAN TRANSMISSION COMPANY
ITC
DAIRYLAND POWER COOPERATIVE
Data Sources: ATC, IDOT, IDNR, ITC, USGS, WDNR, WDOT. 9/9/16

6.0 THE UTILITIES' MACRO-CORRIDORS[12]

6.1 Identification of Potential Macro-Corridors

To identify potential macro-corridors within the Project Study Area, Utilities conducted an opportunities and constraints analysis using the results from field reconnaissance and GIS. Initial screening criteria were used to reduce the number of potential corridors. Specifically, the Utilities looked for routing opportunities that were not negatively impacted by routing constraints. Figure 6-1 shows the routing opportunities overlaid by constraints. In Wisconsin, all corridors were initially analyzed using a 3,000-foot to one-mile wide corridor centered on existing linear features. Each potential macro-corridor was then divided into segments allowing an analysis of each segment. In Iowa, the Utilities initially identified a broad potential macro-corridor, measuring approximately 12-miles long and approximately 5-miles wide and encompassing portions of Clayton and Dubuque Counties.

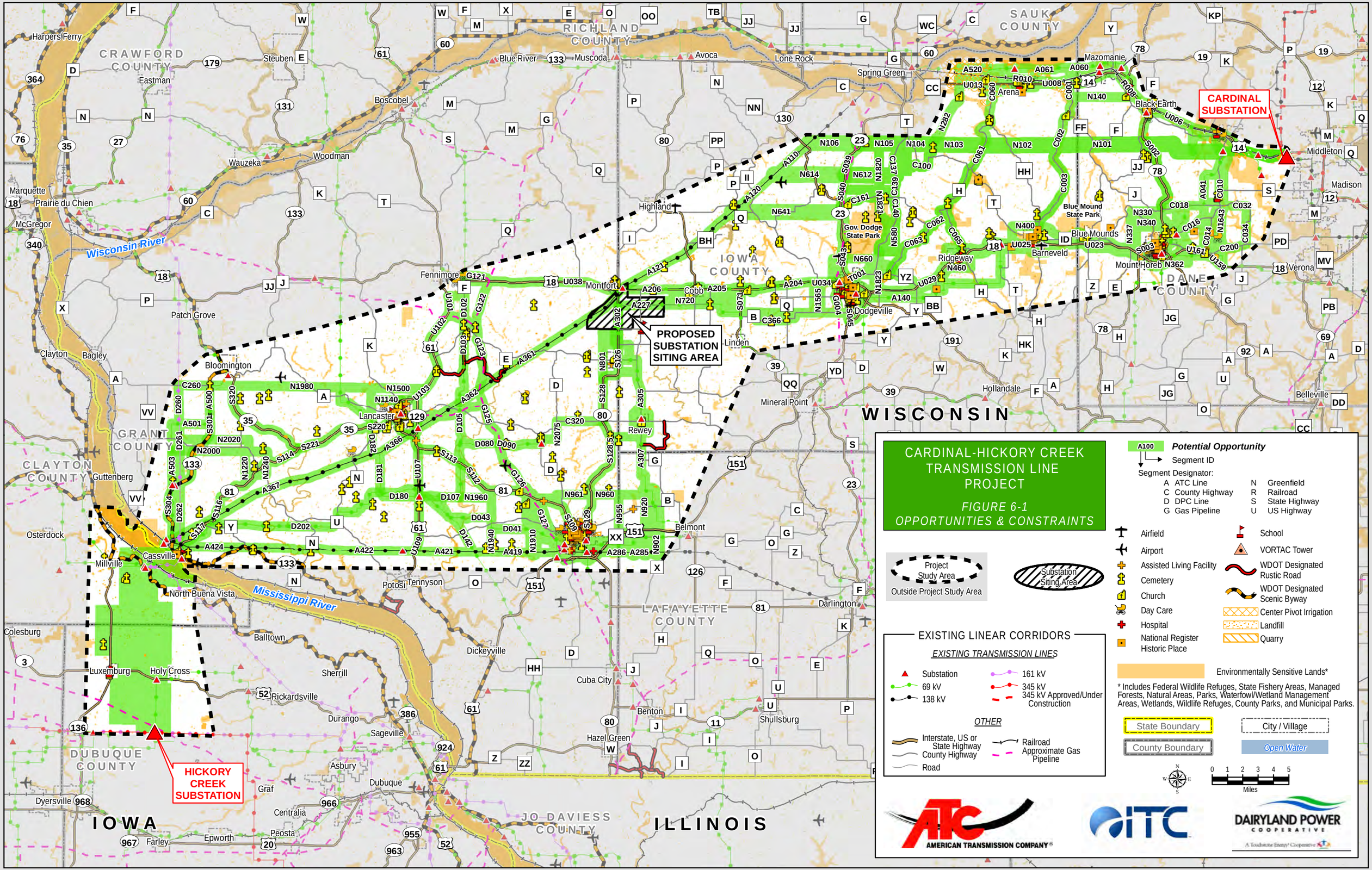
6.2 Opportunities and Constraints Evaluation by Siting Area

To better organize and summarize the analysis of routing opportunities and constraints considered in this MCS analysis, the Project Study Area is divided into three geographic areas, as follows:

- the "Cardinal Substation-to-Montfort Siting Area" that considered the routing options in the eastern part of the Wisconsin portion of the Project Study Area between the existing Cardinal Substation and the intermediate substation location in the Montfort area;
- the "Montfort-to-Mississippi River Siting Area" that considered the routing options in the western part of the Wisconsin portion of the Project Study Area between the intermediate substation location in the Montfort area and river crossing location; and
- the "Mississippi River-to-Hickory Creek Siting Area" that considered the routing options in the Iowa portion of the Project Study Area between the river crossing location and the existing Hickory Creek Substation.

The potential macro-corridors within each of the three siting areas are identified by color-code in Figure 6-2.

[12] Section 6 does not apply to the potential river crossings, which were evaluated in the ACA. See Section 3.2.1, above.



CARDINAL-HICKORY CREEK TRANSMISSION LINE PROJECT

FIGURE 6-1
OPPORTUNITIES & CONSTRAINTS

Project Study Area
Outside Project Study Area

Substation Siting Area

EXISTING LINEAR CORRIDORS

EXISTING TRANSMISSION LINES

- Substation
- 69 kV
- 138 kV
- 161 kV
- 345 kV
- 345 kV Approved/Under Construction

OTHER

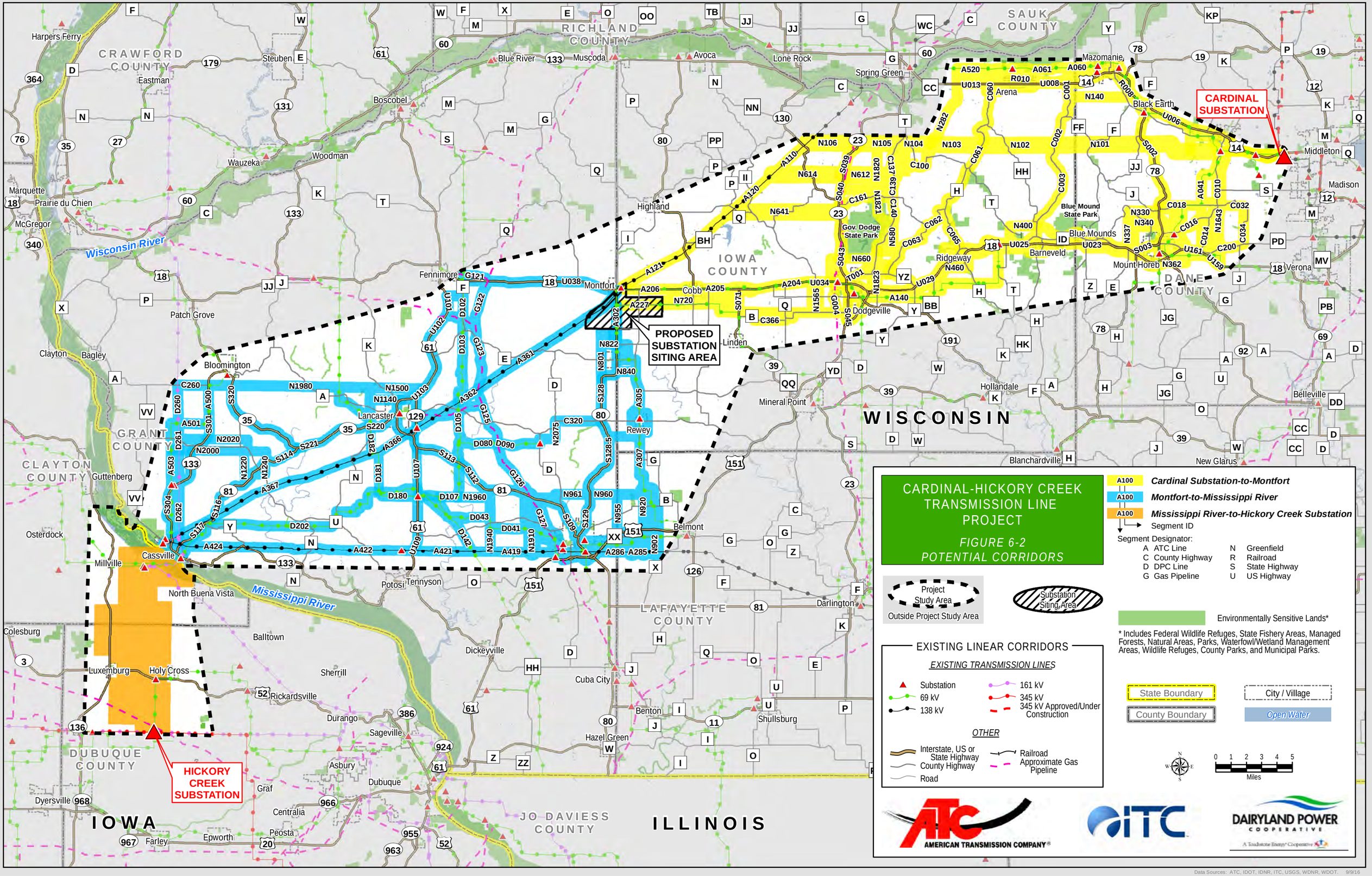
- Interstate, US or State Highway
- County Highway
- Road
- Railroad
- Approximate Gas Pipeline

AMERICAN TRANSMISSION COMPANY®

ITC

DAIRYLAND POWER COOPERATIVE
A Touchstone Energy® Cooperative

Data Sources: ATC, IDOT, IDNR, ITC, USGS, WDNR, WDOT. 9/9/16


CARDINAL SUBSTATION
PROPOSED SUBSTATION SITING AREA
HICKORY CREEK SUBSTATION
Harpers Ferry
CRAWFORD COUNTY
Eastman
Steuben
Boscobel
Wauzeka
Woodman
Marquette
Prairie du Chien
McGregor
Wisconsin River
Patch Grove
Clayton
Bagley
Bloomington
GRANT COUNTY
CLAYTON COUNTY
Guttenberg
Osterdock
Cassville
Millville
North Buena Vista
Mississippi River
Colesburg
Luxemburg
Holy Cross
Rickardsville
Durango
Sageville
DUBUQUE COUNTY
Dyersville
IOWA
Asbury
Dubuque
Graf
Centralia
Peosta
Epworth
Farley
Balltown
Sherrill
Dickeyville
Potosi
Tennyson
Fennimore
Montfort
Highland
Lancaster
Rewey
Linden
Cuba City
Benton
Hazel Green
Shullsburg
Mineral Point
Belmont
Lone Rock
Avoca
Muscoda
Blue River
RICHLAND COUNTY
Spring Green
Arena
Mazomanie
Black Earth
Blue Mound State Park
Gov. Dodge State Park
Barneveld
Blue Mounds
Ridgeway
Mount Horeb
Dodgeville
Cobb
IOWA COUNTY
SAUK COUNTY
DANE COUNTY
Middleton
Madison
Verona
Belleville
Hollandale
Blanchardville
New Glarus
Darlington
LAFAYETTE COUNTY
JO DAVIESS COUNTY
ILLINOIS
WISCONSIN
CARDINAL-HICKORY CREEK TRANSMISSION LINE PROJECT
FIGURE 6-2
POTENTIAL CORRIDORS
Project Study Area
Outside Project Study Area
Substation Siting Area
EXISTING LINEAR CORRIDORS
EXISTING TRANSMISSION LINES
Substation
69 kV
138 kV
161 kV
345 kV
345 kV Approved/Under Construction
OTHER
Interstate, US or State Highway
County Highway
Road
Railroad
Approximate Gas Pipeline
A100 Cardinal Substation-to-Montfort
A100 Montfort-to-Mississippi River
A100 Mississippi River-to-Hickory Creek Substation
Segment ID
Segment Designator:
A ATC Line
C County Highway
D DPC Line
G Gas Pipeline
N Greenfield
R Railroad
S State Highway
U US Highway
Environmentally Sensitive Lands*
* Includes Federal Wildlife Refuges, State Fishery Areas, Managed Forests, Natural Areas, Parks, Waterfowl/Wetland Management Areas, Wildlife Refuges, County Parks, and Municipal Parks.
State Boundary
County Boundary
City / Village
Open Water
0 1 2 3 4 5
Miles
AMERICAN TRANSMISSION COMPANY®
ITC
DAIRYLAND POWER COOPERATIVE
Data Sources: ATC, IDOT, IDNR, ITC, USGS, WDNR, WDOT. 9/9/16

A description of the opportunities and constraints for each of these three siting areas is provided below.

6.2.1 Cardinal–to-Montfort Siting Area - Wisconsin

This siting area is bounded by the following:

- the Cardinal Substation in the east;
- the Wisconsin River in the north;
- the communities of Mount Horeb and Dodgeville in the south; and
- the Eden substation and Iowa County border in the west.

This area has numerous existing utility corridors: an existing 138 kV transmission line from the Wyoming Valley Substation to the Eden Substation and a network of 69 kV transmission lines. Transportation corridors include: USH 14, USH 18, USH 80, USH 151, SH 23, SH 78, SH 92, SH 191, CTH B, CTH H, CTH ID, CTH J, CTH K, CTH P, CTH PD, CTH S, CTH T, CTH Y, CTH YZ, CTH Z, and CTH ZZ. Additional transportation opportunities include a railroad corridor near the Cardinal Substation and multiple local roads. When new corridors were required, the Utilities ensured that property, field, fence and section lines were available within the macro-corridor.

The major constraints within the Cardinal-to-Montfort Siting Area are the Ice Age Trail Corridor and Complex; Governor Dodge and Blue Mound State Parks; the Lower Wisconsin Riverway and associated wetlands; the House on the Rock; and several Important Bird Areas and SNAs. Additional constraints are the City of Dodgeville, and several smaller communities, along with residential development associated with those municipalities. Table 6-1 provides additional examples of constraints within the Cardinal-to-Montfort Siting Area.

6.2.2 Montfort-to-Mississippi River Siting Area - Wisconsin

This area is bounded by the following:

- the Montfort Substation Siting Area in the east;
- the Mississippi River at Cassville in the west;
- the communities of Fennimore and Bloomington in the north;
- Platteville in the southeast; and
- an existing 138 kV transmission line in the south.

Three existing utility corridors are located in this area: an existing 138 kV transmission line from the intermediate substation location to Cassville, an existing 138 kV transmission line from Platteville to

Cassville, and a network of 69 kV transmission lines. Existing transportation corridors within this section are USH 18, USH 61, USH 151, SH 35, SH 80, SH 81, SH 129, SH 133, CTH A, CTH D, CTH V, a railroad corridor near the Mississippi River and multiple local roads. When new corridors were required to connect potential macro-corridors, Utilities sought opportunities along property, field, fence and section lines.

The major constraints within the Montfort–to-Mississippi River Siting Area include the Refuge, and the Great River Road National Scenic Byway. Additional constraints are two confined animal feeding operations, two Important Bird Areas, the communities of Platteville, Fennimore, Lancaster, Cassville, and residential development associated with those municipalities. Table 6-1 provides additional examples of constraints within the Montfort-to-Mississippi River Siting Area.

6.2.3 Mississippi River-to-Hickory Creek Siting Area - Iowa

This siting area is bounded by the following:

- the Mississippi River crossing area in the north;
- the Hickory Creek Substation in the south; and
- the communities of Millville in the northeast, Luxemburg in the west, and Holy Cross in the east.

The routing opportunities include existing transportation corridors such as USH 52, SH 3, SH 136, multiple local roads, and a railroad corridor near the Mississippi River. In addition to roads and railroad corridors, Iowa law requires that routing begin with division lines of land, of which there are a number.

The major constraints associated with this siting area are the Turkey River Mounds State Preserve; White Pine Hollow State Preserve; Merritt Forest State Preserve; three Important Bird Areas; the Refuge; Bankston Park; and the Great River Road National Scenic Byway. Table 6-1 provides additional examples of constraints within the Mississippi River-to-Hickory Creek Siting Area.

The potential macro-corridors within each of the three siting areas are described in Table 6-1.

Table 6-1: Identification of Potential Macro-Corridors within Siting Areas of the Project Study Area

Siting Area	Existing Utility Corridors (applicable only in Wisconsin)	Routing Opportunities Along Existing Transportation Corridor	Routing Opportunities Along Property, Field, and Survey Lines	Constraints	Segment ID's
Cardinal Substation -to-Montfort Siting Area WISCONSIN	Existing 138 kV transmission line from Wyoming Valley to Eden Substation, a network of 69 kV transmission lines, and a natural gas pipeline.	Opportunities include USH 14, USH 18, USH 80, USH 151; SH 23, SH 78, SH 92, SH 191; CTH B, CTH H, CTH ID, CTH J, K, CTH P, CTH PD, CTH S, CTH T, CTH Y, CTH YZ, CTH Z, and CTH ZZ. Additional opportunities include a railroad corridor and multiple local roads.	Property, field, fence, and section lines	Lower Wisconsin Riverway and associated wetlands; Ice Age Trail Corridor, Ice Age Complex, and Ice Age National Scientific Reserve; Governor Dodge and Blue Mound State Park; Thompson Memorial Prairie, Barneveld Prairie, Arena Pines, Pleasant Valley Conservancy, and Sand Barrens State Natural Areas; Black Earth Creek Fishery Area; Black Earth and Trout Creek Wildlife Areas; the House on the Rock; Cave of the Mounds National Natural Landmark; Blackhawk Lake Recreation Area; private conservation lands; Governor Dodge State Park, Military Ridge-York Prairie, and Pecatonica River Prairie Important Bird Areas; City of Dodgeville; Villages of Arena, Blue Mounds; Cobb; Mazomanie, Mount Horeb, Black Earth, and Cross Plains; residential congestion.	A001, A002, A003, A004, A005, A020, A021, A022, A023, A024, A025, A028, A040, A041, A042, A043, A044, A045, A046, A047, A048, A060, A061, A062, A063, A080, A100, A101, A110, A120, A121, A140, A141, A180, A181, A182, A200, A201, A202, A203, A204, A205, A206, A227, A460, A461, A462, A463, A520, C001, C002, C003, C010, C012, C014, C016, C018, C019, C020, C030, C032, C034, C040, C060, C061, C062, C063, C064, C100, C137, C138, C139, C140, C141, C142, C160, C161, C180, C197, C200, C340, C350, C360, C362, C364, C366, G001, G002, G003, G004, N001, N002, N003, N004, N020, N040, N060, N061, N080, N081, N100, N101, N102, N103, N104, N105, N106, N120, N1280, N140, N1570, N1572, N1575, N160, N1615, N1620, N1622, N1625, N1630, N1635, N1640, N1641, N1642, N1643, N1644, N1650, M1655, N1660, N1670, N1680, N170, N171, N180, N1820, N1821, N1822, N1823, N1930N 200, N220, N260, N261, N262, N280, N281, N282, N283, N284, N300, N302, N303, N320, N330, N334, N335, N337, N340, N342, N345, N360, N361, N362, N380, N400, N460, N520, N521, N540, N541, N560, N580, N581, N610, N612, N614, N620, N621, N640, N641, N660, N680, N720, R001, R002, R003, R004, R005, R007, R008, R009, R00, R011, R012, R013, 2001, S002, S003, S020, S021, S040, S041, S042, S043, S045, S071, S081, S120, S121, T001, U001, U002, U003, U004, U005, U006, U007, U008, U009, U010, U011, U012, U013, U017, U018, U019, U020, U021, U022, U023, U024, U025, U026, U27, U028, U029, U030, U031, U032, U033, U034, U035, U036, U037, U060, U062, U063, U064, U159, U160, U161
Montfort-to-Mississippi River Siting Area WISCONSIN	A 138 kV transmission line from Wyoming Valley to Montfort; a 138 kV transmission line from Platteville to Cassville; a network of 69 kV transmission lines; a natural gas pipeline	USH 18, USH 61, and 151; SH 35, SH 80, SH 81, SH 129, SH 133; CTH A, CTH D, and CTH V. Additional opportunities include a railroad corridor near the Mississippi River and multiple local roads.	Property, field, fence, and section lines.	Upper Mississippi National Wildlife and Fish Refuge; Great River Road National Scenic Byway; Mississippi Valley Conservancy; Wyalusing to Dewey and Mississippi River Pool 12, 13, and 14 Important Bird Areas; Crapps Farm Partnership Confined Animal Feeding Operation; Majestic View LLC Confined Animal Feeding Operation; Cities of Lancaster, Platteville, Cassville, and Fennimore; residential congestion.	A284, A285, A286, A287, A288, A302, A303, A304, A305, A306, A307, A308, A310, A311, A312, A313, A357, A358, A361, A362, A363, A364, A365, A366, A367, A368, A369, A370, A380, A381, A400, A401, A402, A403, A404, A415, A416, A47, A418, A419, A420, A421, A422, A423, A424, A425, A426, A427, A428, A429, A430, A440, A441, A442, A443, A500, A50, A502, A503, A504, A505, A555, C260, C300, C310, C320, D035, D040, D041, D042, D043, D045, D050, D080, D090, D100, D102, D103, D104, D105, D106, D107, D108, D109, D12, D143, D144, D160, D161, D162, D180, D181, D182, D200, D201, D202, D203, D204, D220, D221, D222, D223, D260, D261, D262, D280, G121, G122, G123, G124, G125, G126, G127, G28, G129, G130, G131, G132, G160, G161, G180, G181, G182, N1100, N1140, N1141, N1220, N1240, N1500, N1880, N1900, N910, N1920, N1921, N1940, N1960, N1980, N1981, N2000, N2020, N2021, N2042, N2070, N2075, N800, N801, N820, N821, N822, N840, N860, N880, N900, N901, N902, N920, N921, N922, N940, N950, N955, N960, N961, R023, R024, R025, S109, S110, S111, S112, S113, S114, S115, S116, S117, S118, S119, S125, S126, S127, S128, S129, S130, S131, S132, S200, S201, S202, S202, S220, S221, S242, S244, S245, S246, S300, S301, S302, S303, S304, S305, S306, S320, U038, U039, U067, U068, U069, U070, U071, U072, U073, U101, U02, U103, U104, U105, U106, U107, U108, U109
Iowa – Mississippi River-to-Hickory Creek Siting Area IOWA	N/A	USH 52; SH 3, SH 136; multiple local roads; and a railroad corridor near the Mississippi River.	Property, field, fence, and section lines	Merritt Forest State Preserve; Turkey River Mounds State Preserve; White Pine Hollow State Preserve; Bankston Park; Wyalusing to Dewey, White Pine Hollow State Preserve, and Mississippi Important Bird Areas; Upper Mississippi National Wildlife and Fish Refuge; Great River Road National Scenic Byway.	N/A

6.3 Opportunity and Constraint Review of Potential Macro-Corridor Segments

GIS analyses were conducted to review each potential macro-corridor segment. For each segment the opportunities were compared against the constraints. The segments with the best opportunities and the overall lower presence of routing constraints were prioritized for further analysis. Corridor segments were compared to other segments providing similar function. Over 480 segments were analyzed.

The Utilities evaluated the preliminary results of these analyses to eliminate those segments that were most constrained and to reduce the width of the corridors where appropriate. Potential macro-corridors that maximized the use of the legally specified routing priorities and had the fewest constraints were retained for additional review and analysis, while the remaining corridors were removed from further consideration. The results of the review and analysis are discussed below and presented in Tables 6-2 and 6-3.

6.4 Macro-Corridor Analysis by Siting Area

6.4.1 Cardinal Substation-to-Montfort Siting Area - Wisconsin

This section begins with segments that exit the Cardinal substation to the west and follow an existing 69 kV transmission line, railroad, and USH 14. These segments are common to all macro-corridors, as these provide the only routing opportunities west out of the Cardinal Substation because of constraints in this area including the Ice Age Trail.

Once beyond the Ice Age Trail and Complex, the Utilities selected two general paths for macro-corridors: one westerly and the other southerly. The Utilities eliminated from consideration the potential corridors that proceeded northerly because of significant residential development (the communities of Cross Plains, Black Earth, Mazomanie, and Arena) and environmental constraints, such as the Lower Wisconsin Riverway and associated wetlands. Additionally, segments that connect these removed northern routes to corridors in the south were also removed as they were no longer necessary.

The macro-corridor that proceeded westerly from the Ice Age Trail and Complex was created to avoid the residential development and civic constraints to the north. Once beyond the Ice Age Trail and Complex, this westerly path was forced to use a new, cross-country segment. Several options were considered for connecting this cross-country segment to a corridor that follows an existing 138 kV transmission line. Of these options, the Utilities selected the segments that follow CTH Z, CTH ZZ, and a new segment of cross-country corridor. Because of potential for impacts to cultural sites, residential development, and environmental sensitivities such as Governor Dodge State Park and Driftless Area Land Conservancy

lands, Segments C138, C139, C140, C160, N080, N641, S041 were chosen in lieu of the other options that generally followed CTH T, SH 23, and multiple new, cross-country corridors. Segments that connected to these eliminated options (those following CTH T, SH 23, and the cross-country corridors) became non-functional, dead-end segments and were removed from further consideration.

The Utilities chose to co-locate with an existing 138 kV transmission line corridor into the Montfort Substation Siting Area because it maximized the use of an existing utility corridor while also minimizing constraints. Though this macro-corridor was first drawn as a 3000-foot-wide corridor, it was later narrowed to 1,000 feet recognizing that a new line would be located as closely as possible to the existing corridor.

Table 6-2: Macro-Corridors Retained as Shown on Figure 3-3

Siting Area	Routing Opportunity	Corridor Description	Reason Retained	Segment ID's
Cardinal–to-Montfort Siting Area WISCONSIN	Existing 69 kV transmission line, USH 14, and railroad corridor	Exits the Cardinal Substation to the west following several existing linear features. Common segments to all other macro-corridors.	This was deemed the only feasible option to exit the Cardinal substation to the west, because of limited existing linear features and the fact that the area is constrained by the Ice Age Trail Corridor and Complex.	A001, A002, A003, A004, A005, N001, N002, N003, N004, N020, R001, R002, R003, R004, U001, U002, U003, U004
	New cross-country corridor	Follows a generally straight westerly path, south of the communities of Cross Plains, Black Earth, Mazomanie, and Arena.	This corridor was retained because it avoided the residential development, civic constraints, and environmental sensitivities associated with corridors that traversed the communities to the north.	N080, N100, N101N N102, N103, N104
	Existing 138 kV transmission line, CTH Z, CTH ZZ, and new cross-country corridor	Follows a south and westerly direction along county highways and cross-country corridors to connect to an opportunity along an existing 138 kV transmission line.	These corridors were retained because it provided a direct opportunity to connect to the existing 138 kV transmission line which connected to the Montfort Substation Siting Area. Other corridors that similarly followed county and state highways, and cross-country opportunities impacted cultural resources, environmental sensitivities (Governor Dodge State Park and Driftless Area Land Conservancy lands, and residential development.	A121, C138, C139, C160, C161, N641
	Existing 69 kV transmission line, CTH J, SH 78, local roads, and new cross-country corridors	Follow a southerly direction from just west of the Cardinal substation to the community of Mount Horeb.	These corridors were retained because they provided much stronger opportunities when compared to other, removed segments. They connected the Cardinal substation to several opportunities that head west to the Montfort Substation Siting Area, while generally avoided constraints associated with the community of Mount Horeb.	A040, A041, A042, A043, A044, A045, A046, A047, C018, N1640, N1650, N1655, N1660, N1670, N302, N340, S002.5, S002.7
	Existing 69 kV transmission lines, USH 18, USH 151, SH 39, CTH B, CTH Q, and multiple local roads.	Follow a westerly direction from Mount Horeb to the Montfort Substation Siting Area.	These corridors were retained because they provided strong opportunities while minimizing impacts to sensitivities like the Military Ridge State Trail, Cave of the Mounds National Natural Landmark, multiple State Natural Areas, Blue Mound State Park, and local communities.	A182, A201, A202, A203, A204, A205, A206, A207, A227, A462, A463, C340, C350, C360, C362, C364, C366, N1565, N1572, N1575, N1622, N1625, S071, U017, U018, U019, U020, U021, U022, U023, U024, U025, U026, U027, U028, U029, U030, U031, U032, U033, U034, U035, U060, U061, U062, U063
	CTH K and a new cross-country corridor	Segments that connect the northern corridors to the southern to provide geographical diversity.	This connector was retained because it avoided constraints associated with the City of Dodgeville, Dodgeville Municipal Airport, and Governor Dodge State Park, that other options could not.	C003, N400
Montfort-to-Mississippi River Siting Area WISCONSIN	Existing 138 kV transmission line	Segments that exit the Montfort Substation Siting Area and travel in a straight, southwesterly direction to the community of Lancaster	This corridor was retained because it provided a strong, existing linear opportunity with minimal impact to constraints. It also avoided the community of Montfort that other corridors did not.	A361, A362, A363, A364
	Existing 138 kV transmission line	Segments that follow a southwesterly direction from the community of Lancaster	This corridor was retained because it provided a strong, existing linear opportunity with minimal impact to constraints. It also avoided the community of Lancaster that other corridors did not.	A365, A366, A367
	Existing 69 kV transmission line, SH 80, and new cross-country corridors	Segments exit the Montfort Substation Siting Area to the south toward the community of Livingston	These corridors were retained because they all provided viable options leaving the Montfort Substation Siting Area, while avoiding constraints associated with the community of Livingston.	A302, A302, N800, N801, N820, N821, N822, N840, S125, S127
	Existing 69 kV transmission line, and new cross-country corridor	Segments follow a southerly direction from Livingston toward Platteville	These corridors were retained because they provided shorter, straighter opportunities with less residential impacts than other options.	A305, A306, A307, N880
	Existing 138 and 69 kV transmission lines, USH 151, and a new cross-country corridor	Segments are generally located in the vicinity of the community of Platteville	Corridors were retained because the sufficiently avoided residential development, and civic and environmental constraints associated with the community of Platteville.	A284, A285, A286, A287, A288, A308, A310, A311, A312, A313, A357, A401, A415, A416, A417, A418, G130, G131, G132, N1900 N1910, N900, N901, N902, N922, N940, N950, N960, N961, U067, U068, U069, U070, U071, U072, U073
	Existing 138 kV transmission line	Segments follow a westerly path from Platteville to Cassville	Corridor was retained because it provided a shorter more direct opportunity that had less residential development and civic constraints than the geographically similar 69 kV transmission line corridor.	A419, A420, A421, A422, A423, A424
	Existing 138, 161, and 69 kV transmission lines	Segments are located in the vicinity of the community of Cassville Segments are located in the vicinity of the community of Cassville	Corridors were retained because they provided more constructible options that were less impactful to residential development and civic constraints than other options in the area.	A369, A370, A425, A427, A428, D203, D204, D221, D222, D223, D224, D225
Iowa – Mississippi River-to-Hickory Creek Siting Area IOWA	N/A	N/A	N/A	N/A

Table 6-3: Potential Macro-Corridors Removed, Shown as "Inactive" on Figure 3-3

Siting Area	Routing Opportunity	Corridor Description	Reason Removed	Segment ID's
Cardinal-to-Montfort Siting Area WISCONSIN	Existing 69 kV transmission line, USH 14, SH 78, CTH H, CTH K, a railroad corridor, multiple local roads, and new cross-country corridors.	Follows a north and westerly direction along an existing 69 kV transmission line, USH 14, and a railroad corridor. Connectors to corridors in the south follow CTH H, CTH K, local roads, and new cross-country routes.	The corridors that go through the communities of Cross Plains, Black Earth, Mazomanie, and Arena were removed because of residential development and civic sensitivities associated with those communities, as well as, environmental constraints like the Lower Wisconsin Riverway and associated wetlands. Connector corridors were also removed because they no longer served a purpose.	C001, C002, C060, N081, N120, N1280, N120, N1280, N140, N160, N170, N171, N180, N200, N220, N260, N261, N262, N280, N281, N282, N520, N521, N540, N541, R005, R006, R007, R008, R009, R010, R011, R012, R013, S001, U005, U006, U007, U008, U009, U010, U011, U012, U013
	New cross-country corridor	Follows a generally straight westerly path, south of the communities of Cross Plains, Black Earth, Mazomanie, and Arena.	This corridor was retained because it avoided the residential development, civic constraints, and environmental sensitivities associated with corridors that traversed the communities to the north.	N080, N100, N101N N102, N103, N104
	Existing 138 kV transmission line SH 23, CTH T, local roads, and new cross-country corridors	Connectors to an existing 138 kV transmission line	These corridors were removed because of cultural resource impacts, residential development, and environmental impacts to Governor Dodge State Park and Driftless Area Land Conservancy lands. Segments that follow the existing transmission line became non-functional without their connector segments.	A110, A120, C100 N105, N106, N1820, N1821, N283, N284, N610, N612, N614, N620, N621, S040
	Existing 69 kV transmission line, USH 18, SH 78, SH 92, CTH J, CTH P, CTH PD, CTH S, local roads, and new cross-country corridors	Follow a southerly direction from just west of the Cardinal substation to the community of Mount Horeb.	These corridors were removed because they impacted the community of Mount Horeb, and/or added additional mileage in the wrong direction.	A048, A460, A461, C010, C012, C014, C016, C030, C032, C034, C197, C200, N1630, N1635, N1641, N1642, N1643, N1643.5, N1644, N1680, N1930, N330, N334, N345, N360, N362, S002, S003, S020, S021, U159, U160
	Existing 69 kV transmission lines, USH 23, USH 191, a natural gas pipeline, CTH H, CTH ID, CTH K, CTH YZ, Military Ridge State Trail, and new cross-country corridors	Follow a westerly direction from Mount Horeb to the Montfort Substation Siting Area.	These corridors were removed because they impacted sensitivities--such as the Military Ridge State Trail, Cave of the Mounds National Natural Landmark, multiple State Natural Areas, and Blue Mound State Park-- and the communities of Dodgeville, Blue Mounds, Barneveld, and Ridgeway.	A140, A141, A180, A181, A200, C040, C062, C064, C180, G004, N1615, N1620, N1823, N380, N460, N560, N680, S045, S081, T001
	a natural gas pipeline, SH 23, CTH H, CTH Y, CTH Z, and new cross-country corridors	Segments that connect the northern corridors to the southern to provide geographical diversity	These corridors were removed due to impacts to constraints like the City of Dodgeville, Dodgeville, Municipal Airport, and Governor Dodge State Park	C061, C062, C063, C140, C141, C142, G002, G003, N1560, N1821, N1822, N580, N581, N660, S042, S043
Montfort-to-Mississippi River Siting Area WISCONSIN	existing 69 kV transmission line, a natural gas pipeline, USH 18, USH 61, and SH 129	Follows a westerly and then southerly direction from the Montfort Substation Siting Area to the community of Lancaster	These corridors were removed due to impacts to the community of Montfort and because an existing 138kV transmission line provided a straighter, shorter, more direct opportunity that impacted less constraints.	D100, D102, D103, G121, G122, G123, G160, G161, N1100, S200, S201, U038, U039, U101, U102, U103, U104
	Existing 161 and 69 kV transmission lines, USH 61, SH 35, SH 81, SH 133, and new cross-country corridor	Segments follow a southerly and westerly direction from the community of Lancaster	These corridors were removed due to impacts to the community of Lancaster and because an existing 138kV transmission line provided a straighter, shorter, more direct opportunity that impacted less constraints.	A500, A501, A502, A503, A504, A505, C260, D182, D260, D261, D262, D280, N1140, N1141, N1220, N1500, N1980, N1981, N2000, N2020, N2021, N2042, S114, S115, S116, S220, S221, S300, S301, S302, S303, S304, S305, S320, U105
	Existing 69 kV transmission line, and SH 80	Segments exit the Montfort Substation Siting Area to the south toward the community of Livingston	Portions of the utility and transportation corridors were removed because they travelled directly through the community of Livingston.	A303, S126
	SH 80 and new cross-country corridor	Follow a southerly direction from Livingston to the community of Platteville	These corridors were removed because they were greater in length, less straight, and more impactful to residential constraints than other options.	N1180, N860, S128, S128.5
	Existing 69 kV transmission line, a natural gas pipeline, SH 80, SH 81, and new cross-country corridor	Segments are generally located in the vicinity of the community of Platteville	These corridors were removed because they did not sufficiently avoid the residential development, civic and environmental constraints associated with Platteville. Connector segments were also removed as they did not follow a path consistent with the southwesterly direction of the Project.	A381, A400, A402, A403, A404, C300, C310, C320, D080, D090, D104, D105, D106, D035, D040, D160, D161, D162, G124, G125, G126, G127, G128, G129, G180, G181, N920, N921, N955, N2070, N2075, S111, S112, S113, S109, S129, S130
	Existing 69 kV transmission line and connector segments along new cross-country corridors	Segments follow a westerly path from Platteville to Cassville	Corridor was removed because it was longer and more impactful to residential development and civic constraints than 138kV transmission line to the south.	D041, D042, D043, D045, D050, D107, D108, D109, D142, D143, D144, D180, D200, D201, D202, N1921, N1940, N1960, U107, U108, U109
	SH 133, SH 81, and a railroad corridor	Segments are located in the vicinity of the community of Cassville	Corridors were removed because they impacted residential development and civic constraints associated with the community of Cassville and were not constructible due to geographic constraints.	R023, S117, S118, S119, S244, S245, S246, S306
Iowa – Mississippi River-to-Hickory Creek Siting Area IOWA	N/A	N/A	N/A	N/A

The macro-corridor that proceeded southerly from the Ice Age Trail and Complex moves towards the community of Mount Horeb and connects to several opportunities that head west to the Montfort Substation Siting Area. The Utilities sought to avoid the constraints associated with Mount Horeb. The segments selected for the macro-corridor generally follow an existing 69 kV transmission line, SH 78, CTH J, local roads, and new cross-country opportunities. The Utilities rejected geographically similar segments following existing transmission lines, USH 18, SH 78, SH 92, CTH J, CTH P, CTH PD, CTH S, local roads, and cross-country opportunities because they impacted the community of Mount Horeb, added additional mileage in the wrong direction, or had more routing constraints when compared to the remaining segments.

From the community of Mount Horeb, several opportunities follow a westerly direction to the Montfort Substation Siting Area. Of these opportunities, the Utilities selected the following for the macro-corridor: existing 69 kV transmission lines, USH 18, USH 151, SH 39, CTH B, and CTH Q, and multiple local roads. These segments avoided sensitive constraints such as the Military Ridge State Trail, Cave of the Mounds National Natural Landmark, multiple SNAs, and Blue Mound State Park. Segments U017 through U029, which followed a portion of the USH 18 corridor, were moved to the south to avoid development north of the highway. The width of the segments on the south side of the highway remains at 3,000 feet to allow for routing flexibility. The Utilities removed from consideration geographically similar segments following the Military Ridge State Trail, USH 23, USH 191, existing 69 kV transmission lines, a natural gas pipeline, CTH H, CTH ID, CTH K, CTH YZ, and cross-country opportunities because they neither avoided the sensitive constraints noted above nor the communities of Blue Mounds, Barneveld, Dodgeville, and Ridgeway.

To provide geographic diversity, the Utilities evaluated potential connections between the northern and southern macro-corridors. Of these, the only one retained as a macro-corridor followed CTH K and a cross-country corridor. The geographically similar segments following SH 23, CTH H, CTH Y, CTH Z, a natural gas pipeline and cross-country opportunities were removed as a result of potential impacts to the community of Dodgeville, the Dodgeville Municipal Airport and environmental constraints such as Governor Dodge State Park.

6.4.2 Montfort-to-Mississippi River Siting Area – Wisconsin

In this siting area, corridors begin at the Montfort Substation Siting Area and follow either a southwesterly direction or a southerly and then westerly direction to the proposed crossing of the Mississippi River near Cassville, Wisconsin.

Several routing opportunities exit the Montfort area including a group of segments following an existing 138 kV transmission line to the southwest to the Lancaster, Wisconsin area. The Utilities retained the existing 138 kV corridor as a macro-corridor over geographically similar opportunities that follow USH 18, USH 61, SH 129, an existing 69 kV transmission line, and a natural gas pipeline from Montfort to Lancaster. These latter corridors were removed from consideration because they did not avoid constraints in and around the community of Montfort and because the existing 138 kV transmission line provides a more direct route that was shorter in length. Additionally, because the retained corridor followed the existing 138 kV transmission line, it was narrowed from 3,000 to 1,000 feet to recognize that a new line would be located as closely as possible to the existing line and could possibly be double-circuited with that existing line.

The existing 138 kV corridor proceeds just south of the community of Lancaster; at the community of Lancaster, several opportunities continue to the south and west toward Cassville. Of these, the same existing 138 kV transmission line discussed above was retained as the macro-corridor over geographically similar opportunities following an existing 69 kV transmission line, USH 61, SH 133, and a new cross-country corridor. The retained corridor provided a much stronger opportunity because it followed a shorter, more direct path that also avoided residential and civic constraints associated with the community of Lancaster. Additionally, the removed corridors generally have a greater number of angles and would have higher associated costs to construct than the retained corridor. The removal of these corridors resulted in several other segments to become non-functional; these non-functional segments followed existing 161 and 69 kV transmission lines, SH 133, and cross-country opportunities and were also removed.

Another group of segments exit the Montfort Substation Siting Area and head south toward the community of Livingston. These segments include a 69 kV transmission line, SH 80, and several cross-country corridors were added to avoid constraints associated with the community of Livingston. The Utilities retained all of these options as macro-corridors except for the portions that travelled directly through Livingston. From Livingston, an existing 69 kV transmission line and SH 80 continue to provide the main opportunities to the south toward the community of Platteville. A few cross-country segments were considered to avoid the community of Rewey and to provide geographic diversity. Of these potential corridors, the segments following the existing transmission line and a cross-country corridor added to the west of Rewey were retained as macro-corridors over the other options. The three removed corridors--a corridor along SH 80, a cross-country corridor east of Rewey, and a cross-country connector segment--were removed because they were generally less straight, greater in length, and did not avoid residential constraints as well as the retained corridors.

A number of routing opportunities were present near the community of Platteville, including an existing 138 kV transmission line, an existing 69 kV transmission line, USH 151, SH 80, SH 81, and a natural gas pipeline. In order to avoid the residential development, and civic and environmental constraints associated with Platteville, a number of cross-country segments were considered. Of these numerous opportunities, the segments following the existing 138 and 69 kV transmission lines, USH 151, and a cross-country corridor to the north and west of Platteville, were retained as macro-corridors. The corridors that were removed did not avoid constraints in and around Platteville. Additionally, several connector segments between the Platteville area and Lancaster area were removed because they did not follow a path consistent with the general southwesterly direction of the Project and would have added unnecessary length.

From Platteville, two existing transmission corridors (138 kV and 69 kV) provide the main opportunities west to Cassville. Of these potential corridors, the segments following the existing 138 kV corridor were retained as a macro corridor because they were shorter, more direct, impacted less residential development and had fewer civic constraints than the existing 69 kV corridor. Additionally, the existing 69 kV corridor is located near the Lancaster Municipal Airport. With the removal of this 69 kV corridor, several connector segments to the north and south became non-functional and were also removed. Lastly, while this macro-corridor was originally envisioned with a width of 3,000 feet; it was narrowed to 1,000 feet because it followed an existing transmission corridor.

In the Cassville area, numerous existing linear features presented routing opportunities including the two 138 kV transmission lines, a 161 kV transmission line, a 69 kV transmission line, SH 133, SH 81, and a railroad. Of these opportunities, as specified by the Wisconsin Siting Priorities Law, the Utilities retained as macro-corridors only those that followed existing utility corridors. The potential corridors following the state highways and the railroad were removed due to residential and civic constraints associated with the community of Cassville as well as challenging topography in the area that made them unbuildable.

6.4.3 Mississippi River to Hickory Creek Substation Section - Iowa

As a result of the analyses contained within the ACA report, the Utilities determined the only remaining feasible alternative crossing locations extended through Refuge lands near Cassville, Wisconsin. Both the Nelson Dewey and Stoneman crossing locations would extend through Refuge lands in Clayton County, Iowa and extend across the Mississippi River into Wisconsin. The initial macro-corridor in Iowa, identified on Figure 6-2, included the Project endpoint at Hickory Creek Substation and sufficient area to include the remaining feasible crossing locations at Nelson Dewey and Stoneman, eventually connecting with the Montfort Substation Siting Area. As a result of the limited distance between the Hickory Creek

Substation and these Refuge crossing locations (approximately 12 miles) and the presence and location of existing routing constraints between these areas, one large macro-corridor was developed for Iowa in portions of Dubuque and Clayton Counties. This initial macro-corridor was approximately 12-miles long and five-miles wide.

The development of the macro-corridor in Iowa also took into account the necessary and available area to site a prospective route in this area according to Iowa Code § 478.18(2) and 199 IAC 11.1(7), which set forth that routing in Iowa should begin with roads, active railroad ROW, and division lines of land, including section, quarter section, and quarter-quarter section lines.

The specific boundary of the macro-corridor in Iowa also took into account the presence of known routing constraints within northern Dubuque County and southern Clayton County, avoiding the towns of Luxemburg and Holy Cross (Dubuque County) and North Buena Vista (Clayton County). Additionally, the macro-corridor in the Mississippi River-to-Hickory Creek Siting Area sought to avoid the White Pine Hollow State Preserve, Merit Forest State Preserve, Clayton County Conservation Board-owned and/or managed lands, and dense residential development and steep slopes present along Highway 52 in Clayton County (Figure 7-3).

Additional information about the macro-corridor in the Mississippi River-to-Hickory Creek Siting Area is provided in Section 7.3, below.

7.0 THE UTILITIES' ALTERNATIVE CORRIDORS

The Utilities presented their macro-corridors in the May 2016 open houses. Based on the input received from these open houses and on additional comparative analyses, the Utilities narrowed and further refined the macro-corridors resulting in the alternative corridors that are presented in Figure 7-1. This Section 7 describes how and why the macro-corridors were altered in designing the alternative corridors.

7.1 Alternative Corridors in Cardinal Substation-to-Montfort Siting Area

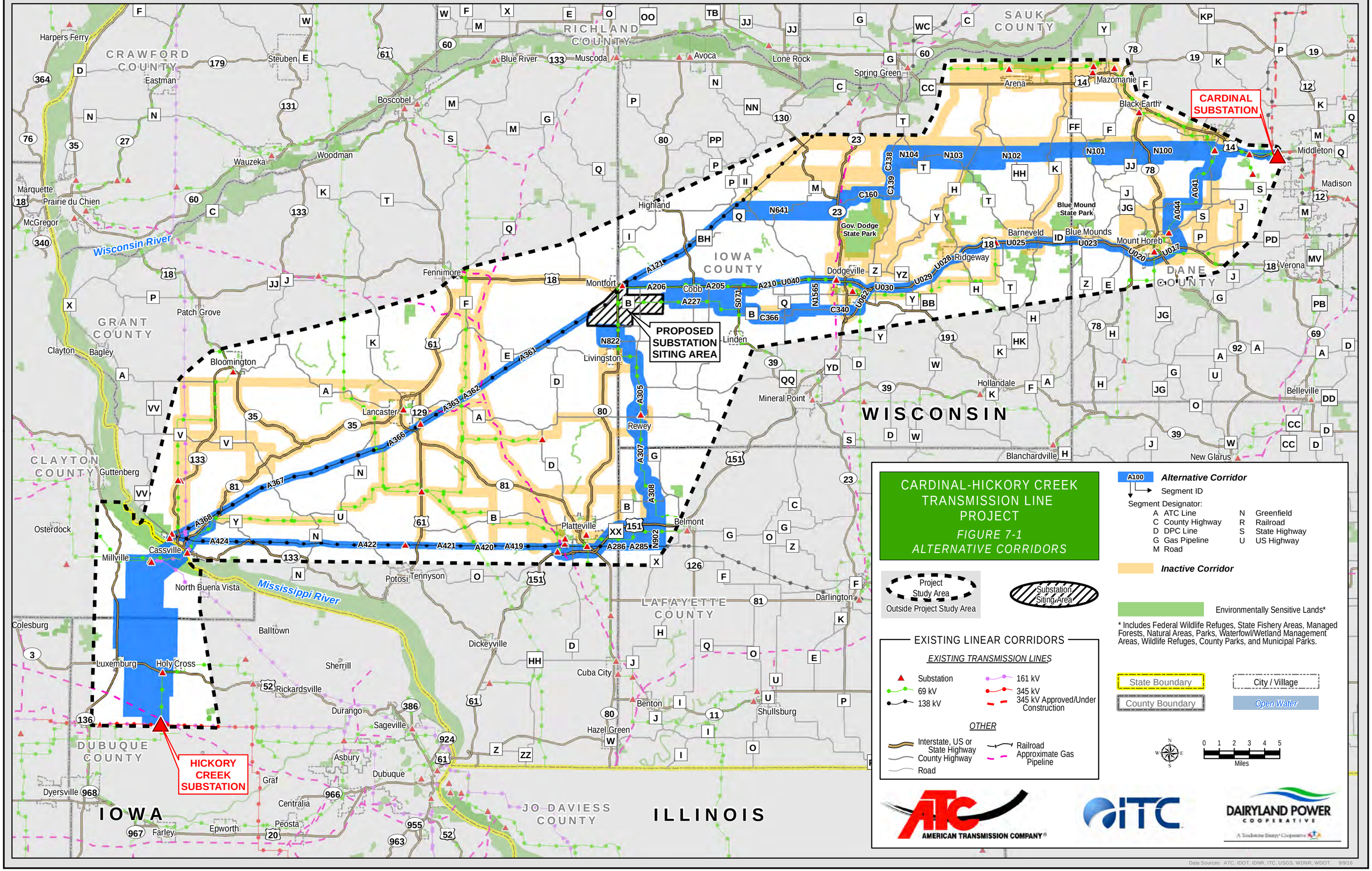
7.1.1 Macro-Corridors Narrowed or Eliminated from Consideration

In developing the alternative corridors in the Cardinal Substation-to-Montfort Siting Area, the Utilities:

- Removed a number of macro-corridors after further comparative analysis revealed better routing opportunities;
- Narrowed some macro-corridors recognizing that the Project would be located as close as possible to existing linear features and associated access; and
- Expanded slightly a few macro-corridors to gain additional flexibility in the routing process.

Specifically, the corridors surrounding and adjacent to the Cardinal Substation were trimmed on the north, south, and east sides as the existing substation configuration requires a new line to exit the south side of the substation and the general path of the Project requires that it head immediately to the west. It was determined that these corridors surrounding the substation would not be used for a new line, as they did not correspond to the existing substation configuration or follow a path consistent with the Project.

The macro-corridors directly west of the Cardinal Substation were narrowed from 1,500 to 500 feet on the north side of the existing 69 kV transmission line to recognize that a new line would be located as closely as possible to the existing transmission line. The macro-corridor that continues west past the Ice Age Trail and Complex along an existing 69 kV transmission line was narrowed from 3,000 to 1,000 feet for the same as reason as above. Additionally, in this area, the macro-corridor following an existing railroad corridor was expanded slightly to be 100 feet to the south of the existing railroad ROW. Because of civic and environmental constraints, this macro-corridor had previously been located only on the north side of the railroad corridor. The Utilities concluded that having a small amount of additional adjacent land to the south would provide routing and engineering flexibility.



CARDINAL-HICKORY CREEK TRANSMISSION LINE PROJECT

FIGURE 7-1
ALTERNATIVE CORRIDORS

Project Study Area
Outside Project Study Area

Substation Siting Area

EXISTING LINEAR CORRIDORS

EXISTING TRANSMISSION LINES

- Substation
- 69 kV
- 138 kV
- 161 kV
- 345 kV
- 345 kV Approved/Under Construction

OTHER

- Interstate, US or State Highway
- County Highway
- Road
- Railroad
- Approximate Gas Pipeline

A100 ***Alternative Corridor***
Segment ID
Segment Designator:

A	ATC Line	N	Greenfield
C	County Highway	R	Railroad
D	DPC Line	S	State Highway
G	Gas Pipeline	U	US Highway
M	Road		

Inactive Corridor

Environmentally Sensitive Lands*

* Includes Federal Wildlife Refuges, State Fishery Areas, Managed Forests, Natural Areas, Parks, Waterfowl/Wetland Management Areas, Wildlife Refuges, County Parks, and Municipal Parks.

State Boundary
County Boundary
City / Village
Open Water

0 1 2 3 4 5
Miles

AMERICAN TRANSMISSION COMPANY®
ITC
DAIRYLAND POWER COOPERATIVE
A Touchstone Energy® Cooperative

From this point, the macro-corridors that follow cross-country segments and county highways west to an existing 138 kV transmission line were revised in several locations. First, the cross-country macro-corridor from Stage Coach Substation to CTH Z was generally moved two quarter-sections lines (2,640 feet) to the south to avoid residential congestion and environmental constraints, like the Pleasant Valley Conservancy SNA. In addition, the corridor was expanded in some places on the south side by an additional quarter section (1,320 feet) to allow for additional routing and engineering flexibility. This corridor was previously one-mile wide in most places, and now ranges from 3,960- to 6,600-feet wide. The segments of the macro-corridor that follow CTH Z were reduced to 1,500 feet on the west side of the highway and revised to follow a quarter section line on the east side in an effort to retain flexibility but also narrow the corridor recognizing that a new line would be placed as close to the road as possible. Additionally, the segments following CTH ZZ were narrowed to exclude lands on the south side of the highway that enter into Governor Dodge State Park, and were expanded slightly on the north to encompass quarter-section lines. The remaining segments along this macro-corridor were left unchanged.

In the Mount Horeb area, , a cross-country macro-corridor east of the community was removed because the macro-corridor following the existing 69 kV transmission line around the east side of Mount Horeb maximized the use of existing utility corridors and avoided a residential area. Cross-country macro-corridors north and west of the Mount Horeb area were also eliminated from consideration because the selected corridor follows an existing utility corridor.

From Mount Horeb, the segments that follow USH 18 west to Dodgeville were generally narrowed from 3,000 to either 2,000- or 1,500-feet wide. In several areas, routing on either the north or south side of the highway was not feasible; in such situations, the corridor was located on just one side of the highway and the width reduced to 1,500 feet. In the area just east of Dodgeville, the macro-corridor was narrowed to 2,000 feet (1,000 feet on either side of the highway) to recognize that the new line would be placed as close to the highway as possible to reduce impacts and maximize the use of existing linear feature.

In the vicinity of Dodgeville, the macro-corridors were all retained but in some cases their widths were narrowed from 3,000- to either 2,000- or 1,000- feet. The macro-corridors following USH 18 and an existing 69 kV transmission line around the north side of Dodgeville were reduced to 1,000 feet (500 feet on either side of the linear feature) recognizing the new line would be placed as close as possible to the road and existing transmission line. The macro-corridors south and west of Dodgeville that follow USH 151, CTH B, and a local road were narrowed to 2,000 feet recognizing that the new line will follow these transportation corridors but also retained routing and engineering flexibility.

From the area west of Dodgeville to the Montfort Substation Siting Area, the macro-corridors were largely unchanged with the exception of a small area immediately east of the Substation Siting Area that was eliminated from consideration because of recently constructed wind turbines.

Lastly, the macro-corridor following CTH K, connecting the northern cross-country corridor to the southern macro-corridor along USH 18, was eliminated from consideration. This macro-corridor was created to connect the northern and southern routes in the event that a viable route could not be found around the community of Mount Horeb. After further analysis, the Utilities concluded that they had a sufficient area for a constructible route: the macro-corridor that largely follows an existing 69 kV transmission line east of Mount Horeb and then heads westerly on a highway south of that community. The eliminated macro-corridor that had followed CTH K had difficult topographic and residential constraints that would have made construction challenging and costly.

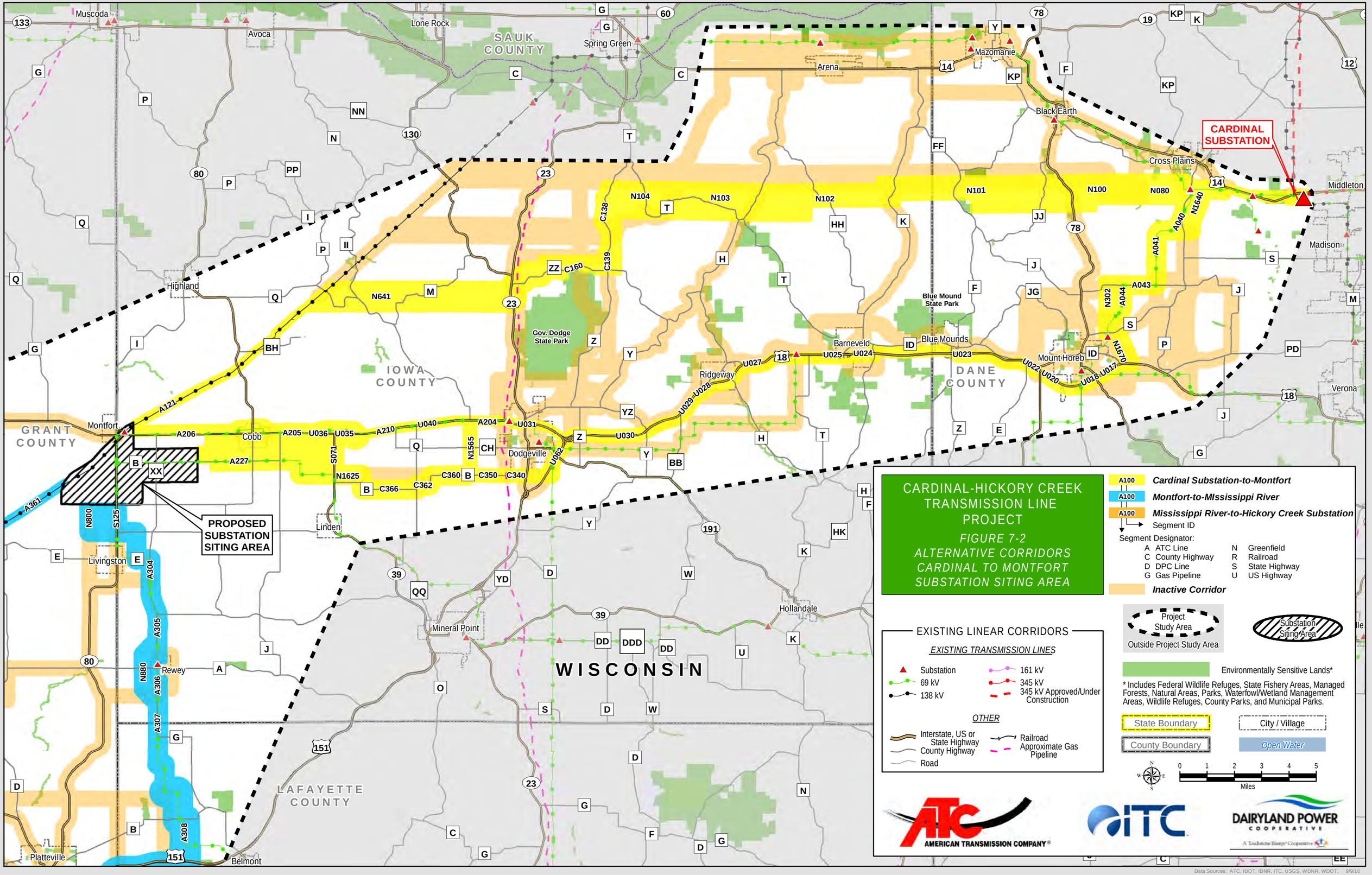
7.1.2 Alternative Corridors Proposed

The alternative corridors in the Cardinal Substation-to-Montfort Siting Area would connect the Project from the Cardinal Substation in the east to the mid-point Montfort Substation Siting Area near Montfort, Wisconsin as shown in Figure 7-2.

This siting area begins with corridors that range from 1,000- to 2,000-feet wide and exits the Cardinal Substation to the west towards the Ice Age Trail and Complex along an existing transmission line, railroad, and highway. From the area of the Ice Age Trail and Complex, the corridors head either west or south and then west to the Substation Siting Area.

The corridors that follow a westerly path from the Ice Age Trail and Complex, generally follow new cross-country segments, county highways, and an existing 138 kV transmission line to the Montfort Substation Siting Area. Generally, the corridors along the existing transmission lines are 1,000-feet wide, while those following county highways are approximately 1,500-feet wide. The cross-country segments in this area are generally one mile in width.

The corridors that head south from the Ice Age Trail to the Mount Horeb area generally follow an existing 69 kV transmission line and a few cross country segments. In this area, the corridors along the existing transmission line and cross-country segments are generally 3,000-feet wide.



CARDINAL-HICKORY CREEK TRANSMISSION LINE PROJECT

FIGURE 7-2
ALTERNATIVE CORRIDORS
CARDINAL TO MONTFORT
SUBSTATION SITING AREA

A100 ***Cardinal Substation-to-Montfort***
A100 ***Montfort-to-MIssissippi River***
A100 ***Mississippi River-to-Hickory Creek Substation***
Segment ID

Segment Designator:

A	ATC Line	N	Greenfield
C	County Highway	R	Railroad
D	DPC Line	S	State Highway
G	Gas Pipeline	U	US Highway

Inactive Corridor

EXISTING LINEAR CORRIDORS

EXISTING TRANSMISSION LINES

- Substation
- 69 kV
- 138 kV
- 161 kV
- 345 kV
- 345 kV Approved/Under Construction

OTHER

- Interstate, US or State Highway
- County Highway
- Road
- Railroad
- Approximate Gas Pipeline

* Includes Federal Wildlife Refuges, State Fishery Areas, Managed Forests, Natural Areas, Parks, Waterfowl/Wetland Management Areas, Wildlife Refuges, County Parks, and Municipal Parks.

AMERICAN TRANSMISSION COMPANY®

ITC

DAIRYLAND POWER COOPERATIVE
A Touchstone Energy® Cooperative

Data Sources: ATC, IDOT, IDNR, ITC, USGS, WDNR, WDOT. 9/9/16

The corridors that head west from Mount Horeb to Dodgeville, and then to the Montfort Substation Siting Area generally follow USH 18, USH 151, existing 69 kV transmission lines, and county highways. The segments along USH 18 and USH 151 range in width from 1,000 to 2,000 feet, while those along county highways range from 2,000 to 3,000 feet. The corridors that follow existing transmission lines are generally 1,000-feet wide. The area immediately east of the Montfort Substation Siting Area was left wider to provide additional flexibility based on the unknown location of the new substation.

The alternative corridor within the Cardinal Substation-to-Montfort Siting Area would be approximately 45- to 50- circuit miles long and, depending on the route chosen, it may pass through or near the municipalities of Blue Mounds, Barneveld, Ridgeway, Dodgeville, and Cobb.

Appendix M contains the USGS 7-1/2' topographic quadrangle maps for the recommended alternative corridors in the Cardinal Substation-to-Montfort Siting Area.

7.2 Alternative Corridors in the Montfort-to-Mississippi River Siting Area

7.2.1 Macro-Corridors Narrowed or Eliminated from Consideration

As discussed in more detail below, a number of macro-corridors in the Montfort-to-Mississippi River Siting Area were removed after further comparative analysis facilitated a further culling of corridors. Additionally, the widths of corridors following existing utility or transportation corridors were narrowed when appropriate. In a few instances, macro-corridors were slightly expanded to gain additional flexibility in addressing constraints.

Macro-corridors exiting the Montfort Substation Siting Area to the south to Livingston were both narrowed or removed. Macro-corridors generally following cross-country segments on the west and south sides of Livingston were eliminated from consideration because a corridor east of Livingston followed an existing 69 kV transmission line south to the Platteville area.

In the Platteville area, a macro-corridor consisting of cross-country segments around the north side of the city was eliminated from consideration because the segments around the east side of the community followed an existing transmission line. The east side alternatives also had fewer environmental impacts when compared to the segments on the north side of the City. As a result of the removal of these cross-country segments, macro-corridors on the west side of Platteville became non-functional, dead-end segments and were also removed. On the south side of Platteville, a macro-corridor following USH 151 was trimmed in a few areas to more closely adhere to the highway, but was generally left at 3,000 feet in

width. The remaining corridors in this section all follow existing transmission lines and were left unchanged.

7.2.2 Alternative Corridors Proposed

The alternative corridors in this section would connect the Project from the Montfort Substation Siting Area in the east to the Mississippi River crossing near Cassville, Wisconsin as shown in Figure 7-3.

The Montfort-to-Mississippi River Siting Area begins with two alternative corridors that exit the Montfort Substation Siting Area directly to the southwest or to the south towards Platteville.

The corridor heading southwest follows an existing 138 kV transmission line all the way to the Mississippi River and is 1,000-feet wide.

The corridor that exits the Substation Siting Area to the south generally follows an existing 69 kV transmission line and a few cross-country segments. The segments that follow the existing transmission line are generally 3,000 to 5,000 feet wide, while the cross-country segments are generally 3,000-feet wide. In the Platteville area, a number of segments follow USH 151, existing 138 and 69 kV transmission lines, and cross-country segments on the east and south sides of the community. In this area, corridors along existing transmission lines are generally 1,000-feet wide, while the corridors following USH 151 and cross-country segments are generally 3,000 feet in width. An area directly east of Platteville that encompasses several routing opportunities was left wider to retain engineering and routing flexibility. From Platteville, a 1,000-foot-wide corridor follows an existing 138 kV transmission line west to the Cassville area. In the Cassville area, Segments A370, A425 through A430, and D221 through D225 are all 1,000-feet wide and follow existing transmission lines to the proposed river crossings.

The alternative corridor within the Montfort-to-Mississippi River Siting Area would be approximately 30- to 50- circuit miles long and, depending on the route chosen, it may pass through or near Livingston, Rewey, Platteville, and Cassville.

Appendix N contains the USGS 7-1/2' topographic quadrangle maps for the alternative corridors in the Montfort-to-Mississippi River Siting Area.

CARDINAL-HICKORY CREEK TRANSMISSION LINE PROJECT

FIGURE 7-3
ALTERNATIVE CORRIDORS
MONTFORT TO MISSISSIPPI RIVER SUBSTATION SITING AREA

A100 ***Cardinal Substation-to-Montfort***
A100 ***Montfort-to-Mississippi River***
A100 ***Mississippi River-to-Hickory Creek Substation***

Segment ID

Segment Designator:

A	ATC Line	N	Greenfield
C	County Highway	R	Railroad
D	DPC Line	S	State Highway
G	Gas Pipeline	U	US Highway

Inactive Corridor

Project Study Area
Outside Project Study Area

Substation Siting Area

EXISTING LINEAR CORRIDORS

EXISTING TRANSMISSION LINES

- Substation
- 69 kV
- 138 kV
- 161 kV
- 345 kV
- 345 kV Approved/Under Construction

OTHER

- Interstate, US or State Highway
- County Highway
- Road
- Railroad
- Approximate Gas Pipeline

Environmentally Sensitive Lands*

* Includes Federal Wildlife Refuges, State Fishery Areas, Managed Forests, Natural Areas, Parks, Waterfowl/Wetland Management Areas, Wildlife Refuges, County Parks, and Municipal Parks.

State Boundary
County Boundary
City / Village
Open Water

N W E S

0 1 2 3 4 5
Miles

AMERICAN TRANSMISSION COMPANY®
ITC
DAIRYLAND POWER COOPERATIVE
A Touchstone Energy® Cooperative

Data Sources: ATC, IDOT, IDNR, ITC, USGS, WDNR, WDOT. 9/9/16

7.3 Mississippi River-to-Hickory Creek Siting Area

As a result of information gathered from the May 2016 Public Open Houses and continued routing analyses, the Utilities reassessed the macro-corridor in the Mississippi River-to-Hickory Creek Siting Area to determine if any additional areas were suitable for removal and/or adjustment. Although the location and distance of the Project endpoint at the Hickory Creek Substation to the remaining feasible crossing locations provides a limited area in which to locate alternative corridors, an analysis was performed to determine if any additional constraints may be avoided, while still assuring an adequate corridor for the development of prospective Project routes. This additional corridor review, combined with information gathered from the open houses, assisted in further reducing the Project's proximity to sensitive resources and lands in both Clayton and Dubuque counties.

To reduce potential conflicts with sensitive resources in Clayton County, an area on the northern end of the initial macro-corridor in the Mississippi River-to-Hickory Creek Siting Area was removed to avoid the entirety of the Turkey Rivers Mounds State Preserve and Clayton County Conservation Board lands, as well as the habitats contained within the Turkey River Bottoms (near the confluence of Turkey River and the Mississippi River) (Figure 7-4). Avoiding these areas would reduce potential impacts to these resources while still maintaining adequate east-west options for locating prospective routes in this location that could extend through the Refuge at either the Nelson Dewey or Stoneman crossing location.

On the eastern edge of the northern portion of the initial macro-corridor in the Mississippi River-to-Hickory Creek Siting Area, two additional areas were removed to avoid areas of extensive steep slopes and topographical relief, as well as unique and sensitive habitats. Of these two areas on the eastern edge, the northern block was removed to prevent prospective routes from being located on or near the braided channel in this area of the Refuge/Mississippi River, and to avoid lands and known migratory waterfowl habitat at Wood Duck Slough and Dead Lake. The second smaller block on the eastern edge was removed as a result of the presence of known algific slopes and similar potential habitat.

An area on the western edge of the initial macro-corridor in the Mississippi River-to-Hickory Creek Siting Area was also reduced to avoid extraneous lands to the west of Highway 52. As previously mentioned, the dense residential development along Highway 52 in Clayton County, and the presence of steep slopes at the same general location, would result in numerous routing challenges for a prospective route through this area; therefore, this additional area was removed from the center of the initial macro-corridor in the Mississippi River-to-Hickory Creek Siting Area, resulting in an approximately 1-mile wide reduction in corridor width.

CARDINAL-HICKORY CREEK TRANSMISSION LINE PROJECT

FIGURE 7-4
ALTERNATIVE CORRIDORS
MISSISSIPPI RIVER TO HICKORY CREEK SUBSTATION SITING AREA

Guttenberg
Osterdock
CLAYTON COUNTY
Millville
Cassville
GRANT COUNTY
WISCONSIN
Potosi
Tennyson
North Buena Vista
Mississippi River
Colesburg
IOWA
Balltown
Luxemburg
Holy Cross
DELAWARE COUNTY
DUBUQUE COUNTY
Rickardsville
New Vienna
Bankston
Asbury
HICKORY CREEK SUBSTATION
81
A367
A368
A369
A427
D203
D223
A424
A423
A422
A421
VV
Y
N
61
B
U
133
O
3
136
52

A100 *Cardinal Substation-to-Montfort*
A100 *Montfort-to-Mississippi River*
A100 *Mississippi River-to-Hickory Creek Substation*
Segment ID
Segment Designator:

A	ATC Line	N	Greenfield
C	County Highway	R	Railroad
D	DPC Line	S	State Highway
G	Gas Pipeline	U	US Highway

Inactive Corridor

Project Study Area
Outside Project Study Area
Substation Siting Area
Environmentally Sensitive Lands*

* Includes Federal Wildlife Refuges, State Fishery Areas, Managed Forests, Natural Areas, Parks, Waterfowl/Wetland Management Areas, Wildlife Refuges, County Parks, and Municipal Parks.

State Boundary
City / Village
County Boundary
Open Water

0 1 2 3
Miles

EXISTING LINEAR CORRIDORS

EXISTING TRANSMISSION LINES

- Substation
- 69 kV
- 138 kV
- 161 kV
- 345 kV
- 345 kV Approved/Under Construction

OTHER

- Interstate, US or State Highway
- County Highway
- Road
- Railroad
- Approximate Gas Pipeline

AMERICAN TRANSMISSION COMPANY®
ITC
DAIRYLAND POWER COOPERATIVE
A Touchstone Energy® Cooperative

Data Sources: ATC, IDOT, IDNR, ITC, USGS, WDNR, WDOT. 9/9/16

Similar to the removal of the section along Highway 52, the Utilities also propose removing additional lands just south of the towns of Luxemburg and Holy Cross. Due to the presence of these municipalities and the available space in which to locate prospective routes in these areas, additional extraneous lands where removed at both these locations. Taking into account these modifications, the alternative corridor within the Mississippi River-to-Hickory Creek Siting Area would range from approximately 10.7- to 12-miles long and would range from approximately 2.5- to 4-miles wide.

Appendix O contains the USGS 7-1/2' topographic quadrangle maps for the alternative corridor in the Mississippi River-to-Hickory Creek Siting Area.

Appendix P provides a list of the individuals who participated in the preparation of this MCS.

8.0 REFERENCES

ACA, the Utilities'. (2016). *Alternative Crossings Analysis*. Submitted to USFWS April 2016.

AES, the Utilities'. (2016). *Alternatives Evaluation Study*. Submitted to RUS July 2016.

BLS (Bureau of Labor Statistics). (2014). *Databases, Tables, & Calculators by Subject*. Retrieved from http://data.bls.gov/timeseries/LNS14000000.

CEQ. (1997). *Environmental Justice: Guidance Under NEPA*. Retrieved from http://energy.gov/nepa/downloads/environmental-justice-guidance-under-nepa-ceq-1997.

EPA. (2001). *Functions and Values of Wetlands*. Retrieved from http://nepis.epa.gov/Exe/ZyPDF.cgi/200053Q1.PDF?Dockey=200053Q1.PDF.

FEMA. (2015). *Federal Flood Risk Management Standard* (FFRMS). Retrieved from https://www.fema.gov/federal-flood-risk-management-standard-ffrms.

IDNR. (no date). *State Preserves Guide*. Retrieved from http://www.iowadnr.gov/Places-to-Go/State-Preserves/State Preserves Guide (Listing of all 95 Preserves).pdf.

IDNR. (2010, February 17). *Iowa Antidegradation Implementation Procedure*. Retrieved from http://www.iowadnr.gov/Environmental-Protection/Water-Quality/Water-Quality-Standards/Antidegradation/Iowa Antidegradation Implementation Procedure.pdf.

MISO. (2010, November 19). *Regional Generation Outlet Study*. Retrieved from https://www.misoenergy.org/Library/Repository/Study/RGOS/Regional%20Generation%20Outlet%20Study.pdf.

MISO. (2011). *MTEP 2011 Report*. Retrieved from https://www.misoenergy.org/Library/Repository/Study/MTEP/MTEP11/MTEP11%20Report.pdf.

MISO. (2014, September). *MTEP14 MVP Triennial Review*. Retrieved from https://www.misoenergy.org/Library/Repository/Study/Candidate%20MVP%20Analysis/MTEP14%20MVP%20Triennial%20Review%20Report.pdf.

Rauch Direct Testimony. (2014, September 15). *Direct Testimony of Laura Rauch*. Submitted on behalf of MISO before the Public Service Commission of Wisconsin in Docket No. 5-CE-142, PSC Ref# 218120.

RUS. (2002, February). *Scoping Guide for RUS Funded Projects Requiring Environmental Assessments with Scoping and EIS*. Retrieved from http://www.rd.usda.gov/files/UEP_Bulletin_1794A-603.pdf.

RUS. (2009, May). *Macro-Corridor Study: Hampton - Rochester - La Crosse 345kV Transmission System Improvement Project*. Retrieved from http://www.rd.usda.gov/files/UWP_WI64-Dairyland_CapXHRLC_MCS-Full.pdf.

RUS. (2016, April 1). *RUS Staff Instructions, Part 1970-O, Environmental--Miscellaneous Resources.* Retrieved from http://www.rd.usda.gov/publications/regulations-guidelines/instructions.

U.S. Census Bureau. (2014). *United States Census American Community Survey 2014 ACS 5-Year Population Estimate*. Retrieved from www.census.gov.

U.S. Census Bureau. (2015). *United States Census 2015 Population Estimate*. Retrieved from www.census.gov.

USFWS. (2006). *Upper Mississippi River National Wildlife & Fish Refuge Comprehensive Conservation Plan*. Retrieved February 2016 from http://www.fws.gov/midwest/planning/uppermiss/index.html.

USFWS. (2013). *Upper Mississippi River National Wildlife and Fish Refuge: About the Refuge*. Retrieved from https://www.fws.gov/refuge/Upper_Mississippi_River/about.html.

USGS. (2003). *A Tapestry of Time and Terrain*. Barton, K., D. Howell, and J. Vigil. Retrieved April 2015 from http://pubs.usgs.gov/imap/i2871/.

USGS and NPS. (2000). *Geologic provinces of the United States: interior plains province*. Retrieved December 2012 from http://www2.nature.nps.gov/geology/ usgsnps/province/intplain.html.

USGS. (2011). *National Land Cover Database 2011*. Retrieved from http://www.mrlc.gov/nlcd2011.php.

WDNR. (2014). *Governor Dodge State Park*. Retrieved from http://dnr.wi.gov/topic/parks/name/govdodge.com.

WDNR. (2015a). *Blue Mound State Park*. Retrieved from http://dnr.wi.gov/topic/parks/name/bluemoun.com.

WDNR. (2015b). *Ice Age National Scenic Trail*. Retrieved from http://dnr.wi.gov/topic/parks/name/iceagetrail.com.

WDNR. (2016). *State Natural Areas Program*. Retrieved from http://dnr.wi.gov/topic/lands/naturalareas.com.