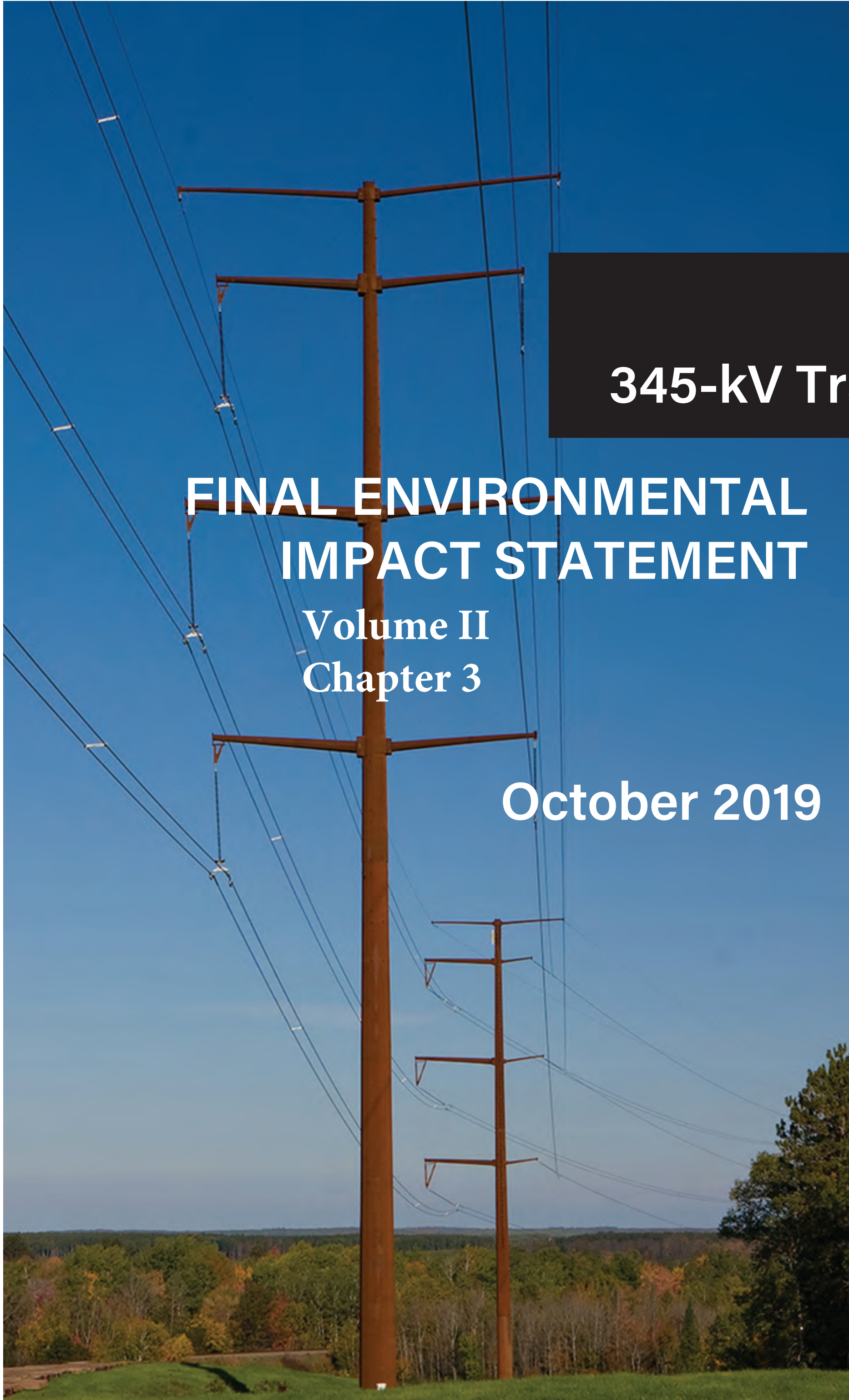
Cardinal-Hickory Creek 345-kV Transmission Line Project



FINAL ENVIRONMENTAL IMPACT STATEMENT

Volume II
Chapter 3

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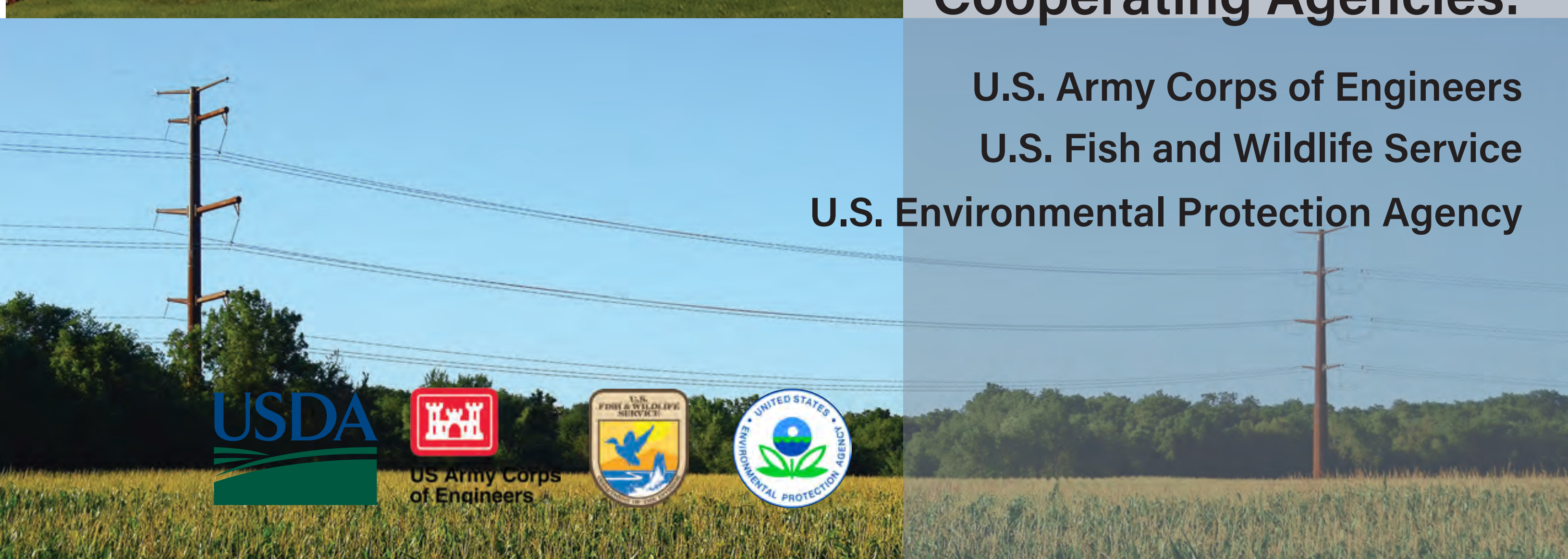
Prepared for:

U.S. Department of Agriculture,
Rural Utilities Service

Cooperating Agencies:

U.S. Army Corps of Engineers
U.S. Fish and Wildlife Service
U.S. Environmental Protection Agency



USDA

US Army Corps of Engineers

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CHAPTER 3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 Introduction

This chapter describes the existing environmental and human resource conditions that could be impacted by the C-HC Project and the potential impacts that the alternatives presented in Chapter 2 would have on those resources. The affected environment and environmental consequences were determined through desktop research, field surveys along portions of the action alternatives, input from the public scoping period, and ongoing coordination with agencies. The potential impacts identified for the proposed C-HC Project are referred to as "impacts" or "effects" interchangeably throughout this FEIS.

3.1.1 *General Project Setting*

The C-HC Project would be primarily on private land in Wisconsin and Iowa. The C-HC Project would cross the Upper Mississippi River National Wildlife and Fish Refuge, which is public land administered by the USFWS with supporting management by the USACE related to specific rights not granted to the USFWS (USFWS 2006a). The eastern termini of the C-HC Project is in Dane County, Wisconsin.
The western termini of the C-HC Project is in Dubuque County, Iowa. Counties that would be crossed by one or more of the action alternatives also include Dane County, Iowa County, Grant County, and Lafayette County, Wisconsin; and Clayton County and Dubuque County, Iowa. The proposed Hill Valley Substation would be constructed near Montfort, Wisconsin, either in western Grant County or eastern Iowa County. Figure 3.1-1 shows the six action alternatives, with key resources that will be discussed in subsequent sections of this chapter.

3.1.2 *Resource Topics Analyzed in Detail*

Based on RUS's review of the public scoping comments and ongoing coordination with agencies, the following resources have been identified as potentially being affected by the alternatives carried forward for detailed analysis from Chapter 2:

- Geology and Soils (Section 3.2)
- Vegetation, including Wetlands and Special Status Plants (Section 3.3)
- Wildlife, including Special Status Species (Section 3.4)
- Water Resources and Quality (Section 3.5)
- Air Quality and Climate Change (Section 3.6)
- Noise (Section 3.7)
- Transportation (Section 3.8)
- Cultural and Historic Resources (Section 3.9)
- Land Use, including Agriculture and Recreation (Section 3.10)
- Visual Quality and Aesthetics (Section 3.11)
- Socioeconomics and Environmental Justice (Section 3.12)
- Public Health and Safety (Section 3.13)
- Upper Mississippi River National Wildlife and Fish Refuge (Section 3.14)

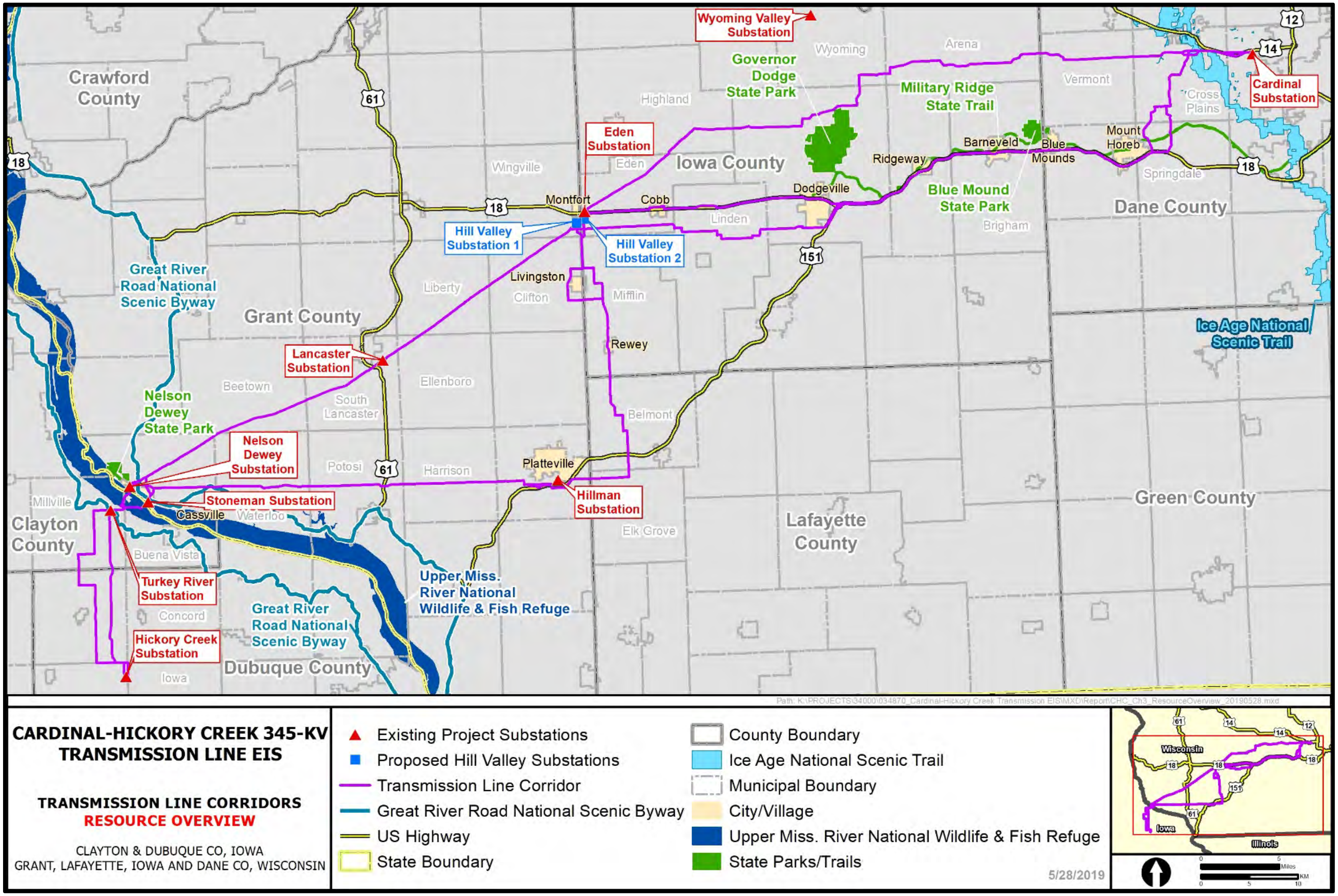

Figure 3.1-1. Resource overview map.

3.1.2.1 AFFECTED ENVIRONMENT

NEPA requires that the environment of the area to be affected by the alternatives under consideration is sufficiently described (40 CFR 1502.15). The Affected Environment section describes the resources that could be affected by the implementation of the alternatives carried forward for detailed analysis from Chapter 2. The resource descriptions provided in the affected environment sections serve as the baseline from which to evaluate the potential impacts of the alternatives.

3.1.2.2 ENVIRONMENTAL CONSEQUENCES

The Environmental Effects section analyzes both beneficial and adverse impacts that would result from implementing any of the alternatives. NEPA requires agencies to assess the direct, indirect, and cumulative impacts the alternatives carried forward for detailed analysis. Direct and indirect impacts are discussed for each resource immediately following the characterization of each resource's affected environment in this chapter of the FEIS. Cumulative impacts are discussed in Chapter 4 of this FEIS.

A direct impact is an effect on a resource that is caused by the proposed action and occurs at the same time and in the same place.

An indirect impact is an effect that is caused by the proposed action and is later in time or farther removed in distance but is still reasonably foreseeable. Indirect impacts remain consistent within the temporal and spatial boundaries of analysis established for the resource.

To properly and meaningfully evaluate the potential impacts of each alternative, the impacts of each action alternative are measured against the impacts projected to occur under the No Action Alternative. The No Action Alternative is the baseline for purposes of comparison of the alternatives to one another.

Table 3.1-1 summarizes the calculations and spatial dimensions that were used to estimate the ground disturbance that would be caused by the various components of the C-HC Project and compares disturbance calculations by temporary and permanent impacts. Temporary disturbance is classified as disturbance during the construction period only, whereas permanent disturbance is for the lifetime of the project. For more information on project components, refer to Section 2.4.1.

Table 3.1-1. Ground Disturbance Assumptions for Project Components

Project Components	Units	Temporary Disturbance	Permanent Disturbance
Foundation ground disturbance	Per structure	100 feet by 100 feet (0.23 acre)	Up to 12 feet in diameter (0.003 acre)
Foundation depths	Per structure	Up to 60 feet deep 3,000 cubic feet	Up to 60 feet deep 3,000 cubic feet
Conductor pulling sites	Per site	40 feet by 300 feet (0.28 acre)	None
Access roads	Per road	14 to 20 feet wide	None
Laydown yards	Total	213 acres	None
Substation ground disturbance	Total	22 acres	22 acres

In order to determine whether an alternative has the potential to result in significant impacts, the context and intensity of the action must be considered. Context refers to area of impacts, timing, and the duration. Intensity refers to the severity of the impact. Intensity definitions have been developed to assess the magnitude of effects for all of the affected resource categories resulting from implementing the proposed action. Context in terms of duration of impact are estimated as either short term or long term (Table 3.1-2). The definitions of intensity are specific to each resource evaluated, and general intensity thresholds are provided in Table 3.1-3. Impact assessment methods, including impact indicators and impact duration definitions, are provided for each resource as part of the environmental consequences presentation.

Table 3.1-2. Impact Duration Definitions

Duration	Description
Short-term	During the construction period through two growing seasons after construction is completed, 1 to 3 years
Long-term	Operational life of the C-HC Project, 3 to 60 years

Table 3.1-3. Impact Intensity Thresholds

Intensity	Description
Minor impact	Impacts would occur, but resources would retain existing characteristics and overall baseline conditions.
Moderate impact	Impacts would occur, but resources would partially retain existing characteristics. Some baseline conditions would remain unchanged.
Major impact	Impacts would occur that would create a high degree of change within the existing resource characteristics and overall conditions of the resources.

Impact analysis for each resource also assumes successful implementation of the environmental commitments that are proposed as part of any action alternative (Table 3.1-4). Table 3.1-4 represents the most current list of environmental commitments to be implemented by the Utilities during the construction and operation of the C-HC Project. Current sources used to inform Table 3.1-4 include the C-HC Project Biological Opinion (Appendix G; USFWS 2019a), the Utilities' application to the PSCW (American Transmission Company, ITC Midwest LLC, and Dairyland Power Cooperative 2018), ongoing mitigation discussions with the Refuge, and ongoing discussions between RUS and the Utilities. These environmental commitments would be included in, and thereby enforced by, applicable permits, authorizations, and orders issued by Federal and state agencies. These commitments may be revised as permits, authorizations, and orders actions are reviewed and issued, if deemed appropriate by the various decisionmakers.

Table 3.1-4. Environmental Commitments Common to All Action Alternatives

Resource	Environmental Commitment
General	• Regulatory agencies may require independent third-party environmental monitors related to permitted aspects of the C-HC Project. The Utilities use trained staff members or contractors as monitors for special resource conditions as a standard practice
Geology and Soils	• An erosion control plan, coordinated with the IDNR and WDNR, would be prepared once a route is approved, and BMPs would be employed near aquatic features (wetlands, streams, waterbodies) to minimize the potential for erosion and to prevent any sediments from entering the aquatic features. • Erosion controls would be regularly inspected and maintained throughout the construction phase of a project until exposed soil has been adequately stabilized.
Vegetation, including Wetlands and Special Status Plants	**General Vegetation** • During restoration, erosion and sediment control measures, including measures for stabilization of disturbed areas during and at the completion of construction, would be implemented as defined in the SWPPP developed for the C-HC Project. Areas where ground disturbance occurs would be monitored until 70% revegetation has been established. • In non-agricultural area where ground disturbance occurs, the area would be monitored until ground cover is reestablished to at least 70% of the vegetation type, density, and distribution that was documented in the area prior to construction.

Resource	Environmental Commitment

	• In areas that were previously forested, disturbed areas would be revegetated consistent with non-invasive herbaceous vegetation that occurs in the area.
	<u>Algific Talus Slopes</u>
	• Upon final route selection and after landowner permission is obtained, additional habitat assessments and algific talus slope surveys will be completed along the final route selected in Iowa.
	• Geotechnical surveys at the proposed pole locations will be completed along the final route selected in Iowa to determine whether caves or cavities exist in bedrock that could be connected to algific talus slopes within or adjacent to the action area.
	• Should any algific talus slopes be identified during habitat assessments, or any caves or cavities be detected in the bedrock during geotechnical surveys, they will be avoided by construction.
	• Pole locations and construction access roads will be adjusted to avoid algific talus slopes, if present.
	• If algific talus slopes are identified, vegetation removal on steep slopes would be minimized to only the amount necessary to maintain conductor clearances.
	• Broadcast spraying of herbicides will be avoided and careful spot spraying will be used in suitable algific talus slope habitat areas.
	<u>Woodlands</u>
	• To minimize the spread of oak wilt, the cutting or pruning of oak trees between April 15 and July 1 for maintenance would be conducted in accordance with WAC PSC 113.051.
	• In Iowa, oak trees may be removed during maintenance activities but pruning oak trees would only occur during dormant periods.
	• Practices that minimize the spread of emerald ash borer would be employed, which include avoiding movement of ash wood products (logs, posts, pulpwood, bark and bark products, and slash and chipped wood from tree clearing) and hardwood firewood from emerald ash borer quarantine areas to nonquarantine areas (see, for example, WAC Agriculture, Trade, and Consumer Protection [ATCP] 21.17). Where ash wood products cannot be left on-site, alternative plans would be developed to meet the requirements.
	• Standard practices used in the quarantine area to avoid the spread of gypsy moth damage include inspections by trained staff and avoiding movement of wood products (logs, posts, pulpwood, bark and bark products, firewood, and slash and chipped wood from tree clearing) from gypsy moth quarantine areas to nonquarantine areas, according to WAC ATCP 21.10.
	<u>Wetlands</u>
	• Impacts to wetlands would be minimized by one or more of the following measures:
	  o Conducting construction activities when wetland soils and water are frozen or stable and vegetation is dormant.
	  o Use of equipment with low ground-pressure tires or tracks.
	  o Placement of construction matting to help minimize soil and vegetation disturbances and distribute axle loads over a larger surface area, thereby reducing the bearing pressure on wetland soils.
	• Access roads through wetlands will not require permanent fill.
	• Erosion control BMPs will be installed where needed to prevent soil erosion into and within wetlands.
	• Any spoils will be removed from wetlands to non-sensitive upland areas or other approved location. Cleaning of construction equipment and mats, per the Wisconsin Council on Forestry's "Invasive Species Best Management Practices: Rights-of-Way" guidance to mitigate the spread of invasive species (see Appendix D). Where necessary to ameliorate minor impacts, such as rutting and vegetation disturbance due to equipment operation and mat placement in wetlands, site restoration activities will be implemented, monitored, and remedial measures applied until established restoration goals are achieved, as required by regulatory permits obtained for the C-HC Project.
	<u>Invasive Species</u>
	• The Utilities would follow the Wisconsin Council on Forestry's "Invasive Species Best Management Practices: Rights-of-Way" guidance to mitigate the spread of invasive species (see Appendix D).
	• Work below the ordinary high-water mark (OHWM) of waterways would be avoided to the extent practicable; the most likely activity would be withdrawing water to stabilize excavations.
	• Before moving construction equipment and material between waterway construction locations where equipment or materials are placed below the OHWM of a waterway, standard inspection and disinfection procedures would be incorporated into construction methods as applicable (see WAC NR 329.04(5)).
	• All natural areas, such as wetlands, forests, and prairies, will be surveyed for invasive species following construction and site revegetation. If new infestations of invasive species due to construction of the C-HC Project are discovered, measures should be taken to control the infestation.
	  o The WDNR or IDNR, as applicable, would be consulted to determine the best methods for control of encountered invasive species.
	• The Utilities will employ a Certified Pesticide Applicator for all herbicide applications within the C-HC Project. The Certified Pesticide Applicators will only use herbicides registered and labeled by the USEPA and will follow all herbicide product label requirements. Herbicides approved for use in wetland and aquatic environments will be used in accordance with label requirements, as conditions warrant.

Resource	Environmental Commitment
Wildlife, including Special Status Species	• In accordance with WDNR avoidance and minimization measures, reptile exclusion fencing would be installed in areas during the appropriate season where habitat is likely to support rare turtles, snakes, or salamanders. • The Utilities will develop a project-specific Avian Protection Plan for the C-HC Project. An eagle management plan will be included as part of the Avian Protection Plan. • Bird flight diverters would be installed on shield wires when overhead transmission lines are built in areas heavily used by rare birds or large concentrations of birds or in specific areas within known migratory flyways. • Design standards for this project will meet avian-safe guidelines as outlined by the Avian Power Line Interaction Committee for minimizing potential avian electrocution risk. • The Utilities will identify locations, in coordination with USFWS, IDNR, and WDNR, where the installation of bird flight diverters will be recommended to minimize the potential for avian collisions. If an eagle nest occurs near the ROW, the Utilities will coordinate with the USFWS to determine if and where bird flight diverters are needed to minimize collision risk. • The Utilities will coordinate with the USFWS, IDNR, and WDNR on eagle nest surveys to occur before construction activities to identify eagle nests within 0.5 mile on either side of the ROW. The surveys would occur preferably in the winter or spring before leaf-on when nests are the most visible and survey data will be provided to the agencies. • The Utilities will coordinate with the USFWS if an eagle nest occurs within 660 feet of the edge of the ROW to determine if and which permits are recommended or if mitigation measures are appropriate to minimize impacts. • The Utilities will work with the IDNR and the WDNR to determine locations where state-listed bird species habitat is present and implement appropriate measures to avoid and/or minimize impacts to those species. • Prior to tree clearing during migratory bird nesting season, the Utilities will complete a field review of the final ROW to identify existing stick nests. Tree clearing crews will also be trained to stop work and notify Environmental staff if they encounter an unanticipated nest. • Vegetation clearing within threatened and endangered avian species habitat will be avoided during migratory bird nesting season. **Iowa Pleistocene Snail** • Upon final route selection and after landowner permission is obtained, additional habitat assessments and algific talus slope surveys will be completed along the final route selected in Iowa. • Geotechnical surveys at the proposed pole locations will be completed along the final route selected in Iowa to determine whether caves or cavities exist in bedrock that could be connected to algific talus slopes within or adjacent to the action area. • Should any algific talus slopes be identified during habitat assessments, or any caves or cavities be detected in the bedrock during geotechnical surveys, they will be avoided by construction. • Pole locations and construction access roads will be adjusted to avoid algific talus slopes, if present. • Vegetation removal that occurs on steep slopes along the proposed ROW in Iowa will be the minimum amount necessary to maintain conductor clearances. • All seed mixes used for restoration and revegetation in areas of algific talus slope habitat will be free of neonicotinoids. • The use of BMPs during construction and vegetation management activities to prevent the spread of invasive species will help to maintain greater plant diversity along the cleared transmission corridors. **Northern Long-eared Bat** • Tree removal activities will be avoided during the northern long-eared bat “pup season” (June 1 to July 31) to avoid potential direct impacts to pups at roosts. • Northern long-eared bat surveys will be performed between the two proposed corridors within the Upper Mississippi River National Wildlife and Fish Refuge per the USFWS’s most recent *Range-wide Indiana Bat/Northern Long-eared Bat Summer Survey Guidelines* (USFWS 2018a). • Northern long-eared bat surveys may be performed along other portions of project segments per the most recent survey guidelines to determine northern long-eared bat presence or probable absence. Areas having survey results of probable absence would not be subject to tree removal restrictions during the pup season.

Resource	Environmental Commitment
	Rusty Patched Bumble Bee • Prior to construction, areas within High Potential Zones preliminarily screened as low-quality habitat or questionable habitat will be evaluated and documented using the *Rusty Patched Bumble Bee Habitat: Assessment Form and Guide* (Xerces Society for Invertebrate Conservation 2017). • Areas determined to contain suitable habitat within High Potential Zones per the *Rusty Patched Bumble Bee Habitat: Assessment Form and Guide (*Xerces Society for Invertebrate Conservation 2017) will be surveyed for rusty patched bumble bee no more than 1 year prior to construction per the *Survey Protocols for the Rusty Patched Bumble Bee* (USFWS 2018b). Additional surveys may be performed more than 1 year prior to construction to guide project planning. • Where the rusty patched bumble bee is confirmed to be present, disturbance and vegetation clearing within suitable habitats will be minimized to the extent possible. • Seed mixes containing a diversity of native flowering plants will be used to reseed existing suitable habitat areas that require revegetation/restoration within High Potential Zones, as well as opportunity areas for expanding suitable habitat within known High Potential Zones. • The use of BMPs during construction and vegetation management activities to prevent the spread of invasive species will help to maintain greater plant diversity along the cleared transmission corridors. • Herbicide application where used for vegetation management purposes in suitable habitat within High Potential Zones will be targeted to limit the effects of the herbicide beyond the targeted species. • To avoid or minimize impacts in areas documented by surveys to be occupied by rusty patched bumble bee, activities within occupied habitat will be sequenced with seasonal time frames as much as is feasible (i.e., late spring/summer work in woodlands to avoid overwintering queens, late fall/winter work in open areas to avoid foraging and nesting sites). • USFWS believes the following reasonable and prudent measures are necessary and appropriate to minimize take of the rusty patched bumble bee: o Minimize preconstruction vegetation clearing and ground disturbance. o Use native species in restoration activities. o Maintain suitable habitat within the permanent ROW. o Document and report to the USFWS the timing and extent of disturbances within suitable habitat for rusty patched bumble bee to help inform future consultations. • To implement the reasonable and prudent measures listed above, the Utilities must comply with the following terms and conditions: o Minimize clearing, grading, and vegetation removal within suitable habitat areas in the High Potential Zones. o Reseed all construction ROW suitable habitat areas (temporary and permanent) within the High Potential Zones with pollinator-friendly native seed mixes consistent with recommendations provided by the USFWS. When possible, include species preferred by the rusty patched bumble bee and ensure that some plants are in bloom through the season when the rusty patched bumble bee may be present. The USFWS provides a list of plants favored by the species (USFWS 2019b). o Provide a written summary of the suitable habitat impacted, the timing of impact as it pertains to the rusty patched bumble bee active and inactive season, and the estimated percentage of disturbed ground at completion of transmission line construction and other associated activities.
Water Resources and Water Quality	• An erosion control plan, coordinated with the IDNR and WDNR, will be prepared once a route is ordered/approved, and BMPs would be employed near aquatic features (wetlands, streams, waterbodies) to minimize the potential for erosion and to prevent any sediments from entering the aquatic features. • Erosion controls would be regularly inspected and maintained throughout the construction phase of a project until exposed soil has been adequately stabilized. • Waterway crossings would require a temporary clear span bridge (TCSB) to avoid the necessity of driving construction equipment through streams. Each TCSB would consist of construction mats, steel I-beam frames, or other similar material placed above the OHWM on either side to span the stream bank. If there are waterways that are too wide to clear span, a temporary bridge with in-stream support would be designed and constructed. • The use of TCSBs would be minimized where possible by accessing the ROW from either side of the stream or by using existing public crossings to the extent practical. The Utilities would work with private landowners to identify alternative access routes to further reduce the use of stream crossings, if possible. • For those streams that would not be crossed by construction vehicles and where stream-crossing permits have not been acquired, wire would be pulled across those waterways by boat, by helicopter,

<table>
<tr><th>Resource</th><th>Environmental Commitment</th></tr>
<tr><td></td><td>or by a person traversing across the waterway. Wire stringing activity may require that waterways be temporarily closed to navigation.
• No structures would be located below the OHWM.
• Any dewatering within the project area during construction would be discharged to a non-sensitive upland site to facilitate re-infiltration to the aquifer.
• Nearby waterways could be used as a water source during project construction. The Utilities would attempt to avoid water withdrawals during spawning seasons. The Utilities would coordinate water withdrawals with the IDNR and WDNR.
• The Utilities would follow these requirements when working in proximity to the Refuse Hideaway Landfill site and contaminated groundwater plume:
o Once a route for the C-HC Project is selected and final design is underway, the Utilities would develop a geotechnical investigation plan, which would include an environmental sampling plan for collection of groundwater and soil samples.
o The environmental sampling plan would be provided to the WDNR case manager for WDNR review and input prior to start of the geotechnical investigations.
o Environmental sampling results would be shared with WDNR.
o The Utilities would then draft a Contaminated Soil and Groundwater Management Plan for the C-HC Project in the vicinity of the Refuse Hideaway Landfill site, and WDNR would review the plan. If WDNR requires a formal approval process, an approval process consistent with the WAC Department of Natural Resources Chapters NR 700-754 will be followed. The Contaminated Soil and Groundwater Management Plan will identify appropriate disposal methods for any contaminated soil and groundwater intercepted during construction of the C-HC Project.
o The Utilities will follow Occupational Safety and Health Administration (OSHA) requirements associated with working with potentially contaminated soil and groundwater.</td></tr>
<tr><td>Air Quality</td><td>• The Utilities will review the Construction Emission Control Checklist with transmission line and substation construction contractors to identify appropriate emission reduction techniques for constructing the C-HC Project (see Appendix D).
• Contractors will clean up any dirt or mud that may be tracked onto the road by equipment daily.
• Tracking pads may be constructed at frequently used access points to minimize mud being tracked onto public roads. Road sweeping will be used as needed to minimize dust.
• A water truck will be available on-site to spray areas of the laydown yards and ROW that are creating excessive dust.</td></tr>
<tr><td>Noise</td><td>• When undertaking construction activities around residences, the Utilities and their contractors will be cognizant of the residents and will limit work hours in that area, specifically during the early morning hours.
• If helicopters are used on the project, the Utilities will use various forms of outreach to notify the affected communities and landowners of when the helicopters will be in operation.
• The Utilities and their contractors plan to generally work during daylight hours Monday through Friday, with an average workday to be approximately 11 hours.</td></tr>
<tr><td>Transportation</td><td>• Traffic control plans will be developed and implemented during construction to minimize traffic impacts and comply with permit requirements.
• The Utilities will minimize the number of vehicles and the amount of time they are parked on the roads.
• If a driveway is needed to access the ROW, the driveways may be protected using composite mats or other low-profile protection systems. Commercial or industrial driveways will be evaluated prior to use as surface protection may not be required.
• Any damage caused by construction access will be repaired as needed.
• The Utilities and their contractors will not block any residence driveways with equipment unless agreed upon with the landowner or resident.
• During final design, the Utilities would attempt to locate structures so that they are directly adjacent to the crossing with either Rustic Road 70 or Rustic Road 75.
• The Utilities will adhere to WisDOT guidance on defining clear zones in its Facilities Development Manual Section 11-15, Attachment 1.9 (WisDOT 2019a).</td></tr>
<tr><td>Cultural and Historic Resources</td><td>• Consultation between the Iowa and/or Wisconsin State Historic Preservation Offices (SHPOs), RUS, the Utilities, and affected tribal groups, among others, would be required under Section 106 of the National Historic Preservation Act. This consultation must be completed prior to financing or license</td></tr>
</table>

Resource	Environmental Commitment
	issuance. For the C-HC Project, Section 106 compliance will be completed using a Programmatic Agreement (see Appendix H). • The Utilities would develop an Unanticipated Discoveries Plan detailing the process for addressing the identification of previously unidentified potential historic properties such as archaeological sites, historic features, or unidentified human remains during the course of construction. Such a plan would include steps for preventing further harm to previously unidentified sites and notifying consulting parties in order to address impacts to potential historic properties. • If unanticipated archaeological resources or human remains are encountered during construction, the Utilities shall stop work at that location and shall immediately report it to the Utilities' Construction Manager and Environmental Monitor. Work shall not commence in that location until the Wisconsin Historical Society or Iowa SHPO and PSCW are notified and direction sought from the Wisconsin Historical Society or Iowa SHPO. Interested tribes would also be notified during this time. Construction may resume after the direction is followed and the qualified archaeologist's reports, if any, are received and approved by the Wisconsin Historical Society or Iowa SHPO.
Land Use, including Agriculture and Recreation	• Where possible, siting in agricultural areas would be along fence lines or between fields or along public road ROW so that the proposed structures would be located along the edge of the land area used for agricultural purposes. If conflicts occur, landowners would be consulted during the real estate acquisition process to accommodate landowner needs to the extent practicable. • During the final design process, landowner input would be obtained to place structures such that impacts to drain tiles would be minimized to the extent practicable. • During construction, matting may be used to more evenly distribute the weight of heavy equipment and low ground-pressure construction equipment may also be used. • After construction, damaged drain tiles would be repaired to preconstruction conditions. • Where appropriate, minimization techniques, such as topsoil replacement and deep tilling, may be used. • Construction vehicles may be cleaned before entering the organic farm parcels, in accordance with input from the landowner. • During the easement negotiation, landowners can decline the use of herbicides for vegetation management activities once the line is in operation. Therefore, no herbicides would be applied within portions of the ROW on which the landowner wishes not to introduce it. • If construction activity occurs during wet conditions and soils are rutted, ruts will be repaired as soon as conditions allow to reduce the potential for impacts. • To minimize soil compaction during construction in agricultural lands, low-lying areas, saturated soils, or sensitive soils, low-impact machinery with wide tracks could be used. • Prior to and during construction, the Utilities will coordinate with land managers regarding public notification about construction activities and temporary closures of public areas. • See more detailed BMPs for agricultural lands in Appendix D.
Visual Quality and Aesthetics	• Steel monopoles with a weathered finish will be used at visually sensitive locations to minimize the visual impacts to the landscape.
Socioeconomics and Environmental Justice	• Short-term impacts to agricultural lands would be mitigated by providing compensation to producers and by restoring agricultural lands to the extent practicable.
Public Health and Safety	• If the proposed transmission lines parallel or cross distribution lines, appropriate measures can be taken to address any induced voltages.
Upper Mississippi River National Wildlife and Fish Refuge	• For the portion of the C-HC Project within the Refuge, preliminary low-profile structures are proposed with a design height to match the existing tree cover within the Refuge (approximately 75 feet) to reduce the potential of avian collisions. • The structures would be horizontal-symmetrical H-frame structures on concrete foundations with a typical span length of approximately 500 feet and would consist primarily of tubular steel H-frame structures. • All conductors on these low-profile structures would be placed on one horizontal plane and the shield wire would be marked with avian flight diverters. • Construction on the Refuge would need to occur outside the eagle nesting season (typically January 15 to June 15) or outside a 660-foot exclusion zone to avoid disturbance to nesting adult, chick, and fledgling eagles. • For the alternatives that cross the Mississippi River at the Nelson Dewey Substation (alternatives 1, 5, and 6), additional minimization steps are proposed:

Resource	Environmental Commitment
	o The Utilities propose to mitigate adverse impacts to forest resources in the Refuge through restoration and enhancement of forest resources both within and off Refuge lands. A restoration plan would be developed in consultation with the USFWS and USACE. The restoration plan would supplement existing USFWS efforts to restore bottomland hardwood forest within the Refuge, specifically on the floodplain of the Turkey River. Mitigation may also include the reestablishment and/or expansion of mature woodlands near the Nelson Dewey Substation and/or other non-Refuge locations adjacent to Refuge lands. These restoration efforts would mitigate adverse impacts on public lands. • Revegetation within the Refuge would be conducted in concert with USFWS and USACE review and direction and in compliance with applicable NERC-regulated vegetation standards. As with the design of the project, the Utilities would work closely with the USACE and USFWS to identify the location, type, and overall revegetation plan that would be appropriate for the project and this specific location of the Refuge. • In addition to the environmental commitments outlined above and other mitigation to be developed with the USFWS and USACE, as part of the USACE and USFWS permit application processes, the Utilities would develop a project-specific mitigation plan. This plan would need to be deemed acceptable by USACE and USFWS prior to the issuance of permits. Appendix I contains the preliminary Federal mitigation plan for the C-HC Project.

3.1.3 *Analysis Area*

For this FEIS, RUS identified a 300-foot analysis area that encompasses the proposed ROW along each action alternative. As discussed in Chapter 2, the proposed ROW for the C-HC Project would typically range from 150 feet wide in Wisconsin, to 200 feet wide in Iowa, and to 260 feet wide in the Refuge. The purpose of the 300-foot analysis area is to allow for minor reroutes along portions of the action alternatives, if the need arises, without triggering a reevaluation of all environmental impacts. Therefore, this FEIS presents impacts for resources within the ROW and for the area outside the ROW and within the 300-foot analysis area.

As presented in the resource sections below, some resources warranted a review of existing conditions beyond the 300-foot analysis area to adequately identify and characterize resources that would be indirectly impacted by the C-HC Project. In those cases, this FEIS also refers to the resource evaluation area, which extends beyond the 300-foot analysis area. Table 3.1-5 identifies the spatial extent that was reviewed for existing conditions and analyzed, by resource.

In the following sections of Chapter 3, current conditions are characterized for either the resource evaluation area or the analysis area, depending on the data available for a specific resource. The analysis areas were determined to allow routing flexibility for final design, and to allow adequate geographic coverage for where direct and indirect impacts would occur.

For presentation of resource impact under the Environmental Consequences section for each resource, the analysis area was used to help convey the direct and indirect impacts of the proposed project within and immediately adjacent to the ROW.

Table 3.1-5. Conditions and Analyze Direct and Indirect Impacts

Resource	Resource Evaluation Area Used to Characterize the Affected Environment	Analysis Area Used to Inform Resource Impacts
Geology and Soils	Same as analysis area	300-foot-wide area, which extends outside the proposed ROW for each action alternative
Vegetation	300-foot-wide area, which extends outside the proposed ROW for each action alternative plus information provided by USFWS, WDNR, and IDNR about species that could occur in the general vicinity of the action alternatives	300-foot-wide area, which extends outside the proposed ROW for each action alternative
Wildlife	300-foot-wide area, which extends outside the proposed ROW for each action alternative plus information provided by USFWS, WDNR, and IDNR about species that could occur in the general vicinity of the action alternatives	300-foot-wide area, which extends outside the proposed ROW for each action alternative
Water Resources and Quality	Same as analysis area	300-foot-wide area, which extends outside the proposed ROW for each action alternative
Air Quality	Same as analysis area	The air quality analysis area extends 5 miles in all directions from ROW for the action alternatives
Noise	Same as analysis area	300-foot-wide area, which extends outside the proposed ROW for each action alternative
Transportation	Same as analysis area	5-mile area surrounding the proposed action alternatives
Cultural and Historic Resources	Same as analysis area, referred to as area of potential effects (APE) for this resource	The area analyzed for potential physical impacts is a 300-foot-wide area, which extends outside the proposed ROW for each action alternative The area analyzed for potential non-physical impacts is a 2,000-foot-wide area that extends outside the ROW for each action alternative
Land Use	Counties crossed by the action alternatives	300-foot-wide area, which extends outside the proposed ROW for each action alternative
Visual Quality and Aesthetics	Same as analysis area	Upwards of 2 miles from the action alternatives
Socioeconomics and Environmental Justice	Same as analysis area	Counties crossed by the action alternatives
Public Health and Safety	Same as analysis area	300-foot-wide area, which extends outside the proposed ROW for each action alternative
Refuge	Mississippi River Miles 606 to 608	300-foot-wide area, which extends outside the proposed ROW for each action alternative

This FEIS has been developed based on available information deemed adequate to characterize expected impacts to the extent that the intensity, context, magnitude, and duration are understood for each affected resource.

3.1.3.1 RETIREMENT OF THE N-9 TRANSMISSION LINE AND CONSTRUCTION OF A NEW 69-KV TAP LINE

For the impact analysis for the decommissioning of the N-9 transmission line and construction of the 0.2- mile tap line connecting the remaining portion of the N-9 transmission line with the Turkey River Substation, the impact analysis area would include the 80-foot-wide N-9 ROW, new tap line, and access roads. Where relevant, impacts are broken out by Refuge, private lands, and transportation ROW. Portions of the N-9 transmission line would be within the ROW associated with 360th Street and CY9. Table 3.1-6 summarizes the acres of surface disturbance (also referred to as the analysis area) associated with each element of the N-9 decommissioning and tap line construction, by land ownership.

Table 3.1-6. N-9 Decommissioning and Tap Line Construction Analysis Area by Land Ownership

	Length (miles)	Within Refuge (acres)	Private Land (acres)	Transportation ROW* (acres)	Total (acres)
Decommissioned N-9 line ROW	2.7	18.6	7.1	0.6	26.3
New tap line ROW	0.2	0.0	1.0	0.9	1.9
Access roads†	3.31	2.9	4.2	0	7.1
Total Analysis Area	**6.21**	**21.5**	**12.3**	**1.5**	**35.3**

* Portions of the N-9 transmission line would be within ROW associated with 360th Street and Great River Road (CY9).

†Access roads refer to the roads used to reach the project area in order to decommission the N-9 line and build the new tap line. No new roads would be constructed or decommissioned as part of the N-9 portion of the project.

3.2 Geology and Soils

This section describes the geologic and soil resources occurring within the 300-foot analysis area corridor. Geologic resources include both the unconsolidated materials at the surface including soil types and consolidated bedrock deposits. This section also describes mined mineral deposits, sensitive soils, and unique physiographic features.

3.2.1 *Affected Environment*

The geology and soils of the analysis area formed in what is called the “Driftless Area,” an isolated area of land that was not directly affected by glaciation, but from the glacial outwash and wind-blown silts as nearby glacial lobes retreated (U.S. Geological Survey [USGS] 2003; USGS and NPS 2000). This area through much of Southwest Wisconsin and a small portion of Northeast Iowa, includes gently to moderately rolling farmland and woodlands in the east portion of the analysis area, to steep, wooded, and rocky ridges and open, narrow valleys formed by streams and rivers cutting through the bedrock formations near the Mississippi River (Iowa Geologic and Water Survey 2010; University of Wisconsin – Extension 2005). Many of these valleys have significant topographical relief, resulting in very scenic but in many locations, sensitive geologic formations and soils that could be affected by construction of the project. The soils are dominantly the result of wind-blown silts or loess that covered the area after retreat of the glaciers, creating soils that are rich for cultivation of crops and support dense woodlands. The silty soils are also prone to erosion, due to wetness from seeps and high water tables and shallow depths where they are exposed to rain and wind on steep slopes.

Many of the soils throughout the analysis area are rich, prime farmland that are prone to erosion, wetness, and potential compaction. Where there are slopes, erosion is the primary concern. In addition, talus slopes are in the analysis area in deposits of shale and rock that once formed at the toe of steep slopes and reflect geologically sensitive areas. Algific talus slopes are unique, very sensitive ecologies that have formed in this area that are protected because of the rarity of their existence (Iowa Geologic and Water Survey 2010; University of Wisconsin – Extension 2005).

3.2.1.1 GEOLOGY

The surface geologic features of the analysis area, including the ridges and valleys present, are a result of millions of years of erosion and drainage to the Mississippi River. The analysis area is within the Driftless Area, which is distinguished by hilly uplands and plateaus deeply dissected by streams. The Driftless Area is also characterized by the lack of glacial drift deposits (often described as till), meaning the area was not covered by ice sheets in the last glacial period. Even without thick deposits of glacial drift, the effects of glaciation are present. Loess deposits derived from the nearby glacial deposits blanket much of the area. Loess is a sediment formed by the accumulation of wind-blown silts and clays (often described as dust). Glacial outwash deposits composed of sands and gravels are present in a small portion of the analysis area, in the northeast near the Wisconsin River.

The bedrock geology within the area consists mostly of Paleozoic era dolomites and sandstones, with some limestone and shale deposited during the Ordovician period (USGS 2003; USGS and NPS 2000). These shallow marine deposits represent multiple periods of sea level rise and fall. Sediments eroded by waves along the shoreline and by rivers draining the land were deposited in the sea to form sandstone and shale. Carbonate precipitating organisms and other calcareous deposits formed layers and reefs of calcium carbonate in shallow marine environments that are mostly dolomite now.

In the analysis area, a landscape described as “karst” is created where water dissolves the limestone and dolomite rocks (Iowa Geologic and Water Survey 2010; University of Wisconsin – Extension 2005). The rocks are dissolved primarily along fractures which create caves and conduits for groundwater flow. Karst landscapes typically have deep bedrock fractures, sinkholes, and springs.

There are two geologic mineral resources mined in southwest Wisconsin. Sand, especially sand used for petroleum extraction called “frac sand,” and iron ore. According to the Wisconsin Geological and Natural History Survey, currently there were no active mines within the analysis area (WDNR 2016a; Wisconsin Geological and Natural History Survey 2018).

3.2.1.2 SOILS

The analysis area is covered in a mantle of silty loess soil ranging in thickness from 1 foot to more than 15 feet thick (USDA Soil Conservation Service 1962, 1966, 1978, 1982, 1985; WDNR 2015). Soil maps show more than 165 soil series—soils with varying profile characteristics—in the analysis area. The great majority of these soils typically consist of well-drained and moderately well-drained, deep silt loam derived from the wind-blown loess that blanketed most of the area, occasionally with substantial stone content. The silt loam soils are generally underlain by sand or clay weathered from bedrock. Thicker soil profiles are generally found in nearly flat, broad valleys throughout the analysis area. Thinner soil profiles are found on steep slopes and ridgetops, like the areas near the Mississippi River.

According to the USDA Natural Resources Conservation Service (NRCS), a typical soil profile consists of a surface horizon of 4 to 8 inches of dark brown, friable silt loam underlain by 10 to as much as 40 inches of yellowish brown, friable silt loam subsoil (USDA NRCS 2018a). This profile is further underlain by light brown to gray, mottled silt loam to depths greater than 60 inches. Shallower soils, those typically found on the shoulders of steep slopes, will similarly consist of 4 inches of dark brown, friable silt loam underlain by approximately 7 to 12 inches of light brown, friable silt loam over bedrock (USDA NRCS 2018a).

Silt loam soils are considered structurally weak, and therefore more sensitive to erosion, compaction, and deep disturbance, such as rutting when soil strength is not sufficient to support the applied load from vehicle traffic (USDA NRCS 2018a). For the purposes of this analysis, sensitive soils are defined as those soils meeting one of the following characteristics:

1. Prime farmland or farmland of statewide importance
2. Highly erodible soils, as defined using erosion capability classification
3. Hydric soils, as defined by using the wet capability classification
4. Shallow soils, as defined by using the shallow soil capability classification
5. Soils on steep slopes greater than 30% incline

Silt loam soils tend to be very rich and productive, and as a result, there is a preponderance of prime farmland, occupying approximately 75% of the analysis area (USDA NRCS 2018a, 2018b). In addition to prime farmland, farmland of statewide importance is present within the study area, occupying approximately 72% of the analysis area (USDA NRCS 2018a, 2018b). Prime farmland consists of soils having the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. Both prime farmland and farmland of statewide importance are protected under the Farmland Protection Policy Act (FPPA) subtitle I of Title XV, Section 1539–1549. The purpose of the FPPA is to minimize the extent to which federally directed or assisted programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses.

The sensitivity of soils to use—primarily crop production—is rated on a capability classification system (USDA Soil Conservation Service 1962, 1966, 1978, 1982, 1985). In the capability system, soils are generally grouped as capability class and subclass.

Class 1 soils have slight limitations that restrict their use.

Class 2 soils have moderate limitations that require moderate conservation practices.

Class 3 soils have severe limitations that require special conservation practices.

Class 4 soils have very severe limitations that require very careful management.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

Capability subclasses are soil groups within each capability class. They are designated by adding a small letter, *e (erosion), w (wetness), s (shallow),* or *c (cold),* to the class numeral. For example, a capability classification of 3e would mean a soil has severe limitations due to erosion. For the analysis area, soils meeting the capability class of 3 or greater may be a concern for the following reasons (USDA Soil Conservation Service 1962, 1966, 1978, 1982, 1985):

1. Erosion (e): While the silt loam soils that dominate the analysis area are ideal for agricultural production, they are also prone to higher rates of erosion. Silt loam soils are typically the most erodible of all soils. The soil particles are easily detached; tend to crust and produce high rates of runoff. The K values (the soil erodibility factor which represents both susceptibility of soil to erosion and the rate of runoff) for these soils tend to be greater than 0.4. Therefore, the primary management concern for soils in the analysis area is erosion. Approximately 56% of the soils in the analysis area have an erosion capability classification greater than 3.
2. Wetness (w): Wet soils typically have poor drainage. These soils often either reflect compacted soil conditions that restrict drainage, or they are hydric soils resulting from a high or perched water table that can then be classified as wetland. Wet soils are a concern in that they are easily damaged and may be difficult to repair. Approximately 3% of the soils in the analysis area have a wet capability classification of 3 or greater. Many of these soils are associated with wetlands and are considered hydric soils.
3. Shallow (s): Shallow soils have limitations from the limited rooting depth they provide plants. The soil limitations include shallowness of rooting zones, stones, low moisture-holding capacity,

low fertility difficult to correct, and salinity or sodium. In the analysis area, they are typically on the shoulders of steep slopes and near the bottom of steep drainages. Approximately 7% of the soils in the analysis area have a shallow classification of 3 or greater.

Limitations or complications due to cold soils (c) are unlikely to occur with the analysis area.

In addition to sensitive soils defined by capability classifications, soils on slopes greater than 30% are considered sensitive because of their susceptibility to erosion and the potential for slumping if they are significantly disturbed and not correctly restored (USDA NRCS 2018a, 2018b). Approximately 6% to 7% of the analysis area includes steep slopes (USDA NRCS 2018a, 2018b).

3.2.1.3 TOPOGRAPHY

The topography of the analysis area, both in Iowa and Wisconsin, is described as gently rolling to hilly, with steep slopes along many ridges (USDA Soil Conservation Service 1962, 1966, 1978, 1982, 1985). This area that was generally unaffected by glaciation, encountered millions of years of uninterrupted erosion that have dissected the landscape, creating bluffs and narrow valleys with more than 400 feet of topographic relief. Topography along the Mississippi River and its tributaries is steep, often with limestone outcrops, while the topography farther to the east becomes more gently rolling with broad ridgetops and wide valleys.

3.2.1.4 UNIQUE PHYSICAL FEATURES, INCLUDING ALGIFIC TALUS SLOPES

The analysis area includes portions of the Paleozoic Plateau. The Paleozoic Plateau includes substantial rock outcroppings, a near absence of glacial deposits, and many deep, narrow valleys that contain fast-flowing streams, and thick woodlands (Iowa Geologic Survey 2017). This steep and severe landscape is the result of erosion through rock strata of Paleozoic age. The bedrock-dominated terrain shelters unusually diverse flora and fauna, including some species normally found in cooler, more northern climates.

Associated with the Paleozoic Plateau are algific talus slopes. Algific talus slopes are rare, fragile soil formations and habitat that exist on north-facing slopes of ridges and canyons in the “Driftless Area” of Wisconsin and Iowa (Iowa Geologic Survey 2017; WDNR 2015). These features are associated with sinkholes and subterranean ice caves. Generally, air flowing through the fractures of rock shelves and sinkholes and into the talus can escape through vents at the base of the talus pile during the spring and summer. These vents create a micro-climate that support unique and rare wildlife and vegetation. The valleys in which they occur tend to be very steep, and often have dense forest cover. In Wisconsin, algific talus slopes are known to exist in western Grant County within a few miles of the Mississippi River, however, none of these slopes are found in the analysis area. In Iowa, there are four potential algific talus slope locations within the analysis area. Algific talus slopes are discussed in greater detail in Section 3.3, Vegetation, including Wetlands and Special Status Plants.

The Mississippi River also occurs within the analysis area. The Mississippi River floodplain is an ancient river valley filled with alluvial material (mud, sand, and gravel) carried and deposited by surface water. Underlying sedimentary rock formations (dolomite, sandstone, and shale) accumulated under inland seas during the early Paleozoic Era about 400 to 600 million years ago. In more recent geologic times, the river valley has taken shape due to the presence (and absence) of glacial action. Several episodes of flushing sediment and filling with sand and gravel of the river valley have occurred. Sand terraces that presently flank the river valley are remnants of ancestral floodplains not scoured during the most recent postglacial floods. The analysis area occurs within a region that has minimal amounts of glacial deposits known as “drift” and is therefore known as the Driftless Area. This landscape features a combination of steep, exposed bluffs that rise 100 to 600 feet above the river valley and eroded ravines that bound the wide floodplain of the Upper Mississippi River (USFWS 2006a).

3.2.2 *Environmental Consequences*

This section discusses potential impacts to the geology, soils, and prime farmlands within the region as a direct result of the construction and operation of the C-HC Project, including the six alternatives and the No Action Alternative.

3.2.2.1 DATA SOURCES, METHODS, AND ANALYSIS ASSUMPTIONS

The following impact indicators were considered when analyzing potential impacts to geology and soils:

- Acres of surface disturbance.
    - Temporary – construction activities.
    - Permanent – structure locations and substations.
- Acres of disturbance to sensitive soils.
- Acres of disturbance to steep slopes.

Data from the NRCS Web Soil Survey and Soil Survey Geographic Database (SSURGO) were used to assess soil conditions and determine the extent that project activities will affect soils (USDA NRCS 2018a, 2018b). The USDA NRCS Web Soil Survey and SSURGO provide the most comprehensive and localized information about soil conditions in the analysis area. Data from the SSURGO database for soil characteristics include the soil classifications used to map and quantify sensitive soils potentially affected by the C-HC Project. From these databases, sensitive soils were considered to be:

1. Prime farmland and farmland of statewide importance, as determined by NRCS (USDA NRCS 2018a, 2018b).
2. Soils on steep slopes. Steep slopes are considered those slopes of greater than 30% grade. Soils on these slopes have higher chances for erosion and instability due to the drainage of water both above and below ground.
3. Soil with severe erosion potential, as determined by the soil capability classification for erodible soils as described in Section 3.2.1.2. Typically soils with a high potential for erosion have a capability classification and subclassification of 3e or greater. This corresponds to a K factor greater than 0.4 as used in the Universal Soil Loss Equation (USDA Soil Conservation Service 1962, 1966, 1978, 1982, 1985).
4. Soil that is limited by shallow depth, as determined by using the soil capability classification for shallow soils as described in Section 3.2.1.2. Shallow soils are susceptible to mechanical damage that may leave insufficient soil for plants, as well as higher erosion potential.
5. Soil that is limited by wetness, as determined by using the soil capability classification for wet soils as described in Section 3.2.1.2. Wet soils have a capability classification and subclassification of 3w or greater. These soils are typically wet or often have hydric characteristics that also render them prone to compaction and/or rutting (deep disturbance of the soil that may result from tracked or wheeled equipment or vehicles).

Impacts to these sensitive soil resources were quantified both within the ROW, outside the ROW but within the 300-foot analysis area, and for any permanent project facilities such as structures or substations. Impacts were then quantified for each sensitive soil category potentially impacted by the C- HC Project as follows:

- Permanent Impacts—The permanent impact to soil and geology due to the displacement during construction of structure foundations was calculated using the estimated number of structures along each alignment, the estimated amount of soil and rock that could be disturbed for construction of the foundation boreholes, and the footprint of the proposed Hill Valley Substation.
- Temporary Impacts—The temporary impacts to soil and geology within the ROW and adjacent 300-foot analysis corridor crossed by the C-HC Project were calculated for the areas that would not contain permanent project facilities. These areas are expected to be temporarily impacted due to land disturbance activities associates with project construction, such as removal of vegetation and surface grading, equipment operation resulting in minor rutting or soil displacement, spoiling of soils and rock, equipment storage, temporary work areas, and access roads. It is assumed that soils at these locations would be restored, and that long-term permanent impacts would not occur due to the implementation of appropriate environmental commitments, restoration, avoidance, and erosion and sediment control measures.

Table 3.2-1 shows the geology and soils impact threshold definitions used to assess the severity of impacts to geology and soil resources by the C-HC Project.

Table 3.2-1. Impact Threshold Definitions for Geology and Soils

	Minor Impact	Moderate Impact	Major Impact
Geology and Soils	Disturbances to geology or soils from construction and operation would be detectable but localized and discountable. Erosion and/or compaction would occur from construction and operation in localized areas and be quickly repaired.	Disturbances would occur over a relatively wide area from construction and operation of the C-HC Project or with sufficient impairment in localized areas that could result in wider areas if not repaired. Impacts to geology or soils would be readily apparent and result in short-term changes to the soil character or local geologic characteristics. Erosion and compaction impacts would occur over a wide area.	Disturbances would occur over a large area from construction and operation of the C-HC Project. Impacts to geology or soils would be readily apparent and would result in short- and long-term changes to the characteristics of the geology or soils over a large area, both in and out of the project boundaries or within limited areas of sensitive environments that would affect vegetation, wildlife, and geological processes. Erosion and compaction would occur over a large area.

3.2.2.2 NO ACTION

Under the No Action Alternative, the C-HC Project would not be built, and there would be no impacts to soils and geology.

3.2.2.3 IMPACTS COMMON TO ALL ACTION ALTERNATIVES

The impacts to soils and geology described in this section are common to all action alternatives. Direct impacts to soil resources resulting from construction activities include the loss of soil productivity due to the disturbance and compaction of soils during construction of access roads, installation of transmission line structures, and construction of the Hill Valley Substation. Clearing of vegetation as well as grading would disturb topsoil, which would result in newly exposed, disturbed soils that could be subject to accelerated soil erosion by wind and water. Access roads and use of heavy equipment in the ROW would cause soil compaction. Impacts to soils could range from short-term to long-term depending on the amount of ground disturbance at a particular location. Some areas may be able to revegetate quickly, and impacts to soils would be short term. In areas with more intense equipment use and construction activities, soil compaction and erosion could have longer impacts. Any soil removal associated with the final footprint of the structure foundations and the substation would be long-term.

Adverse impacts to agriculture, including prime farmland and farmland of statewide importance, is also discussed in Section 3.10, Land Use. As impacts relate to sensitive soils, adverse impacts would include disruption to farm productivity by compaction and erosion of soils in crop fields on prime farmland and farmland of statewide importance. Soil compaction would occur along access roads, both during construction, and along any access roads that could be left in place after construction. Compaction reduces the ability of water to infiltrate into and percolate through soils and reduces the ability for plant roots to grow into the soil where they can access nutrients and water. As a result, crop growth and grain production in impacted areas could be impaired, resulting in reduced agricultural productivity. Erosion resulting from compaction and soil disturbance could extend beyond the immediate area where soil compaction occurs.

Most wet soils impacted by the project are related to wetlands. Impacts to wetland vegetation is addressed in Section 3.3, Vegetation. Use of construction equipment in wet soils could result in greater compaction and rutting, affecting the wetland hydrology and connection to groundwater as well as affecting wetland plant growth. As discussed above, compaction to soil impairs the ability for water to infiltrate and percolate into the soil while also reducing the ability for plant roots to grow. Wet soils are particularly susceptible to compaction as heavy equipment could amplify damage to soil structure, causing decreased pore space and further limiting soil and water volume. Impacts to wet soils would likely be localized to the relatively small areas in which they occur and could result in longer term impacts. The use of timber matting and temporary bridges over wet areas and streams would help mitigate impacts to wet soils.

Shallow soils can be heavily compacted, affecting potential plant growth, as well as easily dislodged from underlying rock or shelves. Generally, shallow soils have limited depth for root growth and water-holding capacity. They often occur on slopes or the shoulders of ridges along rock lines or on rock shelves.

Soils on steep slopes (slopes greater than 30%) have a high risk of damage resulting from the project, although the area of steep slopes impacted by the project is limited. Construction and maintenance equipment may be required to traverse steep slopes to install or inspect transmission line structures. Soils on these slopes ordinarily have higher chances for erosion and instability due to the drainage of water both above and below ground. Steep slopes increase runoff volumes and velocities, increasing the sediment carrying load and therefore the cutting power of water flowing downhill, resulting in increases in erosion. Combined with additional factors, such as soil compaction, the erosive forces on steep slopes are compounded by reducing the amount of stormwater infiltration into the soil and increasing the volume and velocity of water flow even more. Instability of soil on steep slopes increases due to the loss matrix strength inherent in soils in which the soil particles adhere to each other to form a stronger, cohesive mass. If and when the strength of the soil mass is disturbed, the potential for soil erosion increases on the slope.

Indirect impacts to soils would include loss of soil structure and stability, loss of plant productivity or health due to reduction in nutrient availability, a reduction in oxygen in the soil reducing plant function, and increased stormwater runoff emanating from compacted soils. The potential for soil erosion increases not only in the affected area, but erosion could increase in area as rills and gullies are formed and stormwater runoff is channelized across broad areas of land. Expansive erosion will substantially reduce soil productivity and could result in extensive repairs necessary to restore soil condition for agricultural production and native habitat. Erosion will also ultimately impact water quality in streams with increased sediment loads. The Utilities would develop an erosion control plan prior to construction to identify methods for preventing and mitigating soil erosion within the C-HC Project area.

The potential impacts to geology from construction include drilling, blasting, excavation, equipment movement/hauling, and other ground-disturbing activities during construction. It should be noted, that based on preliminary geotechnical information, the Utilities do not anticipate the need to blast. However, if unanticipated geotechnical conditions are discovered, blasting may be the best method for excavation. Direct impacts resulting from the construction of all action alternatives on geologic resources consists of the displacement of soil and rock during construction of structure foundations. Regarding the impacts to karst, the karst features would not be expected to be directly impacted with any of the proposed alternatives. Karst features such as sinkholes and caverns would be identified and stationing between structures can be adjusted to position the structures a sufficient distance away from any karst features. This will ensure that drainage patterns, groundwater flow pathways, and unstable soil and rock conditions that are associated with karst conditions would be avoided.

Borings for transmission line structure foundations would extend approximately 20 to 80 feet below the surface and up to 120 feet below ground surface in unique locations. Using an average depth of 60 feet and an average diameter of 8 feet, the average volume of displaced soil and rock would be approximately 3,000 cubic feet per structure location. For each action alternative, the volume of displaces soil and rock is estimated and is described in the following six sections. This displaced soil and rock would be used for backfilling around structure foundations with excess material removed from the site to locations directed by landowner or disposed of at another location. The use of heavy-duty vehicles and earthmoving equipment required for structure foundations and structure placement would result in short-term moderate impacts on local surface geology (soils) as a result of compaction, rutting, and the potential for localized rill erosion near unimproved roadbeds and on sensitive landscapes.

3.2.2.4 ALTERNATIVE 1

Table 3.2-2 summarizes the acreage of sensitive soils that could be temporarily impacted by Alternative 1. The potential for severe erosion occurs along 67% of the ROW and is the largest potential impact to soils under Alternative 1. The severe erosion potential is not just limited to steep slopes. The total acreage potentially prone to severe erosion includes less-steep slopes as well as farmland.

Table 3.2-2. Alternative 1 Temporary Sensitive Soil Impacts

	Within ROW (acres)	Outside ROW within 300-foot Corridor (acres)	Access Roads (acres)
Total Analysis Area	1,891	1,699	204
Sensitive Soil Type			
Prime Farmland	372	301	27
Farmland of Statewide Importance	510	426	43
Steep Slopes	173	169	8
Severe Erosion Potential	1,265	1,155	146
Shallow Soils	149	152	10
Wet Soils	93	49	6

The adverse impacts to sensitive soils under Alternative 1 would be moderate if not immediately repaired. With repair, adverse impacts would be moderate and generally limited to the impact area. Impacts would be both short and long term, as described under Impacts Common to All Alternatives.

Table 3.2-3 summarizes permanent impact to sensitive soils and geologic resources due to structures and substations associated with Alternative 1. Permanent impacts to sensitive soils due to structures and substations are expected to result in no more than 24 acres of combined impact. The geologic impacts during drilling to prepare foundation holes would be limited to minimal disturbances of subsurface rock. For Alternative 1, an estimate 566 structures would be constructed. The volume of displaced soil and rock during drilling is estimated at approximately 63,000 cubic yards. The adverse permanent impacts to sensitive soils and geologic resources under Alternative 1 would be minor.

Table 3.2-3. Alternative 1 Permanent Sensitive Soil and Geology Impacts

	Rock and Soil Displaced (cubic yards)	Sensitive Soil (acres)
Structures (subsurface impacts)	63,000	–
Structures (surface impacts)	–	≤ 2
Hill Valley Substation	–	≤ 22

Retirement of the N-9 Transmission Line and Construction of a New 69-kV Tap Line

The decommissioning of the N-9 transmission line and construction of the 0.2-mile tap line could impact soils in the analysis area. The decommissioning of the N-9 line would involve the removal of 27 structures, 21 of which are in the Refuge. Table 3.2-4 shows the acreage of impacts to the sensitive soils from the decommissioning of the N-9 transmission line and construction of the 0.2-mile tap line. For the decommissioning of the N-9 line, approximately 35 acres of sensitive soils would be impacted. Approximately half of the impacted soils are wet soils. Impacts to soils from the decommissioning action would include temporary soil destabilization due to the removal of vegetative cover, and soil compaction from the use of heavy construction vehicles on poorly drained soils. In order to minimize soil compaction, the retirement of Dairyland's N-9 transmission line and construction of the tap line would be completed in winter months so that trucks and equipment would drive on frozen soils, reducing compaction. Construction mats would also be used in areas of unstable soils. The use of matting and temporary bridges over wet areas and streams would be used to help minimize impacts to wet soils. Direct, short-term minor impacts are expected for the 35.3 acres of soils during the removal of the N-9 transmission line and new tap line.

The construction of the tap line would impact 2 acres of sensitive soils. The predominant soil type impacted would be prime farmland and a small portion of the soils along the tap line are wet soils. The prime farmland–classified soils are not currently used for agricultural production and will not be in the future because they are located in the Refuge, so there would be no impacts to prime farmlands. Impacts to soils from the construction of the tap line would include soil erosion, loss of soil productivity, and the establishment of noxious weeds on the soil surface. Construction activities may also increase erosion potential by destabilizing the soil surface. Environmental commitments and BMPs, listed in Table 3.1-4, would be used to minimize impacts to soils. These impacts would be short-term in nature and minimized through adherence to the erosion control plan. Long-term impacts to soils would be limited to the three to four transmission structures necessary to construct the 0.2-mile tap line.

Table 3.2-4. Temporary Sensitive Soil Impacts from the N-9 Decommissioning and Tap Line

	Refuge (acres)	Private Land (acres)	Transportation ROW (acres)	Total (acres)
Total Analysis Area	**21.5**	**12.3**	**1.5**	**35.3**
Sensitive Soil Type*				

	Refuge (acres)	Private Land (acres)	Transportation ROW (acres)	Total (acres)
Prime Farmland	6.6	1.2	1.2	9.0
Farmland of Statewide Importance	0.0	3.9	0.0	3.9
Steep Slopes	0.0	0.4	0.0	0.4
Severe Erosion Potential	0.0	8.0	0.0	8.0
Shallow Soils	0.2	3.0	0.2	3.4
Wet Soils	17.2	0.2	0.4	17.8

* Sensitive soil types may add up to more than the total analysis area because there may be overlap among different types of sensitive soils.

As shown in Table 3.2-4, there would be approximately 17.2 acres of impacts to wet soils from the decommissioning of the N-9 line in the Refuge. Construction mats and temporary bridges would also be used in areas in which soils are classified as unstable soils and wet soils to help mitigate impacts. There are approximately 7 acres of soils with a prime farmland classification within the Refuge. However, since this land in the Refuge is not used for farming and would not be used as such in the future, there would be no impacts to prime farmlands. This soil classification and impact analysis would limit soil impacts to minor, short-term impacts.

3.2.2.5 ALTERNATIVE 2

Table 3.2-5 summarizes the acreage of sensitive soils that could be impacted by Alternative 2.
The potential for severe erosion occurs over 67% of the project ROW and is the largest potential impact to soils under Alternative 2. Similar to Alternative 1, severe erosion potential is high in nearly all areas. Additional areas prone to severe erosion include less-steep slopes as well as farmland.

Table 3.2-5. Alternative 2 Temporary Sensitive Soil Impacts

	Within ROW (acres)	Outside ROW within 300-foot Corridor (acres)	Access Roads (acres)
Total Analysis Area	2,008	1,766	210
Sensitive Soil Type			
Prime Farmland	349	307	26
Farmland of Statewide Importance	587	467	43
Steep Slopes	171	169	8
Severe Erosion Potential	1,352	1,204	152
Shallow Soils	141	149	10
Wet Soils	104	55	7

The adverse impacts to sensitive agricultural soils under Alternative 2 would be moderate if not immediately repaired. With repair, adverse impacts would be moderate and generally limited to the impact area. Impacts would be both short and long term, as described under Impacts Common to All Alternatives.

Table 3.2-6 summarizes permanent impact to sensitive soils and geologic resources due to structures and substations associated with Alternative 2. Permanent impacts to sensitive soils due to structures and substations are expected to result in no more than 24 acres of combined impact. The geologic impacts during drilling to prepare foundation holes would be limited to minimal disturbances of subsurface rock.

For Alternative 2, an estimate 596 structures would be constructed. The volume of displaced soil and rock is estimated at approximately 66,000 cubic yards. The adverse permanent impacts to sensitive soils and geologic resources under Alternative 2 would be minor.

Table 3.2-6. Alternative 2 Permanent Sensitive Soil and Geology Impacts

	Rock and Soil Displaced (cubic yards)	Sensitive Soil (acres)
Structures (subsurface impacts)	66,000	–
Structures (surface impacts)	–	≤ 2
Hill Valley Substation	–	≤ 22

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.2.2.6 ALTERNATIVE 3

Table 3.2-7 summarizes the acreage of sensitive soils that could be impacted by Alternative 3. Impacts to sensitive soils from Alternative 3 follow the same general pattern as Alternatives 1 and 2: with the potential for severe erosion being the most prevalent environmental consequence, affecting 58% of the project ROW.

Table 3.2-7. Alternative 3 Temporary Sensitive Soil Impacts

	Within ROW (acres)	Outside ROW within 300-foot Corridor (acres)	Access Roads (acres)
Total Analysis Area	2,210	2,016	157
Sensitive Soil Type			
Prime Farmland	614	573	22
Farmland of Statewide Importance	616	514	45
Steep Slopes	171	172	6
Severe Erosion Potential	1,284	1,178	117
Shallow Soils	159	165	9
Wet Soils	106	62	6

The adverse impacts to sensitive agricultural and sensitive soils under Alternative 3 would be moderate if not immediately repaired. With repair, adverse impacts would be moderate and generally limited to the impact area. Impacts would be both short and long term, as described under Impacts Common to All Alternatives.

Table 3.2-8 summarizes permanent impact to sensitive soils and geologic resources due to structures and substations associated with Alternative 3. Permanent impacts to sensitive soils due to structures and substations are expected to result in no more than 24 acres of combined impact. The geologic impacts during drilling to prepare foundation holes would be limited to minimal disturbances of subsurface rock. For Alternative 3, an estimate 658 structures would be constructed. The volume of displaced soil and rock is estimated at approximately 73,000 cubic yards. The adverse permanent impacts to sensitive soils and geologic resources under Alternative 3 would be minor.

Table 3.2-8. Alternative 3 Permanent Sensitive Soil and Geology Impacts

	Rock and Soil Displaced (cubic yards)	Sensitive Soil (acres)
Structures (subsurface impacts)	73,000	–
Structures (surface impacts)	–	≤ 2
Hill Valley Substation	**–**	**≤ 22**

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.2.2.7 ALTERNATIVE 4

Table 3.2-9 summarizes the acreage of sensitive soils that could be impacted by Alternative 4. Alternative 4 shows an increase of potential environmental impacts affecting prime farmland and farmland of statewide importance as compared to Alternatives 1, 2, and 3. Similar to other alternatives, severely erodible soils remain the most prevalent environmental consequence, affecting 49% of the ROW acreage.

Table 3.2-9. Alternative 4 Temporary Sensitive Soil Impacts

	Within ROW (acres)	Outside ROW within 300-foot Corridor (acres)	Access Roads (acres)
Total Analysis Area	2,246	2,083	116
Sensitive Soil Type			
Prime Farmland	855	839	17
Farmland of Statewide Importance	685	589	40
Steep Slopes	96	86	5
Severe Erosion Potential	1,111	1,024	84
Shallow Soils	155	156	10
Wet Soils	81	36	2

As shown in Alternatives 1, 2, and 3, the adverse impacts to sensitive and agricultural soils under Alternative 4 would be moderate if not immediately repaired. With repair, adverse impacts would be moderate and generally limited to the impact area. Impacts would be both short and long term, as described under Impacts Common to All Alternatives.

Table 3.2-10 summarizes permanent impact to sensitive soils and geologic resources due to structures and substations associated with Alternative 4. Permanent impacts to sensitive soils due to structures and substations are expected to result in no more than 24 acres of combined impact. The geologic impacts during drilling to prepare foundation holes would be limited to minimal disturbances of subsurface rock. For Alternative 4, an estimate 721 structures would be constructed. The volume of displaced soil and rock is estimated at approximately 80,000 cubic yards. The adverse permanent impacts to sensitive soils and geologic resources under Alternative 4 would be minor.

Table 3.2-10. Alternative 4 Permanent Sensitive Soil and Geology Impacts

	Rock and Soil Displaced (cubic yards)	Sensitive Soil (acres)
Structures (subsurface impacts)	80,000	–
Structures (surface impacts)	–	≤ 2
Hill Valley Substation	–	≤ 22

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.2.2.8 ALTERNATIVE 5

Table 3.2-11 summarizes the acreage of sensitive soils that could be impacted by Alternative 5. Environmental consequences for Alternative 5 are similar to those presented for Alternative 4, reflecting a similar proportion of sensitive soil types that will be affected by the project. As compared to other alternatives, Alternative 5 potentially impacts the highest acreage of prime farmland and farmland of statewide importance. Severe erosion remains the most common potential environmental consequence, with 50% of the Alternative 5 ROW crossing areas with severe erosion potential.

Table 3.2-11. Alternative 5 Temporary Sensitive Soil Impacts

	Within ROW (acres)	Outside ROW within 300-foot Corridor (acres)	Access Roads (acres)
Total Analysis Area	2,431	2,230	129
Sensitive Soil Type			
Prime Farmland	916	880	19
Farmland of Statewide Importance	773	654	42
Steep Slopes	97	92	5
Severe Erosion Potential	1,238	1,111	94
Shallow Soils	165	170	9
Wet Soils	91	39	3

The adverse impacts to sensitive and agricultural soils under Alternative 5 would be moderate if not immediately repaired. With repair, adverse impacts would be moderate and generally limited to the impact area. Impacts would be both short and long term, as described under Impacts Common to All Alternatives.

Table 3.2-12 summarizes permanent impact to sensitive soils and geologic resources due to structures and substations associated with Alternative 5. Permanent impacts to sensitive soils due to structures and substations are expected to result in no more than 24 acres of combined impact. The geologic impacts during drilling to prepare foundation holes would be limited to minimal disturbances of subsurface rock. For Alternative 5, an estimated 764 structures would be constructed. The volume of displaced soil and rock is estimated at approximately 85,000 cubic yards. The adverse permanent impacts to sensitive soils and geologic resources under Alternative 5 would be minor.

Table 3.2-12. Alternative 5 Permanent Sensitive Soil and Geology Impacts

	Rock and Soil Displaced (cubic yards)	Sensitive Soil (acres)
Structures (subsurface impacts)	85,000	–
Structures (surface impacts)	–	≤ 2
Hill Valley Substation	**–**	**≤ 22**

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.2.2.9 ALTERNATIVE 6

Table 3.2-13 summarizes the acreage of sensitive soils that could be impacted by Alternative 6. Similar to other alternatives, soils with severe erosion potential are the most prevalent sensitive soil, affecting 56% of the Alternative 6 ROW. Impacts to prime farmland and farmland of statewide importance would occur, but would be less than Alternatives 4 and 5. Overall, Alternative 6 impacts fewer sensitive soils—severely erodible soil, shallow soil, and wet soil—than the other alternatives.

Table 3.2-13. Alternative 6 Temporary Sensitive Soil Impacts

	Within ROW (acres)	Outside ROW within 300-foot Corridor (acres)	Access Roads (acres)
Total Analysis Area	1,936	1,773	163
Sensitive Soil Type			
Prime Farmland	621	573	23
Farmland of Statewide Importance	574	499	37
Steep Slopes	95	82	6
Severe Erosion Potential	1,092	999	113
Shallow Soils	144	143	10
Wet Soils	73	30	3

The adverse impacts to sensitive and agricultural soils under Alternative 6 would be moderate if not immediately repaired. With repair, adverse impacts would be moderate and generally limited to the impact area. Impacts would be both short and long term, as described under Impacts Common to All Alternatives.

Table 3.2-14 summarizes permanent impact to sensitive soils and geologic resources due to structures and substations associated with Alternative 6. Permanent impacts to sensitive soils due to structures and substations are expected to result in no more than 24 acres of combined impact. The geologic impacts during drilling to prepare foundation holes would be limited to minimal disturbances of subsurface rock. For Alternative 6, an estimated 630 structures would be constructed. The volume of displaced soil and rock is estimated at approximately 70,000 cubic yards. The adverse permanent impacts to sensitive soils and geologic resources under Alternative 6 would be minor.

Table 3.2-14. Alternative 6 Permanent Sensitive Soil and Geology Impacts

	Rock and Soil Displaced (cubic yards)	Sensitive Soil (acres)
Structures (subsurface impacts)	70,000	–
Structures (surface impacts)	–	≤ 2
Hill Valley Substation	–	≤ 22

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.2.3 *Summary of Impacts*

Table 3.2-15 summarizes the expected temporary impacts to sensitive soils for each alternative. Overall, Alternative 6 impacts the fewest acres of soils with severe erosion potential, shallow soils, wet soils, and steep slopes.

Table 3.2-15. Summary of Temporary Impacts to Sensitive Soils

Alternative	Severe Erosion Potential (acres)		Shallow Soil (acres)		Wet Soil (acres)		Steep Slopes (acres)	
	Within ROW	Outside ROW within 300-foot Corridor	Within ROW	Outside ROW within 300-foot Corridor	Within ROW	Outside ROW within 300-foot Corridor	Within ROW	Outside ROW within 300-foot Corridor
Alternative 1	1,265	1,155	149	152	93	49	173	169
Alternative 2	1,352	1,204	141	149	104	55	171	169
Alternative 3	1,284	1,178	159	165	106	62	171	172
Alternative 4	1,111	1,024	155	156	81	36	96	86
Alternative 5	1,238	1,111	165	170	91	39	97	92
Alternative 6	1,092	999	144	143	73	30	95	82

Assuming that all impacts would be repaired immediately following construction, impacts to sensitive soils are generally expected to be moderate and short term for each alternative. The greatest potential temporary impact to soils and geology from the C-HC Project is severe erosion. Soils with severe erosion potential are abundant throughout each alternative ROW, accounting for 49% (1,111 acres in Alternative 4) to 67% (1,352 acres in Alternative 2) of the overall ROW acreage. Steep slopes within the analysis area present very sensitive environments that can result in severe erosion in a relatively small (95 to 173 acres) portion of the project area. While the relative extent of impacts due to steep slopes are less than severe erosion alone (steep slopes likely include severe erosion potential), construction damages to steep slopes could have major environmental consequences if not repaired immediately. Other sensitive soil impacts, such as compaction of shallow and wet soils, are likely to be moderate and more localized, and could be long term. The C-HC Project includes environmental commitments and BMPs that are intended to minimize soil erosion and other impacts to soils from construction activities (see Table 3.1-4 in Section 3.1).

The N-9 transmission line decommissioning that would occur within the Refuge would result in short-term adverse impacts to 21.5 acres of soils. There would be long-term beneficial impacts to soils after decommissioning. The N-9 transmission line decommissioning and tap line construction on private land would result in short-term impacts to 12.3 acres of soils and long-term beneficial impacts to soils after decommissioning. There would be long-term adverse impacts to soils at three to four structures for the new tap line. There would be no impact to geology and soils from substation improvements.

The project is also expected to temporarily impact prime farmland and farmland of statewide importance. Table 3.2-16 summarizes temporary impacts to farmland for each alternative. Temporary impacts to prime farmland and farmland of statewide importance typically includes those impacts that involve erosion and wet soils that would be affected by compaction and rutting. Alternative 2 temporarily impacts the fewest prime farmland and farmland of statewide importance acres. Assuming impacted areas would be repaired and restored, temporary impacts to prime farmland and farmland of statewide importance are expected to moderate and of short duration for all alternatives.

Table 3.2-16. Summary of Temporary Farmland Impacts

Alternative	Prime Farmland (acres)		Farmland of Statewide Importance (acres)	
	Within ROW	Outside ROW within 300-foot Corridor	Within ROW	Outside ROW within 300-foot Corridor
Alternative 1	372	301	510	426
Alternative 2	349	307	587	467
Alternative 3	614	573	616	514
Alternative 4	855	839	685	589
Alternative 5	916	880	773	654
Alternative 6	626	578	575	499

Access roads used for construction of the project account for approximately 7.5% to 11.5% of the ROW acreage, varying by alternative. Access road impacts to sensitive soils with severe erosion potential range from 84 to 152 acres (Table 3.2-17) shows that Alternative 4 access roads would have the least impact to sensitive soils. Assuming impacted areas will be repaired and restored, temporary impacts to all sensitive soil types due to access roads are expected to be moderate and of short duration for each alternative.

Table 3.2-17. Summary of Temporary Access Road Impacts to Sensitive Soils

Alternative	Impacts within 30-foot Access Road ROW				
	Severe Erosion Potential (acres)	Shallow Soil (acres)	Wet Soil (acres)	Prime Farmland (acres)	Farmland of Statewide Importance (acres)
Alternative 1	146	10	6	27	43
Alternative 2	152	10	7	26	43
Alternative 3	117	9	6	22	45
Alternative 4	84	10	2	17	40
Alternative 5	94	9	3	19	42
Alternative 6	113	10	3	23	37

Table 3.2-18 summarizes permanent impact to sensitive soils and geologic resources due to structures and substation construction associated with each alternative. Permanent impacts to sensitive soils due to structures and substations are expected to result in no more than 24 acres of combined impact for each alternative. The geologic impacts during drilling to prepare foundation holes would be limited to minimal disturbances of subsurface rock. The adverse permanent impacts to sensitive soils and geologic resources for each alternative would be minor.

Table 3.2-18. Summary of Permanent Sensitive Soil and Geology Impacts

Alternative	Rock and Soil Displaced (cubic yards)	Sensitive Soils (acres)	
		Transmission Line Structures	Hill Valley Substation
Alternative 1	63,000	≤ 2	≤ 22
Alternative 2	66,000	≤ 2	≤ 22
Alternative 3	73,000	≤ 2	≤ 22
Alternative 4	80,000	≤ 2	≤ 22
Alternative 5	85,000	≤ 2	≤ 22
Alternative 6	70,000	≤ 2	≤ 22

3.3 Vegetation, including Wetlands and Special Status Plants

This section describes natural vegetation communities, special status species (i.e., federally and state-listed) and invasive species that occur across the C-HC Project. Most of the data used to characterize the vegetative communities in the affected environment section was obtained by reviewing resource data within 300 feet of each action alternative (also known as the analysis area). Vegetation information was also obtained from WDNR Natural Heritage Inventory (NHI), and these data were provided for an area larger than the 300-foot analysis area (WDNR 2018b). Therefore, the term resource evaluation area is used below to reflect the geographic extent of all data used to characterize vegetation, including wetlands and special status plants.

3.3.1 *Affected Environment*

The eastern terminus of the project lies in the Southeastern Wisconsin Till Plains Level III ecoregion – Southeastern Wisconsin Savannah and Till Plain Level IV ecoregions. Moving west, the majority of the C-HC Project area lies in the Driftless Area Level III Ecoregion, in both the Coulee and Savanna Sections Level IV Ecoregions. The Driftless Area is characterized by broad, level ridgetops and narrow, steep-sided valleys with southern-flowing streams. Land use within this region is a mixture of cropland and pasture, interspersed with small areas of woodland and scattered residences. The potential natural vegetation of this region is a mosaic of oak forests, savannas, and prairie (Dairyland 2016b). Many flatter valleys and ridges have been converted to agricultural use; wetlands occur frequently along the rivers and streams.

The C-HC Project's western terminus occurs in the Western Corn Belt Plains Level III ecoregion, in the Eastern Iowa and Minnesota Drift Plains Level IV ecoregion. This area is a glaciated region with gently rolling terrain, and it is characterized by a mosaic of agriculture, woodlots, and wetlands. Vegetation includes oak forests, oak savanna, prairie, and sedge meadows. Much of the original vegetation has been converted to agricultural uses and scattered residences are common throughout the area.

3.3.1.1 VEGETATION COMMUNITIES

Coordination with the WDNR indicated 14 natural communities would be crossed by the C-HC Project. In addition, the USFWS notes that two areas of algific talus slopes occur in the vicinity of the C-HC Project. A brief description of these natural communities, including wetlands, and the characteristic vegetation of each, follows (WDNR 2018b).

3.3.1.1.1 Algific Talus Slopes

Algific talus slopes are a globally rare community that occurs where air circulation over underground ice produces a constant stream of moist cool air through vents onto an adjacent hillside. In the Driftless Area, algific talus slopes are found along limestone bluffs with steep north- or east-facing slopes covered in fractured rock, rubble, and leaflitter. These slopes create a suitable microclimate for northern monkshood (*Aconitum noveboracense*) (RUS 2018; WDNR 2018c). The overstory is often sparse, composed of scattered, small black ash (*Fraxinus nigra*) and paper birch (*Betula papyrifera*). The mountain maple (*Acer spicatum*) northern shrub may be frequent, and extensive beds of bulblet bladder fern (*Cystopteris bulbifera*) and mosses are characteristic (WDNR 2018b).

Based on USFWS information, algific talus slopes, an ideal habitat for northern monkshood, have been identified along Bluebell Creek in Iowa. Additionally, two algific talus slope sites have been recorded along both C-HC Project routes within the Refuge. No algific talus slopes have been identified within the Wisconsin portion of the resource evaluation area (RUS 2018).

The RUS Biological Assessment (BA) contains a detailed description of the algific talus slope occurrences within the C-HC Project's vicinity (RUS 2018). These occurrences are summarized below:

- Segments B-IA1 and B-IA2. The Iowa terminal of the Cassville Car Ferry is to the west of the site, and the site is within the Mississippi River floodplain. No bluffs or algific talus slopes occur at or within the proposed ROW for Segment B-IA1 or B-IA2. At this location, the relatively level floodplain of the Mississippi River consists of an emergent wetland dominated by reed canary grass (*Phalaris arundinacea*) with scattered black willow (*Salix nigra*) and eastern cottonwood (*Populus deltoides*). This area is affected by the Mississippi River water level and is seasonally flooded.
- Segment C-IA. The algific talus slope recorded site along Segment C-IA occurs along an existing overhead transmission line corridor that crosses the Mississippi River floodplain in the Refuge. No bluffs or algific talus slopes occur at or within the proposed ROW of route Segment C-IA. At this location, the existing overhead transmission line corridor consists of an emergent wetland dominated by reed canary grass. Forested wetlands are present adjacent to the existing overhead transmission line corridor and include black willow, silver maple (*Acer saccharinum*), and eastern cottonwood trees with reed canary grass present in the understory. This area is affected by the Mississippi River water level and is seasonally flooded.
- Segments A-IA and D-IA. Two recorded algific talus slope sites are approximately 3,375 feet west of route Segment A-IA and 6,130 feet east of route Segment D-IA. Based on aerial photography, both Segments A-IA and D-IA cross-wooded slopes and bluffs associated with Bluebell Creek and tributaries to the Mississippi River. These two sites are outside the potential extent of disturbance for all action alternatives.

3.3.1.1.2 Dry Cliffs

Dry cliffs are characterized by dry, vertical bedrock exposures that can occur on various rock types. Scattered pines, oaks, or shrubs often occur. Characteristic plants are ferns, common polypody (*Polypodium vulgare*) and rusty woodsia (*Woodsia ilvensis*). Herb species include columbine (*Aquilegia canadensis*), harebell (*Campanula rotundifolia*), pale corydalis (*Corydalis sempervirens*), juneberry (*Amelanchier* spp.), bush-honeysuckle (*Diervilla lonicera*), and rock spikemoss (*Selaginella rupestris*). Dry cliffs also frequently are colonized by crustose lichens (WDNR 2018b).

3.3.1.1.3 Dry Prairies

The dry prairie grassland community occurs on dry, steep south- or west-facing slopes. The community also occurs at river bluff summits with sandstone or dolomite near the surface. Dominant species are short to medium-sized prairie grasses, including little bluestem (*Schizachyrium scoparium*), side-oats grama (*Bouteloua curtipendula*), hairy grama (*B. hirsuta*), and prairie dropseed (*Sporobolus heterolepis*). Common shrubs and forbs include lead plant (*Amorpha canescens*), silky aster (*Aster sericeus*), flowering spurge (*Euphorbia corollata*), purple prairie-clover (*Petalostemum purpureum*), cylindrical blazing-star (*Liatris cylindracea*), and gray goldenrod (*Solidago nemoralis*) (WDNR 2018b).

3.3.1.1.4 Dry-Mesic Prairies

The dry-mesic prairie grassland community occurs on slightly less-dry sites, compared with the dry prairie community. Dry-mesic prairies are composed of many grasses also found in dry prairie communities; however, dominant dry-mesic prairie grassland community species include taller species such as big bluestem (*Andropogon gerardii*) and yellow Indian-grass (*Sorghastrum nutans*). Needle grass (*Stipa spartea*) also may occur. The herb component is diverse. Soils are often somewhat sandy, either loamy sands or sandy loams. The landscape associations that support the dry-mesic prairie grassland community include large river valley margin terraces, sandy outwash deposits, gravelly moraines, and lower slopes of Driftless Area bluffs (WDNR 2018b).

3.3.1.1.5 Eastern Red-Cedar Thickets

The eastern red-cedar thicket is a savanna community that occurs on steep, dry sandstone, quartzite, rhyolite, or dolomite bluffs. In addition, the community may occur on dry, gravelly slopes on south- or west-facing morainal ridges or on coarse-textured, sandy terraces along major rivers. Dominant tree species is eastern red cedar (*Juniperus virginiana*). The eastern red cedar may occur as scattered trees and shrubs or in thickets interspersed with openings. Other species that may occur are red maple (*Acer rubrum*), paper birch, black oak (*Quercus velutina*) and bur oak (*Q. macrocarpa*) (WDNR 2018b).

3.3.1.1.6 Mesic Prairies

The mesic prairie is a grassland community occurring on rich, moist, well-drained soils. The dominant plant is big bluestem. Little bluestem, Indian-grass, porcupine grass, prairie dropseed, and tall switchgrass (*Panicum virgatum*) are common. The forb layer is diverse and common species include prairie docks (*Silphium* spp.), lead plant, heath aster (*Aster ericoides*), smooth aster (*A. laevis*), sand coreopsis (*Coreopsis palmata*), prairie sunflower (*Helianthus laetiflorus*), rattlesnake-master (*Eryngium yuccifolium*), flowering spurge, beebalm (*Monarda fistulosa*), prairie coneflower (*Ratibida pinnata*), and spiderwort (*Tradescantia ohiensis*) (WDNR 2018b).

3.3.1.1.7 Moist Cliffs

The moist cliff community occurs on shaded, moist to seeping, mossy, vertical exposures, typically of sandstone and dolomite. This community may be shaded due to a cool (e.g., north-facing) aspect, or due to associated tree canopy. Moist cliffs often are very restricted in their spatial extent. Common vascular plants include columbine, fragile ferns (*Cystopteris bulbifera* and *C. fragilis*), wood ferns (*Dryopteris* spp.), rattlesnake-root (*Prenanthes alba*), and wild sarsaparilla (*Aralia nudicaulis*). Rare flora of these cliffs varies substantially across the state. Moist cliff communities in the Driftless Area may support the federally threatened northern monkshood (WDNR 2018b).

3.3.1.1.8 Pine Relicts

Pine relicts are natural stands of native conifers that occur in isolated patches in the Driftless Area of southwestern Wisconsin. These communities are of conservation concern, State Rank S2, and provide unique habitats for plants and animals that would otherwise be absent from southwestern Wisconsin. Significant occurrences of pine relict communities have been documented in Grant, Iowa, and Lafayette Counties, and western Dane County overlaps geographic areas of greatest abundance (Epstein 2017).

Most pine relict stands are 10 acres or less in size and can occur in narrow zones at the top of escarpments or cliff bands (Epstein 2017). Pine relicts occur on sandstone-cored bluffs or in thin soils over sandstone (Epstein 2017; WDNR 2018b). Species composition of pine relicts includes isolated stands of white pine (*Pinus strobus*), red pine (*P. resinosa*), and less commonly, jack pine (*P. banksiana*). The understories typically are characterized by species with northern affinities including blueberries (*Vaccinium* spp.), huckleberry (*Gaylussacia baccata*), wintergreen (*Gaultheria procumbens*), pipsissewa (*Chimaphila umbellata*), and partridge-berry (*Mitchella repens*). Herbs typically found in southern Wisconsin's oak forests and prairies may be present (WDNR 2018b).

3.3.1.1.9 Southern Dry Forests

The southern dry forest community is dominated by white oak (*Quercus alba*) and black oak on upland, dry sites. Northern red oak (*Quercus rubra*), bur oak, and black cherry (*Prunus serotina*) may be present. Brambles (*Rubus* spp.), gray dogwood (*Cornus racemosa*), and American hazelnut (*Corylus americana*) are commonly found in the well-developed shrub layer. Herbaceous species include wild geranium (*Geranium maculatum*), false Solomon's-seal (*Maianthemum racemosum*), hog-peanut (*Amphicarpaea bracteata*), and rough-leaved sunflower (*Helianthus strumosus*). This southern dry forest community intergrades to oak woodland, a community that has similar canopy composition and a relatively more open forest floor due to frequent fire (WDNR 2018b).

3.3.1.1.10 southern dry-mesic forests

This community occurs on loamy soils of glacial till plains and moraines, and on erosional topography. Dominant tree species is commonly red oak. White oak, American basswood (*Tilia americana*), sugar maple (*Acer saccharum*), red maple, white ash (*Fraxinus americana*), shagbark hickory (*Carya ovata*), and wild black cherry are also common. The diverse herbaceous understory flora is often characterized by jack-in-the-pulpit (*Arisaema triphyllum*), enchanter's-nightshade (*Circaea lutetiana*), large-flowered bellwort (*Uvularia grandiflora*), interrupted fern (*Osmunda claytoniana*), lady fern (*Athyrium filix femina*), tick-trefoils (*Desmodium* spp.), hog-peanut, and several other species also found in the southern dry forest community (WDNR 2018b).

3.3.1.1.11 Southern Mesic Forests

The southern mesic forest community occurs on rich, well-drained loamy soils, mostly on glacial till plains or loess-capped sites. Sugar maple is the dominant tree species; American basswood, may be co-dominant. Other trees characteristic of this community are walnuts (*Juglans* spp.), ironwood (*Carpinus caroliniana*), northern red oak, red maple, white ash, and slippery elm (*Ulmus rubra*). The understory is typically open and sometimes brushy with gooseberry (*Ribes* spp.) occurring in areas historically grazed. Herb species include spring-beauty (*Claytonia virginica*), trout-lilies (*Erythronium* spp.), trilliums (*Trillium* spp.), violets (*Viola* spp.), bloodroot (*Sanguinaria canadensis*), blue cohosh (*Caulophyllum thalictroides*), may-apple (*Podophyllum peltatum*), and Virginia waterleaf (*Hydrophyllum virginianum*) (WDNR 2018b).

3.3.1.1.12 Floodplain Forests

This hardwood forest community occurs along large rivers, most of which originate in northern Wisconsin and flow southward, getting larger as the volume of carried water increases. As the stream gradients diminish, floodplains broaden. The community is adapted to periodic flooding. Silt deposition and microtopography development during flood events supports tree germination and establishment, and floods carry seeds and propagules. The most extensive occurrences of floodplain forest occur along large rivers in southern Wisconsin (WDNR 2018b).

The largest "ribbon" of floodplain forest in the analysis area occurs along the Mississippi River. Floodplain forests are declining in the Upper Mississippi River System due to anthropogenic and natural forces and the forests that remain are changing in composition from a diversity of species to a monotypic forest dominated by silver maple and herbaceous openings. Floodplain forests are important to the biological integrity of the Upper Mississippi River System as they provide a rich habitat for wildlife, reduce soil erosion, improve water quality, and provide a scenic and recreational landscape (USFWS 2006a).

3.3.1.2 WETLANDS

Wetlands are unique natural systems defined as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (33 CFR 328). Wetlands are biologically diverse and highly productive when compared to other ecosystem types, supporting a wide variety of plant and animal life. Furthermore, wetlands are beneficial in that they can function to improve water quality, store floodwater, provide groundwater recharge, provide fish and wildlife habitat, store carbon, naturally control and limit erosion within floodplains, shorelines, and along stream channels, and are typically found to be aesthetically pleasing. In the broadest sense, wetlands are classified marshes, swamps, bogs, and fens depending upon dominant vegetation types, landscape positions, and hydrology source.

Natural wetland communities occur within the resource evaluation area and are characterized in the following section based on coordination with WDNR NHI (WDNR 2018b).

3.3.1.2.1 Emergent Marshes

Emergent marshes are wetland communities typically dominated by robust emergent wetland plant species. Common dominant species within these communities include cattails (*Typha* spp.), bulrushes (particularly *Scirpus acutus*, *S. fluviatilis*, and *S. validus*), bur-reeds (*Sparganium* spp.), giant reed (*Phragmites australis*), pickerel-weed (*Pontederia cordata*), water-plantains (*Alisma* spp.), arrowheads (*Sagittaria* spp.), certain species of spike-rush (such as *Eleocharis smallii*), and wild rice (*Zizania* spp.). These wetland plant communities may exist as monodominant stands or diverse species assemblages depending upon the extent and range of inundation. Emergent marsh can occur in a wide variety of settings, including river floodplains and backwaters, shallow topographic basins, protected inland lake and Great Lake bays areas, impoundments, and along the margins of ponds (Epstein 2017).

3.3.1.2.2 Southern Sedge Meadows

Southern sedge meadows are herbaceous wetland communities dominated by graminoids such as tussock sedge (*Carex stricta*), common lake sedge (*Carex lacustris*), water sedge (*Carex aquatilis*), Sartwell's sedge (*Carex sartwellii*), lesser panicled sedge (*Carex diandra*), bristly sedge (*Carex comosa*), and bottlebrush sedge (*Carex hystericina*). Although typically sedge dominated (*Carex* spp.), high-quality southern sedge meadow communities typically include a diverse group of forbs, including marsh bellflower (*Campanula aparinoides*), marsh wild-timothy (*Muhlenbergia glomerata*), American water horehound (*Lycopus americanus*), panicled aster (*Symphyotrichum lanceolatum*), swamp aster (*Symphyotrichum puniceum*), blue flag (*Iris versicolor*), spotted Joe-Pye weed (*Eutrochium maculatum*), marsh fern (*Thelypteris palustris*), and swamp milkweed (*Asclepias incarnate*). Disturbed and low-quality sites often become dominated by reed canary grass at the exclusion of virtually all other species (Epstein 2017).

3.3.1.2.3 Palustrine

Wetlands documented within the resource evaluation area are generally classified as Palustrine. Palustrine wetlands are nontidal, bound by upland areas, and dominated by trees, shrubs, or persistent emergent plants. Palustrine wetlands within the resource evaluation area include Palustrine Emergent (PEM), Palustrine Scrub-Shrub (PSS), and Palustrine Forested (PFO) wetland types (Cowardin et al. 1979). These wetlands are most commonly associated with floodplains of major waterways, riparian corridors of smaller tributaries, and depressions. Open water wetland features include small farm ponds likely excavated for agricultural or recreational purposes and classified as PUB (Palustrine Unconsolidated Bottom) or PAB (Palustrine Aquatic Bed) (Cowardin et al. 1979). Other open-water areas include backwater and side channels within the Mississippi River floodplain.

The majority of wetlands within the resource evaluation area are composed entirely or in part of degraded wet meadow, shallow marsh, farmed wetland, hardwood swamp, and shrub carr communities (Eggers and Reed 1997). These degraded wetland communities are characterized by low plant diversity and dominance by various invasive species, most commonly reed canary grass and invasive cattails, and disturbance-tolerant native species, such as box elder (*Acer negundo*) and Eastern cottonwood. Some higher quality wetland communities occur within the resource evaluation area and are generally associated with extensive and intact riparian complexes such areas near East Branch Blue Mounds Creek (Iowa County, Wisconsin) and Black Earth Creek (Dane County, Wisconsin). These higher-quality wetland communities are composed of fairly intact native wetland vegetation. Higher quality wetland types include some sedge meadow, wet prairie, shrub carr, hardwood swamp, shallow marsh, deep marsh, and shallow, open-water communities (Eggers and Reed 1997). Other higher quality wetlands include those making up the Refuge (see Figure 3.1-1), which is a Wetland of International Importance (Ramsar Sites Information Service 2010).

Acreages of wetlands types found within the resource evaluation area, grouped by Cowardin classification (Cowardin et al. 1979) and Eggers and Reed community types (Eggers and Reed 1997), can be found in Table 3.3-1.

Table 3.3-1. Wetlands Types within the Resource Evaluation Area

Cowardin Classification*	Acreage	Community Type Descriptions†
PEM	157	Wet Meadows, Sedge Meadows, Farmed Wetlands, Shallow Marsh, Emergent Marsh, Wet Prairie
PSS	15	Scrub/Shrub Deciduous Wetlands, Shrub Carr
PFO	21	Forested Deciduous Wetlands, Hardwood Swamp
PEM/PSS complex	6	Wet Meadow/Shallow Marsh/Farmed Wetland with Shrub Carr
PEM/PFO complex	63	Farmed Wetlands/Wet Meadow/Sedge Meadow/Shallow Marsh with Hardwood Swamp
PSS/PFO complex	2	Shrub Carr with Hardwood Swamp
PEM/PSS/PFO complex	22	Wet Meadow/Farmed Wetlands with Shrub-carr and Hardwood Swamp

Cowardin Classification*	Acreage	Community Type Descriptions†
Palustrine/Open Water complex	6	Wet Meadow/Shallow Marsh/Deep Marsh/Hardwood Swamp with Open Water
Open Water (PAB/PUB/L)	4	Lakes, Open Water Ponds
Other	13	N/A
Total	**309**	

* PEM = Palustrine Emergent, PSS = Palustrine Scrub Shrub, PFO = Palustrine Forested, PUB = Palustrine Unconsolidated Bottom, PAB = Palustrine Aquatic Bed, L = Lacustrine

† As defined in Eggers and Reed (1997).

Wetlands are a federally regulated resource under the Clean Water Act (CWA) (33 U.S.C. 1251) and Executive Order (EO) 11990, Protection of Wetlands (42 Federal Register 26961). EO 11990 requires Federal agencies to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands. It also requires that agencies avoid construction in wetlands to the extent practicable (44 CFR 26951). Section 404 of the CWA (33 U.S.C. 1344) established a program to regulate the discharge of dredged or fill material in waters of the U.S. (WUS), including wetlands. Activities in WUS regulated under this program include fill for development, water resource projects, and infrastructure development. Section 404 requires a permit before dredged or fill material may be discharged into WUS. In general, the USACE regulates impacts on wetlands or other WUS through its Section 404 Permit program. As part of the Section 404 permit program, the IDNR and WDNR also reviews projects for compliance with water quality standards pursuant to Section 401of the CWA (33 U.S.C. 1341). Additional state permits for wetland impacts also would be required from the WDNR (s.281 Wisconsin Statutes) and IDNR (571 Iowa Administrative Code [IAC] Chapter 13).

3.3.1.3 SPECIAL STATUS PLANT SPECIES

Several state and/or federally listed plant species have the potential to occur in counties crossed by the C- HC Project. Appendix E provides a list of these species. Targeted plant inventories have not been completed for the project.

3.3.1.3.1 Federally Listed Species

Five federally listed plant species, all listed as threatened, were identified during the project's USFWS Information for Planning and Consultation (IPaC) review as having potential to occur in the project area: Mead's milkweed (*Asclepias meadii*), prairie bush clover (*Lespedeza leptostachya*), eastern prairie fringed orchid (*Platanthera leucophaea*), western prairie fringed orchid (*Platanthera praeclara*), and northern monkshood (see Appendix E).

Mead's Milkweed

This species occurs in tallgrass prairies (WDNR 2018b). Coordination with USFWS indicated no known species records within or near the proposed project segments (RUS 2018). The species was not detected during wetland delineation and field habitat assessment fieldwork completed by the Utilities within portions of the project area in 2017 (RUS 2018).

Prairie Bush Clover

This species occurs in sandy or gravelly hillside prairies with dry, sandy or gravelly soils (WDNR 2018b). Coordination with USFWS indicated no known species records within or near the proposed project segments (RUS 2018). The species was not detected during wetland delineation and field habitat assessment fieldwork completed by the Utilities within portions of the project area in 2017 (RUS 2018).

Eastern Prairie Fringed Orchid

This species occurs in mesic to wet tallgrass prairies and has been observed in sedge meadows, marsh edges, and bogs. The species prefers grassy habitat with little or no woody encroachment, and also has been observed in old field and roadside ditches (USFWS 2018c; WDNR 2018b). Coordination with USFWS indicated no known species records within or near the proposed project segments (RUS 2018). The species was not detected during wetland delineation and field habitat assessment fieldwork completed by the Utilities within portions of the project area in 2017 (RUS 2018).

Western Prairie Fringed Orchid

This species occurs in mesic to wet tallgrass prairies. The species also has been observed in old field and roadside ditches (USFWS 2018c; WDNR 2018b). Coordination with USFWS indicated no known species records within or near the proposed project segments (RUS 2018). The species was not detected during wetland delineation and field habitat assessment fieldwork completed by the Utilities within portions of the project area in 2017 (RUS 2018).

Northern Monkshood

Northern monkshood generally is found on shaded to partially shaded cliffs, near the base of sandstone or limestone cliffs with northern or eastern exposure, algific talus slopes, or along coldwater streams. These habitat settings result in cool, moist conditions with a cool soil environment. Coordination with USFWS indicated no known species records within or near the proposed project segments (RUS 2018). The species was not detected during wetland delineation and field habitat assessment fieldwork completed by the Utilities within portions of the project area in 2017 (RUS 2018).

3.3.1.3.2 State-Listed Species

Many state-listed species have potential to occur in the counties crossed by the project segments where suitable habitat for these species occurs (see Appendix E). The WDNR NHI reports that 5 endangered, 5 threatened, 28 special concern plant species, and 1 lichen species have been recorded within 1 to 2 miles of the project and could be present in suitable habitat areas along portions of the C-HC Project summarized in Appendix E. Additionally, public comments received on the DEIS were concerned with the potential impacts of the C-HC Project on the *Asplenium pinnatifidum*, a fern species that is only found in Iowa County in Wisconsin. This fern is found at four sites (two located in Arena, one in Highland) and one in Brigham, Wisconsin (Hanson and Hanson 1979). All four sites are located outside the analysis area for the C-HC Project, but general impacts to state-listed species are included in the analysis provided below.

The IDNR completed a records search for rare species and significant natural communities in the project area and found no site-specific records that would be impacted by this project (Moore 2017).

3.3.1.3.3 Invasive Species

General location and composition of dominant invasive species present within the ROW were identified and recorded during wetland delineations and vegetation mapping evaluations conducted in 2017. The 2017 fieldwork did not include targeted surveys to identify all invasive species (Dairyland 2016b).

Twenty-five invasive plant species were recorded. All but one of these species are in the “Restricted” category of WAC Chapter NR 40. The most commonly observed “Restricted” plant species were honeysuckle (*Lonicera* spp.), common buckthorn, multiflora rose, and wild parsnip. Observed “Restricted” species include the following:

- Garlic mustard *(Alliaria petiolata)*
- Japanese barberry *(Berberis thunbergii)*
- Spiny plumeless thistle *(Carduus acanthoides)*
- Oriental bittersweet *(Celastrus orbiculatus)*
- Spotted knapweed *(Centaurea maculosa)*
- Canada thistle *(Cirsium arvense)*
- Poison hemlock *(Conium maculatum)*
- Crown vetch *(Securigera varia)*
- Russian olive *(Elaeagnus angustifolia)*
- Autumn olive *(Elaeagnus umbellata)*
- Leafy spurge *(Euphorbia esula)*
- Dame's rocket *(Hesperis matronalis)*
- Bell's honeysuckle *(Lonicera x bella)*
- Amur honeysuckle *(Lonicera maackii)*
- Tartarian honeysuckle *(Lonicera tatarica)*
- White mulberry *(Morus alba)*
- Wild parsnip *(Pastinaca sativa)*
- Curly-leaf pondweed *(Potamogeton crispus)*
- Common buckthorn *(Rhamnus cathartica)*
- Black locust *(Robinia pseudoacacia)*
- Multiflora rose *(Rosa multiflora)*
- Japanese hedgeparsley *(Torilis japonica)*
- Narrow-leaved cattail *(Typha angustifolia)*
- Hybrid cattail *(Typha x glauca)*.

Eurasian manna grass (*Glyceria maxima*) was the only "Prohibited" species observed during 2017 surveys (Dairyland 2016b).

3.3.2 *Environmental Consequences*

This section describes impacts to vegetation associated with the construction, operation, and maintenance of the C-HC Project. Impacts to vegetation are discussed in terms of impacts to vegetation communities, special status plants, and invasive species.

3.3.2.1 DATA SOURCES, METHODS, AND ANALYSIS ASSUMPTIONS

The following impact indicators were considered when analyzing potential impacts to vegetation, including wetlands and special status plants:

- Acres, both permanent and temporary, of disturbance resulting from construction and maintenance activities; and
- Effects to special status species, including the loss of any population of special status plant species that would jeopardize the continued existence of that population.

Comprehensive vegetation community surveys and mapping has not been completed for the project. The description of Affected Environment above, and the Environmental Consequences analysis below, rely on desktop evaluations, agency coordination, and GIS analysis of land use and land cover data obtained from USGS National Land Cover Dataset (NLCD) (USGS 2011). NLCD is a land cover database for the nation that provides spatial reference and descriptive data for characteristics of the land surface such as thematic class (for example, urban, agriculture, and forest), percent impervious surface, and percent tree canopy cover. NLCD is used for a variety of Federal, State, local, and nongovernmental applications to assess ecosystem status and health, understand the spatial patterns of biodiversity, predict effects of climate change, and develop land management policy (Homer et al. 2012). Acreage of land cover by classification was calculated for both the ROW and the analysis area for each action alternative. As described above, the analysis area for each alternative is defined by a 300-foot area surrounding each action alternative presented in Chapter 2. The analysis area is sufficient to identify vegetation resources that could be directly and indirectly affected by the C-HC Project.

Generally, the vegetation communities described above in Section 3.3.1 exist within the broader NLCD classifications as shown below in Table 3.3-2. To support evaluation of impacts to vegetation communities from the C-HC Project, RUS cross-referenced the vegetation communities that occur in the vicinity of the C-HC Project with the NLCD classifications. In total, 1,343,880 acres of agricultural lands, 933,413 acres of grassland, 730,834 acres of forest, and 98,690 acres of wetlands exist within the six counties crossed by the C-HC Project. Impacts from the C-HC Project were then estimated by evaluating 1) acreage of surface impacts to grassland, forest, shrubland, and wetland land cover, and 2) potential effects to special status species that may occur within those land cover types.

Table 3.3-2. Land Cover Classifications and Natural Vegetation Communities Present in the C-HC Project Area

	Grassland	Forest	Shrubland	Wetland	Other
Algific Talus Slope	-	-	-	-	Algific talus slopes are found on limestone bluffs and are not associated to one NLCD land cover type.
Dry Prairie	X	-	-	-	-
Dry-mesic Prairie	X	-	-	-	-
Eastern Red-cedar Thicket	-	-	X	-	-
Mesic Prairie	X	-	-	-	-
Moist Cliff	-	-	-	-	Moist cliffs are found on steep, sandstone and dolomite slopes and are not associated to one specific NLCD land cover type.
Pine Relict	-	X	-	-	-
Southern Dry Forest	-	X	-	-	-
Southern Dry-mesic Forest	-	X	-	-	-
Floodplain Forest	-	X	-	-	-
Wetlands	-	-	-	X	-

To estimate impacts to wetlands, RUS used the wetland delineation data provided by the Utilities and wetland fill estimates provided in the Wisconsin Public Service Commission application. The Utilities also provided wetland fill estimates for the Iowa portion of C-HC Project based on preliminary structure locations.

The Utilities completed wetland delineations from May through July 2017 using methods outlined in the USACE Wetland Delineation Manual (USACE 1987) and the Midwest Region and Northcentral and Northeast Region Supplements (USACE 2010, 2012). Field access was limited to the existing ROW, including ATC and Dairyland transmission lines, and public roads along alternative routes. For areas extending outside the existing right-of-way, wetland boundaries conservatively were estimated based on field observations and through aerial photograph interpretation (2015 National Agriculture Imagery Program and 2016 photographs viewed in Pictometry), soil survey data, National Wetlands Inventory (NWI) maps (USFWS 2016), Wisconsin Wetlands Inventory maps (WDNR 2016b), and additional wetland signatures described by the WDNR Surface Water Data Viewer – Wetlands and Wetland Indicators (WDNR 2016c). In areas without direct access, wetlands were identified based on field observations made from publicly accessible locations and using desktop resources listed above. Field views from public access points crossing or near the alignments such as roads, public lands, parks, and other accessible locations were used to confirm the results of the desktop analysis (if possible) and identify new wetland resources.

Using these data and assumptions, potential impacts to wetlands are quantified as follows:

- Total number wetlands crossed – An estimated quantity of individual wetland communities delineated or identified within the analysis area (300-foot corridor) that may be directly and indirectly affected by the project.
- Total acreage of filled wetlands (permanent impact) – A measure of the estimated permanent wetland impacts due to filling activities associated with the placement of transmission line structures within wetlands.
- Total forested wetland acreage within the ROW (permanent impact) – A measure of the estimated total acreage of forested wetlands within proposed ROW (150- to 260-foot corridor depending upon location). Total forested wetlands within the ROW represents the expected quantity of forested to non-forested wetland conversion required for each alternative, representing a permanent impact.
- Total non-forested wetland acreage within the ROW (temporary impact) – A measure of the estimated total acreage of non-forested wetlands within proposed ROW, used to evaluate the potential extent of temporary wetland impacts for each alternative.
- Total wetland acreage outside the ROW in the analysis area (indirect impacts) – A measure of all wetlands outside, but potentially adjacent to the ROW, used to evaluate the potential extent of indirect wetland impacts for each alternative. This includes both forested and non-forested wetlands.

The following sections provide an effects evaluation by alternative based of the above impact indicators. An overall classification (minor, moderate, major) of impacts is assigned to each alternative. Definitions of the impact threshold for each classification are provided in Table 3.3-3 below.

Table 3.3-3. Impact Thresholds and Descriptions for Vegetation, including Wetlands and Special Status Plants

	Minor Impact	Moderate Impact	Major Impact
Vegetation, including Wetlands and Special Status Plants	Impacts on native vegetation would be detectable but discountable and would not alter natural conditions measurably. Infrequent disturbances to individual plants could be expected, but without affecting local or range-wide population stability. Infrequent or insignificant one-time disturbances to local populations could occur, but sufficient habitat would remain functional at both the local and regional scales to maintain the viability of the species. Opportunities for the increased spread of noxious weeds would be detectable but discountable. There would be some minor potential for an increased spread of noxious weeds.	Impacts on native vegetation would be detectable and/or measurable. Occasional disturbances to individual plants could be expected. These disturbances could affect local populations negatively but would not be expected to affect regional population stability. Some impacts might occur in key habitats, but sufficient local habitat would remain functional to maintain the viability of the species both locally and throughout its range. Opportunities for increased spread of noxious weeds would be detectable and/or measurable. There would be some moderate potential for the increased spread of noxious weeds.	Impacts on native vegetation would be measurable and extensive. Frequent disturbances of individual plants would be expected, with negative impacts to both local and regional population levels. These disturbances could negatively affect local populations and could affect range-wide population stability. Some impacts might occur in key habitats, and habitat impacts could negatively affect the viability of the species both locally and throughout its range. Opportunities for the increased spread of noxious weeds would be measurable and extensive. There would be a major potential for the increased spread of noxious weeds.

3.3.2.2 NO ACTION

Under the No Action Alternative, the proposed Project would not be built, and there would be no impacts on vegetation, including wetlands and special status species.

3.3.2.3 IMPACTS COMMON TO ALL ACTION ALTERNATIVES

3.3.2.3.1 Vegetation Communities

The primary direct and indirect impacts to vegetation during construction and operation and maintenance of the proposed Project associated with all action alternatives would be associated with:

- removal and/or crushing of natural, native species–dominated vegetation communities or associations;
- decreased plant productivity as a result of fugitive dust; and
- plant community fragmentation.

All action alternatives would involve the removal of vegetation during construction activities resulting in the direct loss of plant communities. Forest and shrub vegetation would be cleared within the ROW and in areas where access roads are required. Permanent impacts on vegetation would be limited to conversion of forested cover to non-forest cover within the ROW, and loss of vegetation resulting from permanent conversion of undeveloped areas to new, developed areas, including the footprint of the C-HC Project (such as structures) and the Hill Valley Substation site.

Vegetation removal could affect vegetation communities by changing community structure and composition and altering soil moisture or nutrient regimes. The degree of impact depends on the type and amount of vegetation affected, and, for short-term impacts, the rate at which vegetation would regenerate following construction. These direct and indirect effects could reduce or change the functional qualities of vegetation, including as wildlife habitat (see Section 3.4).

Temporary impacts on vegetation would include the removal of non-forested vegetation that would be restored upon completion of construction. The degree of these impacts depends on the type and amount of vegetation affected, and the rate at which vegetation would regenerate following construction. Fugitive dust resulting from construction and maintenance traffic has the potential to affect photosynthetic rates and decrease plant productivity.

Vegetation removal also would expose soils to potential wind and water erosion. This could result in further loss of soil and vegetation, and potentially to increased sediment into water resources. There would also be indirect effects resulting from the fragmentation of connected vegetation types. Edge areas have different microclimatic conditions and structure, which could lead to different species composition than interior area. The introduction and colonization of disturbed areas by invasive exotic plant species also could lead to changes in vegetation communities. Other indirect impacts to vegetation may result from dust accumulation immediately adjacent to roads, soil compaction at temporarily impacted areas, which could result in lowered individual plant vigor or changes in plant abundance and/or species. However, these impacts would be reduced by implementing environmental commitments (see Table 3.1-4) and BMPs (see Appendix D). Operation and maintenance activities are expected to result in minimal impact to vegetation resources.

Minimal vegetation management activities would be required to maintain the operating transmission line. Operation and maintenance activities would include vegetation trimming within the ROW, aerial inspections, ground inspections, and repairs. Vegetation trimming would result in the removal of limited, target vegetation, including non-native species. Aerial inspections would not affect vegetation. Ground inspections, where vehicles are confined to existing roadways, are unlikely to have any additional direct or indirect impacts on vegetation. Repairs to the transmission structures and conductors could have minor direct and indirect impacts on vegetation resources within areas disturbed by this activity. Impacts would be reduced by implementing BMPs.

Wetlands

Potential impacts to wetlands from the C-HC Project would include fill activities from transmission line structure construction, tree clearing within the ROW, and construction of access roads and staging areas. Wetland fill activities due to the placement of transmission line structures within wetlands, and associated grading and construction activities, are considered permanent impacts resulting in wetland loss.
No permanent fill in any wetlands for access road construction is proposed. Furthermore, it is anticipated that no wetlands will be permanently impacted due to construction of the Hill Valley Substation or at any proposed lay down yards. Construction activities and modifications at existing substations would be confined to current footprint of the facilities.

Forested wetlands crossed by the alternatives would require trees to be removed during construction and maintained in a non-forested state for the life of the C-HC Project. Tree clearing within forested wetlands would generally not be considered a wetland fill activity; however, conversion of a forested wetland to a non-forested wetland type (shrub/scrub or emergent) would be considered a permanent wetland impact as the wetland type and wetland function would be permanently altered.

Wetland impacts may result from temporary wetland crossings for construction equipment and/or materials along the proposed ROW and adjacent areas. Timber mats and other impact minimization techniques and BMPs would be used to prevent soil compaction and earth disturbance at temporary crossings. Wetlands temporarily impacted by construction access, staging areas, and access roads would be restored to original contours and reseeded with a site-appropriate mix of native wetland species.

Wetland areas both within the ROW and adjacent areas may be indirectly impacted by project construction, operation, and maintenance activities. In this instance, indirect impacts generally refer to changes in wetland quantity or quality that are reasonably foreseeable due to the direct, or permanent impact to wetlands (e.g., permanent fill; tree clearing in forested wetlands). Furthermore, indirect impacts are often removed in time and space from the direct impacts of project construction (i.e., involve a lag time; are outside the project footprint). In this respect, the indirect impacts of the C-HC Project are likely to include increased sediment deposition in nearby wetlands, alteration of long-term wetland hydrology, and residual effects resulting from the fragmentation of wetland habitats that span the ROW. Fragmenting wetland habitats can affect adjacent areas by increasing edge habitat and altering light regimes, ultimately driving changes in wetland species composition and function. With respect to species composition, noxious weeds and other invasive species would also potentially be introduced and spread through ground disturbances and transfer by equipment. Precautions would be implemented during construction and reclamation to minimize the long-term magnitude of these potential indirect impacts. Precautions include revegetation of disturbed areas using certified seed and mulch that contain no viable noxious weed seeds, restoration of construction areas to pre-disturbance contours, and the use of standard BMPs during construction and revegetation practices within disturbed areas, as discussed in Section 3.1, Table 3.1-4.

Potential impacts to wetlands are assumed to be minimized by a number of environmental commitments described in Section 3.1, Table 3.1-4. Any unavoidable impacts to wetlands, whether temporary or permanent, will be discussed with the USACE, IDNR, and WDNR prior to construction to determine the permitting requirements and conditions necessary for construction activities involving wetland impacts.

3.3.2.3.2 Special Status Plant Species

Federally Listed Species

As described in Section 3.3.1, five federally listed threatened plant species have potential to occur in the C-HC Project vicinity. A “No Effect” determination was made for the eastern prairie fringed orchid, Mead’s milkweed, prairie bush clover, and western prairie fringed orchid in the RUS BA developed during the Section 7 consultation process for the C-HC Project (Table 3.3-4). Due to a lack of presence within the ROW based on known records, no effects to Mead’s milkweed, prairie bush clover, eastern prairie fringed orchid, or western prairie fringed orchid are anticipated to occur as a result of implementation of any action alternative. Table 3.3-4 summarizes the effects determination for these species as described in the BA (RUS 2018).

Table 3.3-4. Federally Listed Species with Potential to Occur in the C-HC Project and the Effect Determinations for Each in the RUS Biological Assessment

Species	Federal Status	Effect Determination from RUS BA
Eastern prairie fringed orchid	Threatened	No effect
Mead’s milkweed	Threatened	No effect
Northern monkshood	Threatened	May Affect, Not Likely to Adversely Affect
Prairie bush clover	Threatened	No effect
Western prairie fringed orchid	Threatened	No effect

Source: RUS (2018)

The RUS BA determined that the project “May Affect, but is Not Likely to Adversely Affect” the northern monkshood, and USFWS concurred with this determination in the C-HC Project Biological Opinion (BO) (USFWS 2019a). Suitable habitat for the species may be present within the ROW. However, under all action alternatives, the following BMPs would be implemented to ensure activities do not adversely affect the species (RUS 2018):

- Suitable habitat or individual plants/populations that may be identified along Segments A-IA or D-IA locations would be mapped to assist in avoiding direct disturbance, identifying buffer distances, and/or use of BMPs.
- Broadcast herbicide application would be avoided in areas where suitable habitat and/or where individual plants/populations are present.
- Known individual plant/population locations would be avoided and Project activities if needed in area of known presence would be conducted when least likely to affect individual plants, such as during frozen, snow-covered ground conditions or in dry soil areas late in the growing season.
- Pole locations and construction access roads would avoid areas of steep slopes and cliffs.
- BMPs would be used during construction, maintenance, and vegetation management activities to prevent the spread of invasive species.
- Disturbances to hydrology, including soil disturbance from rutting, would be avoided in areas where suitable habitat and/or where individual plants/populations are present.

Due to implementation of these BMPs, effects to the northern monkshood under any action alternative is expected to be minor.

State-Listed Species

Precise locations, if present, within the ROW of state-listed species are not known. The WDNR NHI reports that 39 state-listed species have been recorded within 2 miles of the C-HC Project and could be present in suitable habitat areas along portions of the C-HC Project, including within off-ROW access paths and/or laydown yards. The IDNR completed a records search for rare species and significant natural communities in the project area and found no site-specific records that would be impacted by the C-HC Project.

The Utilities would implement recommended avoidance and impact minimization measures where state-listed species or their habitat are verified to occur. For example, if preliminary research and field assessments indicate that rare species or natural communities may be present in the C-HC Project area, specific, appropriately timed surveys may be conducted prior to construction. The need for and timing of these surveys would be identified by WDNR or IDNR through coordination with the Utilities. Preconstruction surveys may be used to identify whether a particular species is present in the affected area or to what extent suitable habitat for a species is present within the project area. If a threatened or endangered species is observed during the surveys, measures such as flagging or fencing the location of protected plant species and avoiding those areas during construction would be implemented. Because such measures would avoid or minimize impacts to special status plant populations, the action alternatives are expected to have no, or only minor, impacts to these species.

3.3.2.3.3 Invasive Species

Invasive species could be introduced and spread as a result of construction of the C-HC Project, through ground disturbances and transfer by equipment. BMPs would be implemented during construction and reclamation to minimize the potential for introduction and spread of invasive species.

The C-HC Project would directly affect noxious weeds through soil and native vegetation disturbance. Noxious weeds typically are able to effectively compete with native plants and can relatively quickly invade disturbed or fragmented areas. Therefore, disturbance of vegetative cover could facilitate the introduction, spread and proliferation of invasive species, which in turn could alter plant community composition, reduce native plant species cover and biodiversity, alter soils and hydrology, and produce monocultures.

As described in Section 3.3, several species of invasive plants were documented in the C-HC Project during project-specific surveys. However, additional invasive species may be present in the vicinity of the project but not occur in the ROW or analysis area. The use of vehicles and machinery from outside the analysis area could facilitate noxious weed introduction into the project footprint.

Several environmental commitments listed in Table 3.1-4—such as surveying all natural areas for invasive species following construction, and site revegetation and BMPs listed in Appendix D, including those in *Rights-of-Way Best Management Practices for Invasive Species*—would be implemented to avoid and minimize introduction or proliferation of invasive species under all action alternatives.

3.3.2.4 ALTERNATIVE 1

Vegetation Communities

Alternative 1 would result in the temporary or permanent removal, degradation, or alteration of vegetation as shown in Table 3.3-5.

Approximately 524 acres of forest, 228 acres of grassland, 110 acres of wetlands, and 10 acres of shrubland would be directly impacted, either permanently (e.g., removed) or temporarily (disturbed and restored), by construction and maintenance of the project within the ROW, access roads, and laydown yards. These acreages represent less than 1% of total available vegetation types within the six counties the project overlaps; with 0.07% of forest, 0.02% of grassland, and 0.11% of wetlands being impacted.

Approximately 496 acres of forest, 153 acres of grassland, 59 acres of wetland, and 6 acres of shrubland would be indirectly affected outside the ROW and within the analysis area (e.g., as a result of fugitive dust). Within these acres, effects described under Impacts Common to All Action Alternatives would be expected to occur. These acreages represent less than 1% of total available vegetation types within the six counties the project overlaps; with 0.07% of forest, 0.02% of grassland, and 0.06% of wetland being impacted.

Impacts to forest, grassland, and wetlands would be considered moderate. The alteration or removal of vegetation would be measurable and would affect individual plants and local populations. Effects would not be expected to affect regional populations as they would be limited to discrete footprints within the project. Impacts to shrubland would be considered minor. The alteration or removal of 10 acres of shrubland, and indirect effects to approximately 6 acres of shrubland, would be detectable but discountable, and is not expected to affect natural shrubland communities on the regional landscape.

Table 3.3-5. Acreages of Impacts to Vegetation as a Result of Alternative 1

	Within ROW	Outside ROW and within Analysis Area	Hill Valley Substation	Access Roads	Laydown Yards
Total Analysis Area	**1,891**	**1,699**	**22**	**204**	**213**
Land Cover Class					
Grassland	228	153	0	40	0
Forest	524	496	0	11	0
Shrubland	10	6	0	0	0

	Within ROW	Outside ROW and within Analysis Area	Hill Valley Substation	Access Roads	Laydown Yards
Wetland	110	59	0	4	0

Retirement of the N-9 Transmission Line and Construction of a New 69-kV Tap Line

Table 3.3-6 summarizes the impacts to vegetation from the N-9 transmission line decommissioning and new tap line construction. The primary impacts to vegetation from the decommissioning of the N-9 line would be short-term, minor impacts from the use of large equipment to remove the structures. Within the Refuge, approximately 19 acres would be disturbed, of which approximately 17 acres are classified as wetlands. On private lands and within the transportation ROW, most of the vegetation cover is classified as grasslands. Once the structures are removed and the ROW easements are retired, there would be long-term beneficial impacts to vegetation because the retired ROW within the Refuge would be revegetated according to a revegetation plan approved by USFWS and USACE. Areas outside of the Refuge would be allowed to naturally revegetate. Over the long term, the vegetation communities would be consistent with surrounding land uses.

Impacts to vegetation from the construction of the new tap line connecting the remaining portion of the N-9 transmission line with the Turkey River Substation would include:

- Removal and/or crushing of natural, native species–dominated vegetation communities or associations;
- Decreased plant productivity as a result of fugitive dust;
- Potential introduction of non-native plant species; and
- Plant community fragmentation.

The majority of the new tap line would be either within transportation ROW associated with the local roads or within actively managed pastureland. Therefore, impacts (both short and long term) to native vegetation communities from the construction of the new tap line would be minimal. Environmental commitments and BMPs listed in Table 3.1-4, would be utilized to minimize impacts to vegetation.

Table 3.3-6. Acreages of Impacts to Vegetation from the N-9 Decommissioning and Tap Line

Land Cover Class	Refuge (acres)	Private Land (acres)	Transportation ROW (acres)	Total (acres)
Total Analysis Area	**21.5**	**12.3**	**1.5**	**35.3**
Grassland	1.6	5.2	0.6	**7.4**
Forest	0.0*	0.4	0.0	**0.4**
Shrubland	0.1	3.4	0.3	**3.8**
Wetland	17.2	0	0.0	**17.2**

* The lack of forested landcover presented in this table is indicative of the maintained transmission line ROW. Within the Refuge, the area surrounding the ROW is primarily forested.

Wetlands

Alternative 1 would cross approximately 113 wetlands totaling approximately 110 acres of wetland within the ROW, and approximately 59 acres of wetland outside the ROW but within the analysis area.

Alternative 1 would permanently impact approximately 38 total acres of wetland due to tree clearing of forested wetland habitats, including 3 acres of PFO wetlands, 23 acres of PEM/PFO wetlands, and 12 acres of PEM/PSS/PFO wetlands. Alternative 1 would also permanently impact <0.1 acre of wetland due to fill activities associated with transmission line structures.

Temporary impacts to wetlands within the ROW are estimated to be approximately 72 acres, including 56 acres of PEM wetlands, 11 acres of PSS wetlands, 3 acres of PEM/PSS wetlands, 2 acres of PEM/open water wetland complexes. Indirect impacts to wetlands outside the ROW but within the analysis area are estimated to be approximately 59 acres, including 1 acre of PFO wetland, <1 acre of PSS wetland, 21 acres of PEM wetlands, 2 acres of PEM/PSS wetlands, 24 acres of PEM/PFO wetlands, 9 acres of PEM/PSS/PFO wetlands, and 2 acres of PEM/open water wetland complexes.

A summary of forested and non-forested wetlands impacts is included in Table 3.3-7.

Table 3.3-7. Alternative 1 Wetland Impacts

Permanent Impacts	Wetland Acres
Forested Wetlands Cleared within ROW	38
Wetland Filled due to Placement of Structures	<0.1
Total Permanent Impacts	**38**
Temporary or Indirect Impacts	**Wetland Acres**
Non-Forested Wetlands within ROW (Temporary)	72
Wetlands Outside ROW, within Analysis Area (Indirect)	59

Retirement of the N-9 Transmission Line and Construction of a New 69-kV Tap Line

The decommissioning of the N-9 line is expected to result in minor, short-term impacts to wetlands. There are approximately 17 acres of wetlands along the decommissioned N-9 line, all within the Refuge. Temporary direct disturbance to wetlands is expected during decommissioning to provide access to the 21 structures within the Refuge. Nineteen of the 21 structures within the Refuge would be removed at the ground level to avoid permanent impacts to wetlands. Two structures within the Refuge are steel lattice with cement foundations. The foundations for the two lattice structures would be removed to 4 feet below the ground surface. It is estimated the removal of the structure foundations would require no more than 450 square feet (0.01 acre) of surface area and 1,800 cubic feet of permanent fill within wetlands.

Wetland impacts may result from temporary wetland crossings for construction equipment and/or materials along the proposed ROW and adjacent areas. The decommissioning activities would occur in the winter months so that ice bridges would be used to cross any wetlands along the construction area. If the wetland soils are not frozen, decommissioning activities would be performed in these areas using construction mats to prevent soil compaction and earth disturbance at temporary crossings. All of the wooden structures within the Refuge would be cut at ground level to minimize impacts to the wetlands. Two construction pads would be temporarily installed within the Refuge to minimize impacts to wetlands during the removal of the steel lattice structures at the Mississippi River crossing.

Decommissioning activities have the potential to increase sediment deposition in nearby wetlands and fragment wetland habitats that span the ROW and adjacent areas. These indirect impacts may decrease overall wetland habitat quality. Noxious weeds and other invasive species would also potentially be introduced and spread through ground disturbances and transfer by equipment. Adherence to BMPs and environmental commitments from Table 3.1-4 would be utilized to reduce erosion, sediment deposition, and the spread of noxious and invasive species along the decommissioned line and new tap line. Upon completion of construction and decommissioning, disturbed areas within the Refuge would be revegetated according to a revegetation plan developed by the Utilities in coordination with the USACE and USFWS.

No wetlands have been identified along the new 0.2-mile tap line.

Special Status Plants

Effects on special status plant species, if present, would be considered minor. The Utilities would implement recommended avoidance and impact minimization measures when and where practicable in areas where state-listed species or their habitat are verified to occur. Because such measures would avoid or minimize impacts to special status plant populations, the action alternatives are expected to have no, or only minor, impacts to these species.

Invasive Species

Anticipated impacts to invasive species are expected to be moderate, as opportunities for the increased spread of invasive species, including noxious weeds, would be detectable but discountable. There would be a minor potential for an increased spread of noxious weeds.

3.3.2.5 ALTERNATIVE 2

Vegetation Communities

Alternative 2 would result in the temporary or permanent removal, degradation, or alteration of vegetation as shown in Table 3.3-8.

Approximately 530 acres of forest, 249 acres of grassland, 121 acres of wetlands, and 9 acres of shrubland would be directly impacted, either permanently (e.g., removed) or temporarily (disturbed and restored), by construction and maintenance within the ROW, access roads, and laydown yards. These acreages represent less than 1% of total available vegetation types within the six counties the project overlaps; with 0.07% of forest, 0.03% of grassland, and 0.12% of wetlands being impacted.

Approximately 500 acres of forest, 171 acres of grassland, 62 acres of wetland, and 5 acres of shrubland would be indirectly affected outside the ROW and within the analysis area (e.g., as a result of fugitive dust). Within these acres, effects described under Impacts Common to All Action Alternatives would be expected to occur. These acreages represent less than 1% of total available vegetation types within the six counties the project overlaps; with 0.07% of forest, 0.02% of grassland, and 0.06% of wetlands being impacted.

Impacts to forest, grassland, and wetlands would be considered moderate. The alteration or removal of vegetation would be measurable and would affect individual plants and local populations. Effects would not be expected to affect regional populations as they would be limited to discrete footprints within the project. Impacts to shrubland would be considered minor. The alteration or removal of 9 acres of shrubland, and indirect effects to approximately 5 acres of shrubland, would be detectable but discountable, and is not expected to affect natural shrubland communities on the regional landscape.

Table 3.3-8. Acreages of Impacts to Vegetation as a Result of Alternative 2

	Within ROW	Outside ROW and within Analysis Area	Hill Valley Substation	Access Roads	Laydown Yards
Total Analysis Area	2,008	1,766	22	210	213
Land Cover Class					
Grassland	249	171	0	42	0
Forest	530	500	0	11	0
Shrubland	9	5	0	0	0
Wetland	121	62	0	3	0

Retirement of the N-9 Transmission Line and Construction of a New 69-kV Tap Line

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

Wetlands

Alternative 2 would cross approximately 116 wetland crossings totaling approximately 121 acres of wetland within the ROW, and approximately 62 acres of wetland outside the ROW but within the analysis area.

Alternative 2 would permanently impact approximately 52 total acres of wetland due to tree clearing of forested wetland habitats, including 15 acres of PFO wetlands, 25 acres of PEM/PFO wetlands, and 12 acres of PEM/PSS/PFO wetlands. Alternative 2 would also permanently impact <0.1 acre of wetland due to fill activities associated with transmission line structures.

Temporary impacts to wetlands within the ROW are estimated to be approximately 69 acres, including 54 acres of PEM wetlands, 8 acres of PSS wetlands, 2 acres of PEM/PSS wetlands, 5 acres of PEM/open water wetland complexes. Indirect impacts to wetlands outside the ROW but within the analysis area are estimated to be approximately 62 acres, including <1 acre of PFO wetland, <0.1 acre of PSS wetland, 24 acres of PEM wetlands, 2 acres of PEM/PSS wetlands, 25 acres of PEM/PFO wetlands, 9 acres of PEM/PSS/PFO wetlands, and 2 acres of PEM/open water wetland complexes.

A summary of forested and non-forested wetlands impacts is included in Table 3.3-9.

Table 3.3-9. Alternative 2 Wetland Impacts

Permanent Impacts	Wetland Acres
Forested Wetlands Cleared within ROW	52
Wetland Filled due to Placement of Structures	<0.1
Total Permanent Impacts	**52**
Temporary or Indirect Impacts	**Wetland Acres**
Non-Forested Wetlands within ROW (Temporary)	69
Wetlands Outside ROW, within Analysis Area (Indirect)	62

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

Special Status Plants

Effects to special status plant species, if present, would be considered minor. Because the Utilities would complete vegetation surveys prior to construction, and BMPs would be implemented to avoid and minimize effects to identified special status plants, any impacts are expected to be minor.

Invasive Species

Anticipated impacts to invasive species are expected to moderate, as opportunities for the increased spread of invasive species, including noxious weeds, would be detectable but discountable. There would a minor potential for an increased spread of noxious weeds.

3.3.2.6 ALTERNATIVE 3

Vegetation Communities

Alternative 3 would result in the temporary or permanent removal, degradation, or alteration of vegetation as shown in Table 3.3-10.

Approximately 504 acres of forest, 302 acres of grassland, 107 acres of wetlands, and 10 acres of shrubland would be directly impacted, either permanently (e.g., removed) or temporarily (disturbed and restored), by construction and maintenance within the ROW, access roads, and laydown yards. These acreages represent less than 1% of total available vegetation types within the six counties the project overlaps; with 0.07% of forest, 0.03% of grassland, and 0.11% of wetlands being impacted.

Approximately 504 acres of forest, 198 acres of grassland, 55 acres of wetland, and 8 acres of shrubland would be indirectly affected outside the ROW and within the analysis area (e.g., as a result of fugitive dust). Within these acres, effects described under Impacts Common to All Action Alternatives would be expected to occur. These acreages represent less than 1% of total available vegetation types within the six counties the project overlaps; with 0.07% of forest, 0.02% of grassland, and 0.06% of wetlands being impacted.

Impacts to forest, grassland, and wetlands would be considered moderate. The alteration or removal of vegetation would be measurable and would affect individual plants and local populations. Effects would not be expected to affect regional populations as they would be limited to discrete footprints within the project. Impacts to shrubland would be considered minor. The alteration or removal of 10 acres of shrubland, and indirect effects to approximately 8 acres of shrubland, would be detectable but discountable, and is not expected to affect natural shrubland communities on the regional landscape.

Table 3.3-10. Acreages of Impacts to Vegetation as a Result of Alternative 3

	Within ROW	Outside ROW and within Analysis Area	Hill Valley Substation	Access Roads	Laydown Yards
Total Analysis Area	2,210	2,016	22	157	213
Land Cover Class					
Grassland	302	198	0	27	0
Forest	504	504	0	12	0
Shrubland	10	8	0	0	0
Wetland	107	55	0	3	0

Retirement of the N-9 Transmission Line and Construction of a New 69-kV Tap Line

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

Wetlands

Alternative 3 would cross approximately 134 wetlands totaling approximately 107 acres of wetland within the ROW and approximately 55 acres of wetland outside the ROW but within the analysis area.

Alternative 3 would permanently impact approximately 49 total acres of wetland due to tree clearing of forested wetland habitats, including 13 acres of PFO wetlands, 23 acres of PEM/PFO wetlands, and 12 acres of PEM/PSS/PFO wetlands. Alternative 3 would also permanently impact <0.1 acre of wetland due to fill activities associated with transmission line structures.

Temporary impacts to wetlands within the ROW are estimated to be approximately 58 acres, including 44 acres of PEM wetlands, 8 acres of PSS wetlands, 2 acres of PEM/PSS wetlands, and 4 acres of PEM/open water wetland complexes. Indirect impacts to wetlands outside the ROW but within the analysis area are estimated to be approximately 55 acres, including <1 acre of PFO wetland, <0.1 acre of PSS wetland, 18 acres of PEM wetlands, 2 acres of PEM/PSS wetlands, 24 acres of PEM/PFO wetlands, 9 acres of PEM/PSS/PFO wetlands, and 2 acres of PEM/open water wetland complexes.

A summary of forested and non-forested wetlands impacts is included in Table 3.3-11.

Table 3.3-11. Alternative 3 Wetland Impacts

Permanent Impacts	Wetland Acres
Forested Wetlands Cleared within ROW	49
Wetland Filled due to Placement of Structures	<0.1
Total Permanent Impacts	**49**
Temporary or Indirect Impacts	**Wetland Acres**
Non-Forested Wetlands within ROW (Temporary)	58
Wetlands Outside ROW, within Analysis Area (Indirect)	55

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

Special Status Plants

Effects to special status plant species, if present, would be considered minor. Because the Utilities would complete vegetation surveys prior to construction, and BMPs would be implemented to avoid and minimize effects to identified special status plants, any impacts are expected to be minor.

Invasive Species

Anticipated impacts to invasive species are expected to be moderate, as opportunities for the increased spread of invasive species, including noxious weeds, would be detectable but discountable. There would a minor potential for an increased spread of noxious weeds.

3.3.2.7 ALTERNATIVE 4

Vegetation Communities

Alternative 4 would result in the temporary or permanent removal, degradation, or alteration of vegetation as shown in Table 3.3-12.

Approximately 236 acres of forest, 433 acres of grassland, 69 acres of wetlands, and 16 acres of shrubland would be directly impacted, either permanently (e.g., removed) or temporarily (disturbed and restored), by construction and maintenance within the ROW, access roads, and laydown yards. These acreages represent less than 1% of total available vegetation types within the six counties the project overlaps; with 0.03% of forest, 0.05% of grassland, and 0.07% of wetlands being impacted.

Approximately 216 acres of forest, 317 acres of grassland, 18 acres of wetland, and 10 acres of shrubland would be indirectly affected outside the ROW and within the analysis area (e.g., as a result of fugitive dust). Within these acres, effects described under Impacts Common to All Action Alternatives would be expected to occur. These acreages represent less than 1% of total available vegetation types within the six counties the project overlaps; with 0.03% of forest, 0.03% of grassland, and 0.02% of wetlands being impacted.

Impacts to forest, grassland, and wetlands would be considered moderate. The alteration or removal of vegetation would be measurable and would affect individual plants and local populations. Effects would not be expected to affect regional populations as they would be limited to discrete footprints within the project. Impacts to shrubland would be considered minor. The alteration or removal of 16 acres of shrubland, and indirect effects to approximately 10 acres of shrubland, would be detectable but discountable, and is not expected to affect natural shrubland communities on the regional landscape.

Table 3.3-12. Acreages of Impacts to Vegetation as a Result of Alternative 4

	Within ROW	Outside ROW and within Analysis Area	Hill Valley Substation	Access Roads	Laydown Yards
Total Analysis Area	2,246	2,083	22	116	213
Land Cover Class					
Grassland	433	317	0	19	0
Forest	236	216	0	7	0
Shrubland	16	10	0	0	0
Wetland	69	18	0	2	0

Retirement of the N-9 Transmission Line and Construction of a New 69-kV Tap Line

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

Wetlands

Alternative 4 would cross approximately 129 wetlands totaling approximately 69 acres of wetland within the ROW, and approximately 18 acres of wetland outside the ROW but within the analysis area.

Alternative 4 would permanently impact approximately 16 total acres of wetland due to tree clearing of forested wetland habitats, including 13 acres of PFO wetlands, <1 acre of PSS/PFO wetland, and 3 acres of PEM/PFO wetlands. Alternative 4 would also permanently impact <0.1 acre of wetland due to fill activities associated with transmission line structures.

Temporary impacts to wetlands within the ROW are estimated to be approximately 54 acres, including 40 acres of PEM wetlands, 9 acres of PSS wetlands, 1 acre of PEM/PSS wetlands, and 4 acres of PEM/open water wetland complexes. Indirect impacts to wetlands outside the ROW but within the analysis area are estimated to be approximately 18 acres, including <1 acre of PFO wetland, <1 acre of PSS wetland, 12 acres of PEM wetlands, 1 acre of PEM/PSS wetlands, 2 acres of PEM/PFO wetlands, 1 acre of PSS/PFO wetland, and 2 acres of PEM/open water wetland complexes.

A summary of forested and non-forested wetlands impacts is included in Table 3.3-13.

Table 3.3-13. Alternative 4 Wetland Impacts

Permanent Impacts	Wetland Acres
Forested Wetlands Cleared within ROW	16
Wetland Filled due to Placement of Structures	<0.1
Total Permanent Impacts	**16**
Temporary or Indirect Impacts	**Wetland Acres**
Non-Forested Wetlands within ROW (Temporary)	54
Wetlands Outside ROW, within Analysis Area (Indirect)	18

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

Special Status Plants

Effects to special status plant species, if present, would be considered minor. Because the Utilities would complete vegetation surveys prior to construction, and BMPs would be implemented to avoid and minimize effects to identified special status plants, any impacts are expected to be minor.

Invasive Species

Anticipated impacts to invasive species are expected to be moderate, as opportunities for the increased spread of invasive species, including noxious weeds, would be detectable but discountable. There would a minor potential for an increased spread of noxious weeds.

3.3.2.8 ALTERNATIVE 5

Vegetation Communities

Alternative 5 would result in the temporary or permanent removal, degradation, or alteration of vegetation as shown in Table 3.3-14.

Approximately 245 acres of forest, 454 acres of grassland, 66 acres of wetlands, and 8 acres of shrubland would be directly impacted, either permanently (e.g., removed) or temporarily (disturbed and restored), by construction and maintenance within the ROW, access roads, and laydown yards. These acreages represent less than 1% of total available vegetation types within the six counties the project overlaps; with 0.03% of forest, 0.05% of grassland, and 0.07% of wetlands being impacted.

Approximately 216 acres of forest, 338 acres of grassland, 27 acres of wetland, and 7 acres of shrubland would be indirectly affected outside the ROW and within the analysis area (e.g., as a result of fugitive dust). Within these acres, effects described under Impacts Common to All Action Alternatives would be expected to occur. These acreages represent less than 1% of total available vegetation types within the six counties the project overlaps; with 0.03% of forest, 0.04% of grassland, and 0.03% of wetlands being impacted.

Impacts to forest, grassland, and wetlands would be considered moderate. The alteration or removal of vegetation would be measurable and would affect individual plants and local populations. Effects would not be expected to affect regional populations as they would be limited to discrete footprints within the C-HC Project. Impacts to shrubland would be considered minor. The alteration or removal of 8 acres of shrubland, and indirect effects to approximately 7 acres of shrubland, would be detectable but discountable, and is not expected to affect natural shrubland communities on the regional landscape.

Table 3.3-14. Acreages of Impacts to Vegetation as a Result of Alternative 5

	Within ROW	Outside ROW and within Analysis Area	Hill Valley Substation	Access Roads	Laydown Yards
Total Analysis Area	**2,431**	**2,230**	**22**	**129**	**213**
Land Cover Class					
Grassland	454	338	0	22	0
Forest	245	216	0	7	0
Shrubland	8	7	0	0	0
Wetland	66	27	0	2	0

Retirement of the N-9 Transmission Line and Construction of a New 69-kV Tap Line

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

Wetlands

Alternative 5 would cross approximately 158 wetlands totaling approximately 66 acres of wetland within the ROW and approximately 27 acres of wetland outside the ROW but within the analysis area.

Alternative 5 would permanently impact approximately 5 total acres of wetland due to tree clearing of forested wetland habitats, including 2 acres of PFO wetlands, <1 acre of PSS/PFO wetland, and 3 acres of PEM/PFO wetlands. Alternative 5 would also permanently impact <0.1 acre of wetland due to fill activities associated with transmission line structures.

Temporary impacts to wetlands within the ROW are estimated to be approximately 61 acres, including 48 acres of PEM wetlands, 11 acres of PSS wetlands, 1 acre of PEM/PSS wetlands, and 1 acre of PEM/open water wetland complexes. Indirect impacts to wetlands outside the ROW but within the analysis area are estimated to be approximately 27 acres, including 1 acre of PFO wetland, <1 acre of PSS wetland, 17 acres of PEM wetlands, 1 acre of PEM/PSS wetlands, 5 acres of PEM/PFO wetlands, 1 acre of PSS/PFO wetland, and 2 acres of PEM/open water wetland complexes.

A summary of forested and non-forested wetlands impacts is included in Table 3.3-15.

Table 3.3-15. Alternative 5 Wetland Impacts

Permanent Impacts	Wetland Acres
Forested Wetlands Cleared within ROW	5
Wetland Filled due to Placement of Structures	<0.1
Total Permanent Impacts	**5**
Temporary or Indirect Impacts	**Wetland Acres**
Non-Forested Wetlands within ROW (Temporary)	61
Wetlands Outside ROW, within Analysis Area (Indirect)	27

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

Special Status Plants

Effects to special status plant species, if present, would be considered minor. Because the Utilities would complete vegetation surveys prior to construction, and BMPs would be implemented to avoid and minimize effects to identified special status plants, any impacts are expected to be minor.

Invasive Species

Anticipated impacts to invasive species are expected to be moderate, as opportunities for the increased spread of invasive species, including noxious weeds, would be detectable but discountable. There would a minor potential for an increased spread of noxious weeds.

3.3.2.9 ALTERNATIVE 6

Vegetation Communities

Alternative 6 would result in the temporary or permanent removal, degradation, or alteration of vegetation as shown in Table 3.3-16.

Approximately 250 acres of forest, 352 acres of grassland, 76 acres of wetland, and 17 acres of shrubland would be directly impacted, either permanently (e.g., removed) or temporarily (disturbed and restored), by construction and maintenance within the ROW, access roads, and laydown yards. These acreages represent less than 1% of total available vegetation types within the six counties the project overlaps; with 0.03% of forest, 0.04% of grassland, and 0.07% of wetlands being impacted.

Approximately 201 acres of forest, 273 acres of grassland, 38 acres of wetland, and 9 acres of shrubland would be indirectly affected outside the ROW and within the analysis area (e.g., as a result of fugitive dust). Within these acres, effects described under Impacts Common to All Action Alternatives would be expected to occur. These acreages represent less than 1% of total available vegetation types within the six counties the project overlaps; with 0.03% of forest, 0.03% of grassland, and 0.02% of wetlands being impacted.

Impacts to forest, grassland, and wetlands would be considered moderate. The alteration or removal of vegetation would be measurable and would affect individual plants and local populations. Effects would not be expected to affect regional populations as they would be limited to discrete footprints within the project. Impacts to shrubland would be considered minor. The alteration or removal of 17 acres of shrubland, and indirect effects to approximately 9 acres of shrubland, would be detectable but discountable, and is not expected to affect natural shrubland communities on the regional landscape.

Table 3.3-16. Acreages of Impacts to Vegetation as a Result of Alternative 6

	Within ROW	Outside ROW and within Analysis Area	Hill Valley Substation	Access Roads	Laydown Yards
Total Analysis Area	**1,936**	**1,773**	**22**	**163**	**213**
Land Cover Class					
Grassland	352	273	0	32	0
Forest	250	201	0	6	0
Shrubland	17	9	0	0	0
Wetland	76	38	0	2	0

Retirement of the N-9 Transmission Line and Construction of a New 69-kV Tap Line

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

Wetlands

Alternative 6 would cross approximately 114 wetlands totaling approximately 76 acres of wetland within the ROW and approximately 38 acres of wetland outside the ROW but within the analysis area.

Alternative 6 would permanently impact approximately 8 total acres of wetland due to tree clearing of forested wetland habitats, including 3 acres of PFO wetlands, 1 acre of PSS/PFO wetland, and 4 acres of PEM/PFO wetlands. Alternative 6 would also permanently impact <0.1 acre of wetland due to fill activities associated with transmission line structures.

Temporary impacts to wetlands within the ROW are estimated to be approximately 63 acres, including 49 acres of PEM wetlands, 12 acres of PSS wetlands, 1 acre of PEM/PSS wetlands, and 1 acre of PEM/open water wetland complexes. Indirect impacts to wetlands outside the ROW but within the analysis area are estimated to be approximately 20 acres, including <1 acre of PFO wetland, <1 acre of PSS wetland, 14 acres of PEM wetlands, 1 acre of PEM/PSS wetlands, 2 acres of PEM/PFO wetlands, 1 acre of PSS/PFO wetland, and 2 acres of PEM/open water wetland complexes.

A summary of forested and non-forested wetlands impacts is included in Table 3.3-17.

Table 3.3-17. Alternative 6 Wetland Impacts

Permanent Impacts	Wetland Acres
Forested Wetlands Cleared within ROW	8
Wetland Filled due to Placement of Structures	<0.1
Total Permanent Impacts	**8**
Temporary or Indirect Impacts	**Wetland Acres**
Non-Forested Wetlands within ROW (Temporary)	63
Wetlands Outside ROW, within Analysis Area (Indirect)	20

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

Special Status Plants

Effects on special status plant species, if present, would be considered minor. Because the Utilities would complete vegetation surveys prior to construction, and BMPs would be implemented to avoid and minimize effects to identified special status plants, any impacts are expected to be minor.

Invasive Species

Anticipated impacts to invasive species are expected to be moderate, as opportunities for the increased spread of invasive species, including noxious weeds, would be detectable but discountable. There would a minor potential for an increased spread of noxious weeds.

3.3.3 *Summary of Impacts*

Table 3.3-18 provides a summary and comparison of impacts to grassland, forest, and shrubland by Alternative. For all action alternatives, impacts to vegetation would be moderate, impacts to special status species would be minor, and impacts to invasive species would be minor. Alternative 2 would have the greatest impact to forested land cover, while Alternative 6 would have the smallest impact to forested land cover.

Table 3.3-18. Summary of Effects to Vegetation, Expressed in Acres, by Alternative

		Grassland			Forest			Wetland			Shrubland		
	Total Analysis Area	Direct Effects	Indirect Effects	Total Effects	Direct Effects	Indirect Effects	Total Effects	Direct Effects	Indirect Effects	Total Effects	Direct Effects	Indirect Effects	Total Effects
Alt 1	3,591	228	153	**381**	524	496	**1,020**	110	59	**169**	10	6	**16**
Alt 2	3,774	249	171	**420**	530	500	**1,030**	121	62	**183**	9	5	**14**
Alt 3	4,226	302	198	**500**	504	504	**1,008**	107	55	**162**	10	8	**18**
Alt 4	4,329	433	317	**750**	236	216	**542**	69	18	**87**	16	10	**26**
Alt 5	4,661	454	338	**792**	245	216	**461**	66	27	**93**	8	7	**15**
Alt 6	3,709	352	273	**625**	250	201	**451**	76	38	**114**	17	9	**26**

The following summary table (Table 3.3-19) provides summary of the wetland impacts for each project alternative. No alternative avoids impacting wetlands, with permanent wetland impacts ranging from 5 acres (Alternative 5) to 52 acres (Alternative 2), primarily due to clearing forested wetlands within the ROW. Each alternative would likely have moderate impacts to wetlands, as the impacts would be measurable but would not be expected to have significantly impacts on regional habitat abundance or species populations.

Table 3.3-19. Impact Summary Table for Wetlands

Alternative	Permanent Impact		Temporary Wetland Impacts within ROW (acres)	Indirect Wetland Impacts Outside ROW, within Analysis Area (acres)
	Wetlands Filled (acres)	Forested Wetlands Cleared (acres)		
Alternative 1	<0.1	38	72	59
	Moderate Impact – Impacts to wetlands would be detectable and measurable. Wetland impacts and disturbances would be localized and are not expected to affect regional population or habitat viability. Impacts and disturbance could increase the spread of noxious weeds and invasive species; however, negative impacts due to noxious weeds and invasive species are expected to be minimal with application of appropriate management and mitigation measures.			
Alternative 2	<0.1	52	69	62
	Moderate Impact – Impacts to wetlands would be detectable and measurable. Wetland impacts and disturbances would be localized and are not expected to affect regional population or habitat viability. Impacts and disturbance could increase the spread of noxious weeds and invasive species; however, negative impacts due to noxious weeds and invasive species are expected to be minimal with application of appropriate management and mitigation measures.			
Alternative 3	<0.1	49	58	55
	Moderate Impact – Impacts to wetlands would be detectable and measurable. Wetland impacts and disturbances would be localized and are not expected to affect regional population or habitat viability. Impacts and disturbance could increase the spread of noxious weeds and invasive species; however, negative impacts due to noxious weeds and invasive species are expected to be minimal with application of appropriate management and mitigation measures.			
Alternative 4	<0.1	16	54	18
	Moderate Impact – Impacts to wetlands would be detectable and measurable. Wetland impacts and disturbances would be localized and are not expected to affect regional population or habitat viability. Impacts and disturbance could increase the spread of noxious weeds and invasive species; however, negative impacts due to noxious weeds and invasive species are expected to be minimal with application of appropriate management and mitigation measures.			
Alternative 5	<0.1	5	61	27
	Moderate Impact – Impacts to wetlands would be detectable and measurable. Wetland impacts and disturbances would be localized and are not expected to affect regional population or habitat viability. Impacts and disturbance could increase the spread of noxious weeds and invasive species; however, negative impacts due to noxious weeds and invasive species are expected to be minimal with application of appropriate management and mitigation measures.			
Alternative 6	<0.1	8	63	20
	Moderate Impact – Impacts to wetlands would be detectable and measurable. Wetland impacts and disturbances would be localized and are not expected to affect regional population or habitat viability. Impacts and disturbance could increase the spread of noxious weeds and invasive species; however, negative impacts due to noxious weeds and invasive species are expected to be minimal with application of appropriate management and mitigation measures.			

The N-9 transmission line decommissioning that would occur within the Refuge would result in short-term adverse impacts to 17.2 acres of wetlands. There would be long-term beneficial impacts to vegetation communities after decommissioning. The N-9 transmission line decommissioning and tap line construction on private land would result in short-term impacts to 5.2 acres of grassland, 3.4 acres of grassland, and 0.4 acre of forest land. There would be adverse impacts to vegetation at the three to four structures for the new tap line. There would be long-term beneficial impacts to vegetation communities after decommissioning. There would be no impact to vegetation, including wetlands and special status plants, from substation improvements.

3.3.3.1 ADDITIONAL MITIGATION MEASURES

Environmental commitments for avoiding and minimizing wetland impacts are presented in Section 3.1, Table 3.1-4.

Any unavoidable impacts to wetlands, whether temporary or permanent, would be discussed with the USACE or appropriate state agency (IDNR or WDNR) prior to construction to determine the permitting requirements and conditions necessary for construction activities involving wetland impacts. With regards to Section 404 of the CWA (33 U.S.C. 1344), it is anticipated that USACE Nationwide Permit No. 12 or a Utility Regional General Permit, authorizing minor impacts to wetland and channels associated with utility line activities, may be used to permit wetland impacts. Impacts that are greater than minor may require an Individual Permit.

Unavoidable wetland impacts would be mitigated via multiple avenues, depending upon the type of impact, the location of the impact, and mitigation programs available by state or watershed. Conceptually, options for mitigating unavoidable impacts to wetland could include mitigation banks, in-lieu fee (ILF) programs, or permitee-responsible mitigation sites.

Within Wisconsin, the WDNR administers the Wisconsin Wetland Conservation Trust (WWCT). The WWCT is a wetland mitigation ILF program. Through the sale of WWCT credits, the WWCT can satisfy a permittee's wetland mitigation requirement specified by USACE and WDNR permits. WWCT credits are sold based upon the service area where the impact occurs. Service areas are generally aligned with watersheds. Aligning service areas with watershed helps to ensure that wetland restoration, establishment, or creation projects funded by the ILF program occur within reasonable geographic proximity of the impact, helping to maintain the overall health and quality of the impacted watershed. As a result, ILF credits may need to be purchased from multiple service areas, depending upon the location of wetland impacts requiring mitigation. The C-HC Project would cross the Upper Mississippi-Maquoketa-Plum, Lower Wisconsin, and Rock WWCT ILF service areas in Wisconsin. WWCT credits are currently available within each of these service areas if needed. Currently, there is no approved ILF program available in Iowa.

Should an ILF program be insufficient or unavailable, such as in Iowa, credits could be purchased from established and certified wetland mitigation banks. Several public and private wetland mitigation banks include primary or secondary service areas that are crossed by the C-HC Project. Similar to ILF programs, mitigation bank service areas are also determined using a watershed approach, helping to ensure that overall watershed health and quality is maintained. As a result, credits may need to be purchased from multiple banks, depending upon the location of the wetland impacts requiring mitigation. Established wetland mitigation banks with service areas that are crossed by the C-HC Project include Brophy Creek Mitigation Bank (Iowa), Crawford-Dillman Brothers Mitigation Bank (Wisconsin), Sauk-Big Hollow Wetland Bank (Wisconsin), Dane-Willow Drive (Wisconsin), Walworth-Jacobson Parcel (Wisconsin), Rock-Bass Creek (Wisconsin), Monroe-Kreyer Creek West Wetland Bank (Wisconsin), Monroe-Council Creek Wetland Mitigation Bank (Wisconsin), and the Walworth-L.B. Palmer Family Wetland Mitigation Bank (Wisconsin).

Finally, some wetland impacts may not be able to be mitigated using WWCT or established mitigation bank credits due to credit availability or service area restrictions. In these cases, permittee-responsible wetland mitigation sites may be developed. These sites may involve wetland preservation, enhancement, restoration, or creation to offset wetland impacts. Given the linear nature of the project spanning a broad geographic area, multiple permittee-responsible mitigation sites may be needed, as these types of mitigation sites are generally required to be located within the same watershed (8-digit Hydrologic Unit Code [HUC] watershed) as the wetland impact.

The quantity of mitigation required would be a function of the types of wetlands impacted (e.g., PEM, PSS, PFO), and the method of mitigation. In general, in-kind creation of PEM wetlands is typically mitigated at a 2:1 ratio (that is, 2 acres of PEM wetland creation for every 1 acre of PEM impact), with PFO wetlands potentially requiring a 4:1 ratio or higher. Mitigation ratios generally vary based upon the type, or functional quality, or wetland impacted, with higher quality wetlands (e.g., PFO wetlands) requiring higher mitigation rations than lower quality wetlands (e.g., PEM wetlands). Furthermore, mitigation ratios vary based upon the method of mitigation. For example, mitigation ratios are generally lower when ILF or wetland banks are used, as these programs offer a high rate of success. Mitigation ratios for permittee-responsible sites are variable based upon the method of mitigation (preservation, enhancement, restoration, or creation), as each method provides different levels of functional wetland replacement based upon the existing conditions of a site and the site's spatial and ecological context.

Once final impacts are determined, coordination with the USACE, IDNR, and WDNR would occur to properly permit unavoidable wetland impacts and determine mitigation requirements. As part of a permit application, a mitigation plan would be developed that would outline the proposed methods of mitigation for agency review and approval prior to project construction.

3.4 Wildlife, including Special Status Species

This section presents the occurrence and distribution of wildlife species within the analysis area, including, non-special status species, endangered, threatened, candidate, proposed,[1] and state-listed endangered species (collectively referred to as special status species).

In addition to special status wildlife species, this section also documents general wildlife and wildlife habitat known to occur in the vicinity of the C-HC Project.

3.4.1 *Affected Environment*

The analysis area for wildlife and special status species consists of a 300-foot area that encompasses each action alternative. Species-specific surveys have not been conducted, and therefore the potential for presence of wildlife and special status species has been determined first through coordination with the IDNR, WDNR, and USFWS to identify previously documented occurrences of wildlife and special status species within the analysis area. IDNR and WDNR provided records for occurrences beyond the analysis area: IDNR provided county level records and a review specific to the analysis area and WDNR provided a review of records within 2 miles of the analysis area. USFWS provided its analysis of the proposed action alternatives potential to effect federally listed species based on reviewing of the Biological Assessment (RUS 2018) and issuing the Biological Opinion (USFWS 2019a), which defined the project's action area as the proposed ROW and off-ROW areas. These areas used by IDNR, WDNR, and USFWS are collectively referred to as the resource evaluation area in this section. Records of wildlife and special status species within the resource evaluation area, but not within the analysis area, were cross-referenced with habitat availability based on remote sensing data to assess their potential for occurrence within the analysis area. In some instances, IDNR, WDNR, and USFWS provided information indicating that certain species with occurrence records within the resource evaluation area were not present within the analysis area. Additionally, the Audubon Society's current Christmas Bird Count data for Cassville, Dubuque, Fennimore, and Mount Horeb were reviewed, as these systematic surveys provide information on resident bird populations (National Audubon Society 2018).

3.4.1.1 HABITAT

The analysis area is within the Paleozoic Plateau or Driftless Area ecoregions of Wisconsin and Iowa (Omernick et al. 2000). The analysis area's eastern terminus, 59 acres, is in the Southeastern Wisconsin Savanna and Till Plains Level III ecoregion within the Southeastern Wisconsin Till Plains, Level IV

[1] Endangered, threatened, candidate, and proposed species are federally listed species.

ecoregion. This area supports a mix of agriculture and woodland where most of the original vegetation has been cleared, with forested areas remaining only on steeper end moraines and poorly drained depressions. Irregular till plains, end moraines, kettles, and drumlins are common, and wetlands are found throughout the region, especially along end morainal ridges. Most of the analysis area, 9,110 acres, overlaps the Savanna Section and Coulee Section Level III ecoregions in the Driftless Area Level IV ecoregion. The Driftless Area is distinguished by hilly uplands, with much of the region consisting of loess-capped plateaus deeply dissected by streams. Major land uses include livestock and dairy farming. The analysis area’s western terminus, 236 acres, is in the Western Corn Belt Plains Level III ecoregion, in the Eastern Iowa and Minnesota Drift Plains Level IV ecoregion. This area is a glaciated region with gently rolling terrain, and it is characterized by a mosaic of agriculture, woodlots, and wetlands. Vegetation includes oak forests, oak savanna, prairie, and sedge meadows. Much of the original vegetation has been converted to agricultural uses and scattered residences are common throughout the area.

The U.S. Forest Service developed a National Hierarchical Framework of Ecological Units to delineate and described ecosystems at the regional and subregional scale. According to that system, the ecological Province that contains the analysis area is the Eastern Broadleaf Forest (McNab and Avers 1994). The three sections spanned by the analysis area include the Minnesota and northeast Iowa Morainal, Oak Savannah Section; North Central U.S. Driftless and Escarpment Section; and the Southwestern Great Lakes Morainal Section (McNab and Avers 1994).

The western extent of the analysis area lies within the Minnesota and northeast Iowa Morainal, Oak Savannah Section (McNab and Avers 1994). It is characterized by level plains and low, irregular hills resulting from glaciation; till and outwash plains; drumlin fields and morainal ridges; and local occurrences of other features (e.g., kames, eskers, and kettles). Natural land cover includes bluestem prairie with significant maple-basswood forests and lesser amounts of oak savannah, oak-hickory forest, and northern floodplain forest. Current land use is dominated by agriculture, though forest remains in areas preserved for wildlife habitat and recreation, as well as on steep landscapes and adjacent to streams and lakes (McNab and Avers 1994).

The majority of the analysis area lies within the North Central U.S. Driftless and Escarpment Section (McNab and Avers 1994). This section, bisected by the Mississippi River floodplain, is an upland plateau with broad, steep-sided bedrock ridges and mounds up to 500 feet high. Natural land cover includes oak savanna and maple-basswood forest, with some northern floodplain forest along the major rivers found within this section. Current land use is dominated by agriculture, but most of the steeper slopes remain wooded (McNab and Avers 1994).

The eastern extent of the analysis area lies within the Southwestern Great Morainal Section (McNab and Avers 1994). This section is characterized by flat to undulating topography resulting from glaciation: plains composed of till, outwash, and lacustrine; drumlin fields and morainal ridges; and local occurrences of other features (kames, eskers, kettles, etc.). Natural land cover within this section is primarily oak savanna, with some areas of maple-basswood or bluestem prairie. Current land use is dominated by agriculture as well as urban development near Madison, Wisconsin (McNab and Avers 1994).

3.4.1.2 GENERAL WILDLIFE SPECIES

3.4.1.2.1 Mammals

Large mammals historically found in the sections spanned by the analysis area were the bison (*Bison bison*) and elk (*Cervus canadensis*), which occurred in large numbers. The whitetail deer

(*Odocoileus virginianus*) was common but apparently not numerous. The major predators were wolf (*Canis lupus*) and black bear (*Ursus americanus*). Smaller mammals included Franklin's ground squirrel (*Poliocitellus franklinii*), and many species adapted to a mixture of prairie, oak savanna, and forested conditions. Today the dominant large mammal is the whitetail deer, which has extended its range into all Sections of the Eastern Broadleaf Forest Province. The bison, elk, and wolf were extirpated by the early to mid-1800s. In Wisconsin, there are approximately 28,000 black bears, with a primary range in the northern part of the state (WDNR 2017a). Iowa does not report a breeding black bear population. Modern commonly observed small mammals include red fox (*Vulpes vulpes*), coyote (*Canis latrans*), raccoon (*Procyon lotor*), cottontail rabbit (*Sylvilagus floridanus*), and both red (*Sciurus vulgaris*) and gray squirrels (*Sciurus carolinensis*) (McNab and Avers 1994). These species are considered habitat generalists and may be present through the habitat types available within the analysis area.

3.4.1.2.2 Birds

There are 316 bird species native to Iowa and Wisconsin that may be present year-round, or as migrants. Ten are species considered "at risk" following NatureServe's Standards and Methods for assessment (Ridgely et al. 2003).

According to current Christmas Bird Count results from 2018, common resident bird species include Canada goose (*Branta canadensis*), house sparrow (*Passer domesticus*), European starling (*Sturnus vulgaris*), mallard (*Anas platyrhynchos*), dark-eyed junco (*Junco hyemalis*), rock pigeon (*Columba livia*), American crow (*Corvus brachyrhynchos*), American tree sparrow (*Spizella arborea*), black-capped chickadee (*Poecile atricapillus*), northern cardinal (*Cardinalis cardinalis*), blue jay (*Cyanocitta cristata*), mourning dove (*Zenaida macroura*), American goldfinch (*Spinus tristis*), wild turkey (*Meleagris gallopavo*), and white-breasted nuthatch (*Sitta carolinensis*) (National Audubon Society 2018).

The Migratory Bird Treaty Act (16 U.S.C. 703–712, 709 omitted) protects migratory birds, and EO 13186 was enacted to ensure that environmental evaluations of Federal actions take into account the effects of those actions on migratory birds. The U.S. Department of Interior, Office of the Solicitor recently found that MBTA prohibitions (e.g., pursuing, hunting, taking, capturing, or killing migratory birds, or attempting to do the same) applies "only to direct and affirmative purposeful actions that reduce migratory birds, their eggs, or their nests, by killing or capturing, to human control" (U.S. Department of Interior 2017).

The USFWS and its partner agencies manage for migratory birds based on specific migratory route paths (flyways) within North America (Atlantic, Mississippi, Central, and Pacific) (USFWS 2018d). Waterfowl and other migratory birds use these flyways to travel between nesting and wintering grounds. The study area is within the Mississippi Flyway, which includes Iowa and Wisconsin as well as 12 other states.

According to breeding bird survey results from 2014–2017, common waterfowl and other species dependent on wetland habitat within the analysis area include Canada geese, mallards, wood ducks (*Aix sponsa*), sandhill cranes (*Grus canadensis*), and red-winged blackbirds (*Agelaius phoeniceus*). Bird species common to the analysis area that are adapted to forested habitat include red-eyed vireo (*Vireo olivaceus*), indigo bunting (*Passerina cyanea*), northern cardinal, and the American robin (*Turdus migratorius*). Bird species common to the analysis that inhabit grassland habitat include dickcissel (*Spiza americana*), killdeer (*Charadrius vociferus*), eastern meadowlark (*Sturnella magna*), and the savannah sparrow (*Passerculus sandwichensis*). Introduced species such as the house sparrow and European starling are very common as well. Turkey vultures (*Cathartes aura*) and red-tailed hawks (*Buteo jamaicensis*) are also commonly observed (USGS 2018).

Bald Eagles

The bald eagle (*Haliaeetus leucocephalus*), which has been removed from protection under the ESA, remains protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act (16 U.S.C. 668–668c). Bald eagles feed opportunistically on fishes, injured waterfowl, various mammals and carrion (NatureServe 2011). The USFWS considers the availability of nest sites and food as the limiting factors for raptor population. In areas with limited nesting sites, adults breed only when an existing breeding territory becomes vacant. Bald eagles typically nest within approximately 2.5 miles of water bodies where fish and waterfowl are available for food (NatureServe 2011). In 1991, the total population was estimated at 70,000, with all but 10,000 in Alaska and western Canada (NatureServe 2011). At that time, there were approximately 3,000 nesting sites in the lower 48 states (NatureServe 2011). At the time the bald eagle was removed from the list of endangered and threatened species in 2007, the USFWS estimated approximately 9,800 breeding pairs in the lower 48 states.

The WDNR has been collecting eagle nest occupancy data since 1973. In 2018, 1,695 nests were occupied in the state. Fourteen active nests were documented in Dane County, 21 in Iowa County, 5 in Lafayette County, and 81 in Grant County. Bald eagle populations in the state have shown steady increase since 1973 and occupied nests increased more than 6% from 2017 (WDNR 2018d). Additionally, there are records of nesting bald eagles between the two proposed Mississippi River crossing alternatives within the Refuge.

3.4.1.2.3 Fish and Other Aquatic Species

Northeast Iowa and southwest Wisconsin supports a variety of habitat for a variety of fish and other aquatic species owing to its proximity to the Mississippi River. This habitat consists mostly of large and small river systems, though wetlands and open water habitat is available as well. Common fish species include the northern pike (*Esox lucius*), catfish, largemouth bass (*Micropterus salmoides*), walleye (*Sander vitreus*), carp and sucker (McNab and Avers 1994). Historically, there were 55 species of mussel known in the State of Iowa, though approximately half remain (Cedar Valley Resource, Conservation & Development, Inc. 2002). Similarly, over half of Wisconsin's 51 native mussel species are listed as species of greatest conservation need. Threats like habitat alteration (dams, siltation) and the presence of invasive mussels (zebra mussels) pose major threats to the native mussel populations (Wisconsin Aquatic and Terrestrial Resources Inventory 2018). Commonly observed species include the giant floater (*Pyganodon grandis*), mapleleaf (*Quadrula quadrula*), mucket (*Actinonaias ligamentina*), plain pocketbook (*Lampsilis cardium*), white heelsplitter (*Lasmigona complanata*), and threeridge (*Amblema plicata*) (Cedar Valley Resource, Conservation & Development, Inc. 2002).

3.4.1.2.4 Reptiles and Amphibians

There are 55 native species of reptile and amphibians in Wisconsin: 11 turtle species, 21 snake species, 4 lizard species, 12 frog species, and 7 salamander species (WDNR 2018e). Within Clayton and Dubuque Counties, Iowa, there are 8 turtle species, 13 snake species, 2 lizard species, 9 frog species, and 2 salamander species (Reptiles and Amphibians of Iowa 2018a, 2018b). Common turtle species, such as the snapping turtle (*Chelydra serpentine*), painted turtle (*Chrysemys picta*), and common map turtle (*Graptemys geographica*) use wetland and open water habitat. Snake species that are common to the analysis area use grassland, forested, wetland, and open water habitat. The amphibian species common to the analysis area use wetland and open water habitats, as well as adjacent uplands (Reptiles and Amphibians of Iowa 2018a, 2018b; WDNR 2018e).

3.4.1.2.5 Wildlife Specific to the Upper Mississippi River National Wildlife and Fish Refuge

The Refuge is home to unique habitat types which support a variety of wildlife species, including many of those described above. There are 51 mammal species known to occupy the Refuge, including many described above. Mammal species that are more common within the Refuge than the rest of the analysis are species typically dependent on wetland and open water habitat such as muskrat (*Ondatra zibethicus*), mink (*Neovison vison*), beaver (*Castor canadensis*), and river otters (*Lontra canadensis*) (USFWS 2006a).

Owing to its location in the heart of the Mississippi Flyway, many species of bird migrate through or occupy habitat within the Refuge. This includes species dependent on wetland and open water habitat such as the wood duck, mallard, blue-winged teal (*Anas discors*), American wigeon (*Anas americana*), gadwall (*Anas strepera*), northern pintail (*Anas acuta*), green-winged teal (*Anas carolinensis*), canvasback (*Aythya valisineria*), lesser scaup (*Aythya affinis*), common goldeneye (*Bucephala clangula*), ringed-necked duck (*Aythya collaris*), bufflehead (*Bucephala albeola*), ruddy duck (*Oxyrua jamaicensis*), merganser (*Mergus* sp.), belted kingfisher (*Megaceryle alcyon*), Canada goose, and Tundra swan (*Cygnus columbianus*) (USFWS 2006a).

Wetland and open water dependent colonial nesters common to the Refuge include black tern (*Chlidonia niger*), great blue herons (*Ardea herodias*), double-crested cormorants (*Phalacrocorax auritus*), great egrets (*Ardea alba*), and green herons (*Butorides virescens*) (USFWS 2006a).

Over 160 species of songbird have been documented within them Refuge. Species that rely on forested areas and grasslands that are commonly found nesting within the Refuge include the American robin, downy woodpecker (*Picoides pubescens*), great-crested flycatcher (*Myiarchus crinitus*), prothonotary warbler (*Protonotaria citrea*), tree swallow (*Tachycineta bicolor*), yellow-headed blackbird (*Xanthocephalus xanthocephalus*), northern cardinal, and the brown creeper (*Certhia americana*) (USFWS 2006a).

The Refuge also supports nesting pairs of red-shouldered hawks (*Buteo lineatus*) (common to forested areas) and osprey (*Pandion haliaetus*) (who nest near and hunt in the Mississippi River and other large bodies of water), among other raptors that migrate through (USFWS 2006a).

Eleven species of turtle occupy the Refuge, using habitats that range from quiet backwaters (e.g., Blanding’s [*Emydoidea blandingii*], painted, snapping, and common map turtles) to the faster-flowing waters of the larger channels (e.g., smooth and spiny softshells [*Apalone mutica* and *Apalone spinifera*], Ouachita and false map turtles [*Graptemys ouachitensis* and *Graptemys pseudogeographica*]). There are nine species of frog and one toad species known in the Refuge. Bullfrogs (*Lithobates catebeianus*), boreal chorus frogs (*Pseudacris maculata*), and spring peepers (*Pseudacris crucifer*) are commonly found in and near wetland and open water habitat (USFWS 2006a).

One-hundred nineteen fish species are known to use the Refuge. These include common sport fish such as walleye, sauger (*Stizostedion canadense*), white bass (*Morone chrysops*), large and smallmouth bass (*Micropterus dolomieu*), channel catfish (*Ictalurus punctatus*), northern pike, bluegill (*Lepomis macrochirus*), and crappies (*Pomoxis* sp.), as well as non-sport fish such as sturgeon (*Acipenser* sp.) and paddlefish (*Polyodon spathula*). There are 39 species of mussel considered present within the Refuge, with pink papershell (*Potamilus ohiensis*) and giant floater commonly observed species (USFWS 2006a).

3.4.1.3 SPECIAL STATUS SPECIES

The USFWS, IDNR, and WDNR each administer laws or rules that regulate certain actions with regard to designated species (i.e., special status species) that each agency has deemed in need of protection due to threats to their populations. The USFWS administers the ESA (16 U.S.C. 1531 et seq.), Bald and Golden Eagle Protection Act, and Migratory Bird Treaty Act. The IDNR administers Chapter 481B of the Code of Iowa, Endangered Plants and Wildlife Law. The WDNR administers State Statute 29.604, Endangered and Threatened Species Protected.

Each agency keeps records of occurrences of special status species within its jurisdictions and provides analyses of a given project or action and its potential to affect those species or overlap with those occurrences. The information for federally listed species was provided by USFWS through direct coordination with RUS. The IDNR publishes lists of state special status species that may be present within each county (IDNR resource evaluation area) and reviewed the analysis area for occurrence records. The WDNR reviewed all land within 2 miles of the analysis area (WDNR resource evaluation area).

Through the coordination described above with USFWS, IDNR (Moore 2017), and WDNR (WDNR 2018a), it was determined that 117 special status species have been: 1) previously documented, 2) are likely present, or 3) are not known to occur, but for which suitable habitat is present within the resource evaluation area as described for each agency (Table 3.4-1).

Table 3.4-1. Special Status Species Considered Potentially Present within C-HC Project Resource Evaluation Area as Determined through Coordination with USFWS, IDNR, and WDNR

Common Name	Scientific Name	Iowa DNR[1]	Wisconsin DNR[2]	USFWS[3]
Mammals				
Big brown bat	*Eptesicus fuscus*		T	
Eastern pipistrelle	*Perimyotis subflavus*		T	
Franklin's ground squirrel	*Poliocitellus franklinii*		SC	
Little brown bat	*Myotis lucifugus*		T	
Northern long-eared bat	*Myotis septentrionalis*		T	T
Prairie vole	*Microtus ochrogaster*		SC	
Southern flying squirrel	*Glaucomys volans*	SC		
Spotted skunk	*Spilogale putorius*	E		
Birds				
Acadian flycatcher	*Empidonax virescens*		T	
Bald eagle	*Haliaeetus leucocephalus*	SC		
Barn owl	*Tyto alba*	E		
Bell's vireo	*Vireo bellii*		T	
Cerulean warbler	*Setophaga cerulea*		T	
Henslow's sparrow	*Ammodramus henslowii*	T	T	
Hooded warbler	*Setophaga citrina*		T	
Kentucky warbler	*Geothlypis formosa*		T	
King rail	*Rallus elegans*	E		
Long-eared owl	*Asio otus*		SC	
Peregrine falcon	*Falco peregrinus*		E	
Prothonotary warbler	*Protonotaria citrea*		SC	

Common Name	Scientific Name	Iowa DNR[1]	Wisconsin DNR[2]	USFWS[3]
Red-shouldered hawk	*Buteo lineatus*	E	T	
Upland sandpiper	*Bartramia longicauda*		T	
Western meadowlark	*Sturnella neglecta*		SC	
Whooping crane	*Grus americanus*			E-NEP
Yellow-breasted chat	*Icteria virens*		SC	
Yellow-throated warbler	*Setophaga dominica*		E	
Amphibians				
Blanchard's cricket frog	*Acris blanchardi*		E	
Mudpuppy	*Necturus maculosus*	T		
Pickerel frog	*Lithobates palustris*		SC	
Reptiles				
Blanding's turtle	*Emydoidea blandingii*	T	SC	
Bullsnake	*Pituophis catenifer sayi*	SC	SC	
Common musk turtle	*Sternotherus odoratus*	T		
Gray ratsnake	*Pantherophis spiloides*		SC	
Lined snake	*Tropidoclonion lineatum*		SC	
North American racer	*Coluber constrictor*		SC	
Ornate box turtle	*Terrapene ornata*	T	E	
Prairie ring-necked snake	*Diadophis punctatus arnyi*		SC	
Timber rattlesnake	*Crotalus horridus*		SC	
Western wormsnake	*Carphophis vermis*		SC	
Fish				
American brook lamprey	*Lampetra appendix*	T		
Black buffalo	*Ictiobus niger*		T	
Black redhorse	*Moxostoma duquesnei*	T		
Blue sucker	*Cycleptus elongatus*		T	
Bluntnose darter	*Etheostoma chlorosoma*	E	E	
Burbot	*Lota lota*	T		
Chestnut lamprey	*Ichthyomyzon castaneus*	T		
Crystal darter	*Crystallaria asprella*		E	
Goldeye	*Hiodon alosoides*		E	
Grass pickerel	*Esox americanus*	T		
Lake chubsucker	*Erimyzon sucetta*		SC	
Lake sturgeon	*Acipenser fulvescens*	E		
Least darter	*Etheostoma microperca*	E		
Mud darter	*Etheostoma asprigene*		SC	
Ozark minnow	*Notropis nubilus*		T	
Paddlefish	*Polyodon spathula*		T	
Pallid shiner	*Hybopsis amnis*		E	
Pugnose minnow	*Opsopoeodus emiliae*	SC		
River redhorse	*Moxostoma carinatum*		T	
Shoal chub	*Macrhybopsis hyostoma*		T	
Weed shiner	*Notropis texanus*	E		
Western sand darter	*Ammocrypta clara*	T		

Common Name	Scientific Name	Iowa DNR[1]	Wisconsin DNR[2]	USFWS[3]
Mussels				
Butterfly	*Ellipsaria lineolata*	T	E	
Creek heelsplitter	*Lasmigona compressa*	T		
Creeper	*Strophitus undulatus*	T		
Cylindrical papershell	*Anodontoides ferussacianus*	T		
Ellipse	*Venustaconcha ellipsiformis*	T	T	
Fawnsfoot	*Truncilla donaciformis*		T	
Higgins eye pearly mussel	*Lampsilis higginsii*	E	E	E
Mapleleaf	*Quadrula quadrula*		SC	
Monkeyface	*Quadrula metanevra*		T	
Pistolgrip	*Tritogonia verrucosa*	E		
Purple wartyback	*Cyclonaias tuberculata*	T		
Rock pocketbook	*Arcidens confragosus*		T	
Round pigtoe	*Pleurobema sintoxia*	E		
Sheepnose	*Plethobasus cyphyus*	E		E
Slippershell mussel	*Alasmidonta viridis*	E		
Spectacle case mussel	*Cumberlandia monodonta*			E
Wartyback	*Quadrula nodulata*		T	
Washboard	*Megalonaias nervosa*		SC	
Yellow and slough sandshell	*Lampsilis teres*	E	E	
Insects				
A leafhopper	*Attenuipyga vanduzeei*		E	
A leafhopper	*Kansendria kansiensis*		SC	
A leafhopper	*Laevicephalus vannus*		SC	
A planthopper	*Myndus ovatus*		SC	
Abbreviated underwing moth	*Catocala abbreviatella*		SC	
A riffle beetle	*Stenelmis musgravei*		SC	
A water scavenger beetle	*Cymbiodyta toddi*		SC	
An issid planthopper	*Fitchiella robertsonii*		T	
Brilliant granule	*Guppya sterkii*		SC	
Byssus skipper	*Problema byssus*		SC	
Columbine dusky wing	*Erynnis lucilius*	SC	SC	
Gorgone checker spot	*Chlosyne gorgone*		SC	
Gray copper	*Lycaena dione*		SC	
Hine's emerald dragon fly	*Somatochlora hineana*			E
Leadplant flower moth	*Schinia lucens*		SC	
Leonard's skipper	*Hesperia leonardus*	SC		
Ottoe skipper	*Hesperia ottoe*		E	
Red-tailed prairie leafhopper	*Aflexia rubranura*		E	
Regal fritillary	*Speyeria idalia*		E	
Royal river cruiser	*Macromia taeniolata*		SC	
Rusty patched bumble bee	*Bombus affinis*		SC	E
Silphium borer moth	*Papaipema silphii*		E	
Smooth coil	*Helicodiscus singleyanus*		SC	

Common Name	Scientific Name	Iowa DNR[1]	Wisconsin DNR[2]	USFWS[3]
Springwater dancer	*Argia plana*		SC	
Trumpet vallonia	*Vallonia parvula*		SC	
Velvet-striped grasshopper	*Eritettix simplex*		SC	
Whitney's underwing moth	*Catocala whitneyi*		SC	
Wild indigo dusky wing	*Erynnis baptisiae*	SC		
Snails				
Bluff vertigo	*Vertigo meramecensis*	E		
Briarton Pleistocene vertigo	*Vertigo brierensis*	E		
Frigid ambersnail	*Catinella gelida*	E		
Hubricht's vertigo	*Vertigo hubrichti*	T		
Iowa Pleistocene snail	*Discus macclintocki*	E		E
Iowa Pleistocene vertigo	*Vertigo iowaensis*	E		
Midwest Pleistocene vertigo	*Vertigo hubrichti hubrichti*	T		
Variable Pleistocene vertigo	*Vertigo hubrichti variabilis*	T		
Wing snaggletooth	*Gastrocopta procera*		T	

Note: E: Endangered, E-NEP: Endangered, nonessential experimental population T: Threatened; SC: Species of Concern

[1] Species considered potentially present in Clayton and Dubuque Counties, Iowa. IDNR Natural Areas Inventory database review conducted on May 23, 2018.

[2] Wisconsin State-listed species that may be present within the resource evaluation area (WDNR 2018b).

[3] Federally listed species that may be present within the resource evaluation area (RUS 2018).

3.4.1.3.1 Federally Listed Species and Critical Habitat

RUS, in consultation with the USFWS, identified eight wildlife species that are federally listed as threatened or endangered that may occur in the analysis area: whooping crane (*Grus americanus*), Higgins eye pearly mussel (*Lampsilis higginsii*), sheepnose mussel (*Plethobasus cyphyus*), spectacle case mussel (*Cumberlandia monodonta*), Hine's emerald dragonfly (*Somatochlora hineana*), Iowa Pleistocene snail (*Discus macclintocki*), northern long-eared bat (*Myotis septentrionalis*), and rusty patched bumble bee (*Bombus affinis*) (see Table 3.4-1). No designated critical habitat is found within the study area. RUS prepared a BA addressing federally endangered, threatened, and candidate species (RUS 2018) and USFWS prepared a BO based on their review of the C-HC Project (USFWS 2019a). The BO can be found in the FEIS Appendix G.

Whooping Crane

The whooping crane, North America's tallest bird species, is typically found in wetland habitats such as coastal marshes, estuaries, inland marshes, lakes, ponds, wet meadows, rivers, and agricultural fields (Whooping Crane Eastern Partnership [WCEP] 2018). The species migrates from the southern United States to nesting grounds between March and May and begin migration back to their wintering grounds in September (WCEP 2018). During migration they use stopover habitat along their migration corridor, usually completing migration in 2 to 4 weeks. There are an estimated 383 individuals, with a single remaining self-sustaining wild population: the Aransas-Wood Buffalo National Park population which winters in coastal marshes in Texas and nests in Wood Buffalo National Park in Canada. Attempts to reintroduce a migratory population of whooping cranes in the eastern United States began in 2000, and a final rule establishing the population as a Nonessential Experimental Population was published in the *Federal Register* on June 26, 2001 (USFWS 2001). The WCEP estimated the population size as of May 1, 2018, to be 102 individuals: 47 female, 52 male, and 3 unknown (WCEP 2018). Whooping cranes have been confirmed in 2018 in northeast Iowa, western Wisconsin, and central Wisconsin using wetland stopover habitat (WCEP 2018). However, during coordination with USFWS, it was determined that whooping cranes using land within the analysis area or near the Refuge is uncommon and impacts to the species are not anticipated.

Federally Listed Mussel Species

The three endangered mussel species (Higgins eye pearly mussel, sheepnose mussel, and spectacle case mussel) are found in large rivers with clear water and substrates that vary from mud to sand and gravel. Their microhabitat ranges from areas sheltered from the currents to deep, free-flowing runs. Fertilized females store developing larvae (glochidia) until they are mature enough to release. Upon release, larva attach to the gills of host fish for further development. Juvenile mussels then detach from their host fish and settle in the river substrate. Host fish include the sauger, walleye, yellow perch (*Perca flavescens*), largemouth bass, smallmouth bass, and freshwater drum (*Aplodinotus grunniens*) (USFWS 2012a, 2012b, 2012c).

Hine's Emerald Dragonfly

Suitable habitat for the Hine's emerald dragonfly consists of wetlands such as calcareous, spring-fed marshes and sedge meadows overlaying dolomite bedrock (USFWS 2006b). Hine's emerald dragonflies exist in the nymph stage for 2 to 4 years, during which time they subsist on smaller insects. Nymphs shed their skin several times before crawling out of the water for a final time. Adults live for 4 to 5 weeks. Males defend small breeding territories and mate with females who enter those territories (USFWS 2006b).

Iowa Pleistocene Snail

The Iowa Pleistocene snail is a relic of the last glaciation event of North America during the Pleistocene. Currently, the Iowa Pleistocene snail is known to occur at approximately 30 sites in the Driftless Area of Iowa (described in Sections 3.2.1.4 and 3.4.1.1) and Illinois along the Mississippi River and its tributaries. The Iowa Pleistocene snail is found in leaflitter and is dependent on algific talus slopes (described in Sections 3.2.1.4 and 3.4.1.1) that create a cool and humid microclimate for the snail similar to climatic conditions during the Pleistocene. Algific talus slopes occur along limestone bluffs with steep north- or east-facing slopes covered in fractured rock, rubble, and leaflitter. Ice that is trapped within limestone caves and cavities of the bluff and bedrock emits cold moist air from cracks and fissures into fractured rock and rubble, creating a microclimate suitable for the Iowa Pleistocene snail. Iowa Pleistocene snails are typically active from late March to October or until the first hard freeze in fall. Iowa Pleistocene snails are typically less active in August, likely due to increased temperatures and dryer conditions. Observed breeding in the wild occurs from late March or April to August. The Iowa Pleistocene snail is not self-fertilizing, but hermaphroditic with both adults laying eggs and fertilizing each other (Pilsbry 1948). Clutch size varies from two to six, with three being typical. Eggs are laid in moist areas in rock crevices, under logs and bark, and in soil just below ground surface. Hatching occurs approximately 28 days after the eggs are laid (USFWS 1984).

The USFWS provided the locations of four algific talus slopes within the resource evaluation area: one along each route of Segments B-IA1 and B-IA2 (same talus slope for both segments), one along Segment C-IA, and two that are between Segments A-IA and D-IA along Bluebell Creek. These locations were ground-truthed during field survey in 2017, and it was determined that they did not provide suitable Iowa Pleistocene snail habitat (RUS 2018).

Northern Long-Eared Bat

The northern long-eared bat uses a wide variety of forested habitats for roosting, foraging and traveling, and may also use some adjacent and interspersed non-forested habitat such as emergent wetlands and edges of fields over grassland and agricultural land. This species has also been found roosting in human-made structures like barns and sheds (particularly when suitable tree roosts are unavailable). Roosting habitat includes forested areas with live trees and/or snags with a diameter at breast height of at least 3 inches with exfoliating bark, cracks, crevices, and/or other cavities. Trees are considered suitable if they meet those requirements and are within 1,000 feet of the nearest suitable roost tree, woodlot, or wooded fencerow (USFWS 2014). Suitable summer habitat includes roosting habitat, as well as foraging and travel habitat such as adjacent edges of agricultural fields, old fields, pastures, fencerows, riparian forests, and other wooded corridors. Maternity habitat is any portion of suitable summer habitat that is used by juveniles and reproductive females. The summer maternity season in Wisconsin and Iowa is April 1 through September 30 (USFWS 2014). Winter habitat includes underground caves and cave-like structures such as abandoned or active mines and railroad tunnels. These hibernacula typically have high humidity, minimal air current, large passages with cracks and crevices for roosting, and maintain a relatively cool temperature (32 degrees Fahrenheit [°F] to 48°F) (USFWS 2014). It is common for this species to overwinter in sites with other *Myotis* species. No maternity roosts or hibernacula are known to occur within a 0.25-mile radius of the action area.

Rusty Patched Bumble Bee

The rusty patched bumble bee is a generalist forager and is found in a variety of habitats, including prairies, woodlands, wetlands, agricultural landscapes, and residential parks and gardens (Szymanski et al. 2016). The species is one of the first bumble bees to emerge in the spring and is the last to go into hibernation in the fall, generally active from April through September. Due to their long-life cycle, the rusty patched bumble bee requires habitat that supports diverse and abundant flowering plants throughout the bee's active period (mid-March through mid-October), undisturbed nesting sites near food resources, and overwintering sites for hibernating queens near early spring floral resources. Rusty patched bumble bee colony nests are typically within abandoned rodent dens or other small cavities one to four feet below ground in open areas or near open areas that are not heavily forested or wet. The rusty patched bumble bee will overwinter in loose soil and/or leaf litter a few centimeters below ground. Overwintering habitat includes woodlands or woodland edges that contain spring blooming herbaceous plants, shrubs, and trees (Szymanski et al. 2016; USFWS 2018e). The rusty patched bumble bee forms annual colonies comprised of a single queen, female workers, and males. In the early spring, the solitary queen is responsible for establishing the colony and must find a suitable nest site near ample food resources. She then collects pollen and nectar to support production of her eggs, which are fertilized by sperm stored since mating the previous fall before hibernation (Szymanski et al. 2016). The WDNR has determined that the rusty patched bumble bee has been recorded within 1 mile of the project (WDNR 2018b).

The USFWS has developed a habitat connectivity model for the rusty patched bumble bee based on land cover mapping, which is intended to assess the likelihood of bumble bee movement away from locations of known records (USFWS 2019c). This model was used to develop three types of geographic zones within the historic range of the species that correspond with the likelihood of rusty patched bumble bee presence:

> *High Potential Zones* – centered around records of species occurrence from 2007 to present, the species is considered likely present
>
> *Primary Dispersal Zones or Low Potential Zones* – these areas surround High Potential Zones and encompass the maximum dispersal potential of the species around records from 2007 to present.

Uncertain Zones – Zones modeled around occurrence records dating between 2000 and 2006. It is unknown whether the species has been extirpated from these areas or not.

The analysis area crosses multiple High Potential Zones and Low Potential Zones (Figure 3.4-1).

The USFWS also defines suitable habitat as follows:

- *High quality, suitable habitat* – open, vegetated areas with high floral diversity and abundance including prairies, meadows, roadsides, and wetlands with uncompacted soft soils, compost/leaf litter, and rodent burrows within or nearby for nesting and overwintering
- *Low quality, suitable habitat* – similar to high quality habitat, but dominated by grasses or sedges with a low diversity and/or low abundance of flowering plants
- *Poor quality, unsuitable habitat* – areas without a diversity and/or abundance of flowering plants and with compacted soils; such areas include paved areas, open water, permanently flooded areas, mowed lawns, monoculture crop fields, woodlands with invasive shrubs dominant and spring ephemerals absent, and areas mowed too frequently to allow for development of diverse flowering plants (e.g., roadsides)
- *Questionable habitat* – areas that are not clearly determined to be poor quality habitat

Field surveys determined that potential high-quality rusty patched bumble bee foraging, nesting, and overwintering habitat may be present within portions of the High Potential Zone that intersect portions of the C-HC Project alternatives. Overall, the High Potential Zone areas that are intersected by the C-HC Project can be described as containing a small amount of high-quality foraging and nesting habitat, and a mix of low-quality, poor-quality (unsuitable), or questionable rusty patched bumble bee foraging, nesting, or overwintering habitat (RUS 2018; USFWS 2019a).

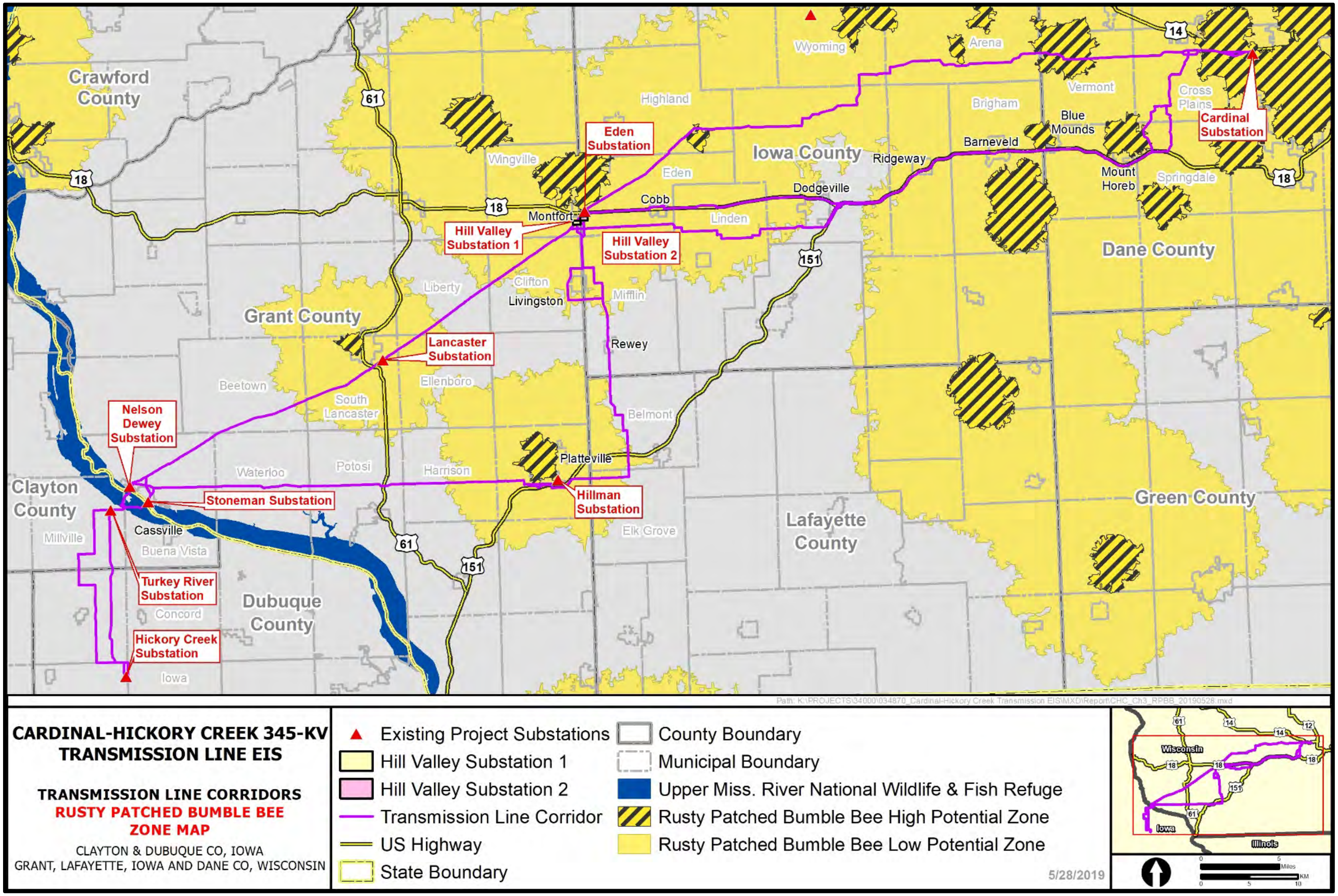

Figure 3.4-1. Rusty patched bumble bee habitat potential zones.

State-Listed Species

The IDNR considers 20 state endangered species and 20 state threatened species to be potentially present in Clayton and Dubuque Counties (see Table 3.4-1). The IDNR reviewed the proposed C-HC Project for its potential to impact state threatened and endangered species. They determined that no site-specific records that would be impacted by the proposed Project (Moore 2017).

The WDNR conducted an Endangered Resources review within the project area and a surrounding 2-mile buffer. The WDNR identified records of 16 state endangered species and 24 state threatened species within 2 miles of the Aquatic and Terrestrial project area (WDNR 2018b).

Mammals

The WDNR has determined that the state endangered northern long-eared bat is known to occur within 1 mile of the project area. Additionally, three threatened species are known to occur within 1 mile of the project—big brown bat (*Eptesicus fuscus*), little brown bat (*Myotis lucifugus*), and eastern pipistrelle (*Pipistrellus subflavus*). These bat species hibernate in caves, mines, and human-made structures during the winter. During the summer they forage in and near forested areas, over water, and other riparian habitat. They roost in trees and human-made structures singly or in colonies (WDNR 2018b).

Birds

The WDNR has determined that two state endangered bird species—peregrine falcon (*Falco peregrinus*) and yellow-throated warbler (*Setophaga dominica*)—and eight threatened bird species—Acadian flycatcher (*Empidonax virescens*), Bell's vireo (*Vireo bellii*), cerulean warbler (*Setophaga cerulean*), Henslow's sparrow (*Ammodramus henslowii*), hooded warbler (*Setophaga citrina*), Kentucky warbler (*Geothlypis formosa*), upland sandpiper (*Bartramia longicauda*), and red-shouldered hawk—have been recorded within 1 mile of the project. These species occupy forested habitat, scrub/shrub, and open grasslands (WDNR 2018b).

Reptiles and Amphibians

The WDNR has determined that the state endangered Blanchard's cricket frog (*Acris blanchardi*) and ornate box turtle (*Terrapene ornata*) have been recorded within 2 miles of the project. Blanchard's cricket frogs occupy a variety of aquatic and wetland habitat, though tend to breed in areas with limited or no flow. Suitable habitat for the ornate box turtle includes grasslands and forested areas, such as dry-mesic prairies, sand prairies, oak savannas with sandy soils, and open to semi-open woodlands (WDNR 2018b).

Fish and Other Aquatic Species

The WDNR has determined that four state endangered fish species—bluntnose darter (*Etheostoma chlorosoma*), crystal darter (*Crystallaria asprella*), goldeye (*Hiodon alosoides*), and pallid shiner (*Hybopsis amnis*)—and six state threatened species—black buffalo (*Ictiobus niger*), blue sucker (*Cycleptus elongates*), Ozark minnow (*Notropis nubilus*), paddlefish, river redhorse (*Moxostoma carinatum*), and shoal chub (*Macrhybopsis hyostoma*)—have been recorded within 2 miles of the project. The WDNR has determined that three state endangered mussel species—butterfly (*Ellipsaria lineolate*) and Higgins eye, and yellow and slough sandshell (*Lampsilis teres anodontoides* and *Lampsilis teres teres*)—and five state threatened mussel species—ellipse (*Venustaconcha ellipsiformis*), fawnsfoot (*Truncilla donaciformis*), monkeyface (*Quadrula metanevra*), rock pocketbook (*Arcidens confragosus*), and wartyback (*Quadrula nodulata*)—have been recorded within 2 miles of the project. These species can be found in a variety of stream types and differing micro-habitats within perennial waters (WDNR 2018b).

Insects

The WDNR has determined that five state endangered insects—a leafhopper (*Attenuipyga vanduzeei*), Ottoe skipper (*Hesperia ottoe*), red-tailed prairie leafhopper (*Aflexia rubranura*), regal fritillary (*Speyeria idalia*), and silphium borer moth (*Papaipema silphii*)—and one state threatened species (an Issid planthopper [*Fitchiella robertsonii*]) have been recorded within 1 mile of the project. These insects occupy grassland and wetland habitat where their host plants are present (WDNR 2018b).

3.4.2 *Environmental Consequences*

This section describes impacts to wildlife, including special status species, associated with the construction, operation, and maintenance of the C-HC Project. Impacts to wildlife and special status species are discussed in terms of impacts to species and their habitat(s).

3.4.2.1 DATA SOURCES, METHODS, AND ANALYSIS ASSUMPTIONS

The following impact indicators were considered when analyzing potential impacts to wildlife, including special status species:

Acres of habitat, including federally designated critical habitat, to be modified/removed by construction and maintenance activities. A total of 933,413 acres of grassland, 730,834 acres of forest, 98,690 acres of wetlands, and 61,432 acres of open water exist within the six counties crossed by the C-HC project.

For non-listed species, a qualitative description of potential direct and indirect impacts to individuals.

For federally and state-listed species, a qualitative description of potential direct and indirect impacts to populations will be written and the appropriate “effect determination” language will be incorporated to help inform the Federal and state agencies that will be consulted on the C-HC Project.

In 2017, the Utilities completed habitat assessments for some species within accessible portions of the analysis area, though no species-specific presence/probable absence surveys have been completed. This analysis includes those field-collected data, while the remaining portions of the analysis area were assessed through review of aerial imagery; review of project-specific land cover mapping developed through the combination of NLCD (USGS 2011), state-level land cover datasets provided by IDNR (2017) and WDNR (2016d); and coordination with USFWS, IDNR, and WDNR for their potential to be occupied by the wildlife species above. Impacts were analyzed through both the potential for direct effects during construction of the project, and indirect effects that can result from operation and habitat modification resulting from construction of the project, as categorized below. Finally, the analyses conducted for the RUS BA are included here.

Impacts will be classified by their assessed severity relative to their severity and duration (Table 3.4-2). Temporary impacts are those that are expected to occur during construction and specific to construction activities. Permanent impacts are those impacts that are expected to result from maintenance and operation of the project once construction is complete.

Table 3.4-2. Impact Thresholds and Descriptions for Wildlife, including Special Status Species

	Minor Impact	Moderate Impact	Major Impact
Wildlife, including Special Status Species	Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, but discountable and would not measurably alter natural conditions. Infrequent responses to disturbances by some individuals could be expected, but without interference to feeding, breeding, sheltering, or other factors affecting population levels. Small changes to local population numbers, population structure, and other demographic factors could occur. Sufficient habitat would remain functional at both the local and range-wide scales to maintain the viability of the species.	Impacts on native species, their habitats, or the natural processes sustaining them would be detectable and/or measurable. Occasional responses to disturbance by some individuals could be expected, with some negative impacts to feeding, reproduction, resting, migrating, or other factors affecting local population levels. Sufficient population numbers or habitat would retain function to maintain the viability of the species both locally and throughout its range.	Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, and would be extensive. Frequent responses to disturbances by some individuals would be expected, with negative impacts to feeding, reproduction, or other factors resulting in a decrease in both local and range-wide population levels and habitat type. Impacts would occur during critical periods of reproduction and would result in mortality of individuals or loss of habitat that might affect the viability of a species. Local population numbers, population structure, and other demographic factors might experience large changes or declines.

3.4.2.2 NO ACTION

Under the No Action Alternative, the proposed project would not be built, and there would be no impacts to wildlife, including special status species.

3.4.2.3 IMPACTS COMMON TO ALL ACTION ALTERNATIVES

All of the alternatives cross a variety of terrain, vegetative communities, and habitat types used by the wildlife species described above. Construction and maintenance of any chosen alternative would result in long-term adverse impacts to habitat.

Potential construction-related impacts from the C-HC Project common to all wildlife groups would include the loss, degradation, and/or fragmentation of breeding, rearing, foraging, and dispersal habitats; collisions with and crushing by construction vehicles; loss of burrowing animals and burrows in areas where grading would occur; increased invasive species establishment and spread; and increased noise/vibration levels. These construction-related impacts would be moderate and short-term.

Portions of the ROW would be converted from one vegetation community, such as forested, to a different vegetation community, grassland. Long-term moderate impacts associated with clearing the ROW would include habitat loss, fragmentation, and degradation along with changes to species movement. Fragmentation could result in a shift in species composition, especially in continuous blocks forest habitat, where forest-obligate species are likely to occur. Habitat generalists use a range of habitat types and therefore would be less impacted by habitat fragmentation; however species that have poor dispersal abilities are area-sensitive and these species or forest-interior species can be intolerant of disturbance associated with clearing the ROW in forested areas. The shift in species composition can be a concern where rare, unique, or specialized species exist because they are more likely to be adversely impacted from fragmentation (Brittingham 2018). The transmission line would serve as a movement corridor for some species and as a barrier for others. Although some wildlife species would be temporarily displaced during construction of the transmission line, permanent displacement of these species is not anticipated, except potentially in cleared forest areas that may provide habitat for forest-obligate species and in areas of permanent conversion to substations. Forest habitat would be available in other areas near or adjacent to the ROW, and any loss of woodland would be minimal, with adjacent woodland areas still available along the route for refuge during construction and as habitat during project operation.

Noise and vibration associated with construction activities would change habitat use patterns for some species. Some individuals would move away from the source(s) of the noise/vibration to adjacent or nearby habitats, which may increase competition for resources within these areas. Noise/vibration and other disturbances may also lead to increased stress on individuals, which could decrease their overall fitness due to increased metabolic expenditures. These effects would be temporary and moderate, and the impacts would cease with the completion of construction activities.

Potential impacts from maintenance activities would be similar in nature to those previously discussed above for construction activities. However, the scope of maintenance impacts would be lower in magnitude than those for construction as there would be less equipment and fewer people working. Maintenance impacts would be temporary and would occur sporadically over the life of the C-HC Project. After construction, a mid-year cycle application of herbicide will be conducted in 2 to 3 years. Thereafter, the vegetation management cycle will occur every 5 years.

The following subsections describe typical impacts to animal groups, including state-listed species.

Mammals

Potential impacts on mammals from the proposed C-HC Project would include those described above as common to all species. Small mammals that shelter underground would be susceptible to being crushed by construction equipment. Mammals that forage or hunt in edge habitat would see beneficial effects upon completion of construction. Overall, potential impacts on mammals common to the analysis area would be long term and minor for most mammal species.

The state-listed mammals with potential to occur within the analysis area are all bat species. Direct long-term impacts could occur if occupied roosts are felled. Indirect moderate impacts could result from permanent modification of suitable roosting and foraging habitat. Modification to foraging habitat could result in changes to insect prey abundance and variety, degrading its quality. However, creation of a permanent ROW could result in a net gain in edge habitat suitable for foraging.

Birds

Potential impacts on bird species from the proposed C-HC Project would include those described above as common to all species. Additional impacts to bird species outside the ROW would occur and would include disturbance from noise as well as changes to habitat use. Noise-related construction activities could affect nesting, roosting, and foraging activities. Changes to behavior could include increased alertness, turning toward the disturbance, fleeing the disturbance, changes in activity patterns, and nest abandonment. Raptors would be especially susceptible to noise disturbance early in the breeding season, when it can cause nest abandonment and failure.

The presence of transmission structures would provide perches as well as nesting habitat for some species. This would allow some species to use areas that would otherwise be unsuitable. The increased amount of edge habitat created by the proposed C-HC Project would allow for an increase in species that use edge habitats. This would change the species composition of the ROW area and impact species that use larger blocks of habitat as they would be subject to increased predation. Other species that use edge habitats or have more general habitat requirements would benefit from the increased amount of edge habitat.

Habitat loss may occur for forest-dwelling bird species, causing temporary displacement of local populations during construction. When construction is completed, grassland species would be expected to return to the area as grassland is restored and disturbances specific to construction are eliminated. Forest-dwelling species would likely move into neighboring forested areas adjacent to the ROW during construction and operation of the transmission line. Species dependent on forested habitat would experience a permanent loss of habitat within the ROW. Forest fragmentation occurs when linear corridors are cleared through large contiguous tracts of woodland habitat. Woodland species, particularly interior woodland nesting birds, may experience a loss of habitat or decreased nesting success in these edge areas because they may result in altered vegetation characteristics, availability of preferred food sources, increased nest competition, nest parasitism, or predation.

Operation of the proposed project would present the potential for avian collisions with the transmission line, particularly for larger species and in areas of dense bird congregations, such as migrating waterfowl corridors in the Mississippi Flyway (Avian Power Line Interaction Committee [APLIC] 2012). Under high wind, fog, or poor light conditions, avian collisions with the transmission line may occur. Migratory waterfowl would be especially susceptible to transmission line collisions where the proposed transmission lines are near migration staging areas and natural flight corridors such as the Mississippi River. Collocating with existing transmission line creates only an incremental elevation in existing collision risk, whereas construction of a new and separate ROW creates a new collision risk on the landscape. Environmental commitments outlined in Table 3.1-4 would further help to minimize impacts to avian species from collisions.

Electrocutions of large avian species, particularly raptors, have been known to occur from contact with energized lines. Electrocutions are primarily due to the close vertical or horizontal separation of conductors and other equipment often found in distribution lines (APLIC 2012). Design standards for this Project would meet avian-safe guidelines as outlined by APLIC and the Utilities would develop a project-specific Avian Protection Plan, thereby minimizing potential avian electrocution risk. Electrocution impacts from operation of the line would be permanent, though minor, as a result of implementation of the APLIC guidelines. The project-specific Avian Protection Plan would include also an eagle management plan to ensure that impacts to eagles were minimized. Eagle nest surveys would also be conducted prior to construction activities, and the Utilities would coordinate with the appropriate agencies to minimize the impacts to nearby nesting eagles. Furthermore, environmental commitments outlined in Table 3.1-4 would further help to minimize impacts to large avian species from electrocutions.

Fish and Other Aquatic Species

All aquatic sites would be spanned, and construction equipment would be kept out of flowing stream channels and active drainages to the extent possible to avoid directly impacting fish and other aquatic species' habitat. No operational or maintenance impacts on fish species are anticipated. Increases in soil erosion from ground-disturbing activities would be avoided through the development and implementation of a SWPPP. A spill prevention plan would be developed that would limit the potential for construction equipment to leak any hazardous materials that could impact water quality. Areas of ground disturbance would be restored to the extent possible upon completion of construction activities. If restoration activities were successful potential erosion would be minimized. However, if restoration activities were not successful erosion could continue to impact water quality for fish species throughout the operation and maintenance of the transmission line.

Nearby waterways could be used to obtain water to fill foundation excavation sites and for other construction purposes. Water could also be hauled from a municipal source or other water body outside the project area. Standard practice is to notify the WDNR or IDNR of water withdrawal from water bodies for construction activities. Withdrawal activities would be scheduled to avoid spawning seasons, if possible. Utilities would coordinate water withdrawal activities with the IDNR and WDNR; therefore, impacts to state-listed fish and other aquatic species or their habitat are considered minor and temporary.

Reptiles and Amphibians

Potential impacts on reptile and amphibian species from the proposed C-HC Project would include those described above as common to all species. Amphibian species would also be affected by any changes to water quality. Potential construction impacts on amphibian species would be short term and minor. No operational or maintenance impacts on amphibians are anticipated. Increases in erosion from ground-disturbing activities would be avoided through the development and implementation of a SWPPP. A spill prevention plan would be developed that would limit the potential for construction equipment to leak any hazardous materials that could impact water quality. Areas of ground disturbance would be restored to the extent possible upon completion of construction activities. If restoration activities are successful, potential erosion would be minimized. However, if restoration activities are not successful, erosion could continue throughout the life of the transmission line operation and maintenance, which may contribute to long-term impacts to water quality for amphibian species. Reptile and amphibian species that shelter underground would be susceptible to being crushed by construction equipment. Construction-related materials or debris may attract reptile predators such as raptor species. The presence of the transmission line and poles could provide perching and nesting habitat for reptile predators such as raptors. Potential construction impacts on reptiles would be long term and moderate. Impacts from the operation and maintenance of the proposed C-HC Project on reptiles would be long term and minor.

The state-listed reptiles and amphibians with potential to occur within the analysis area use a variety of habitat types. Direct impacts could occur if these habitats remain occupied during construction. Indirect impacts include permanent modification of suitable habitat, such as forested habitat removal, and degradation of suitable habitat through ongoing maintenance activities, including herbicide application.

Insects

Insects, including the state-listed insects with potential to occur within the analysis area, use a variety of habitat types and rely on several different host plants. Direct impacts could occur during construction if individuals remain within construction areas during active construction. Indirect impacts could result from construction through the removal of host plants and modification of suitable habitat. Indirect impacts could result from ongoing maintenance activities if activities such as mowing or herbicide application prevent a given species’ host plant from regrowth within the maintained ROW. Therefore, impacts to insects or their habitat are considered moderate and long term.

Pollinating insects including beetles, flies, wasps, ants, bees, butterflies, and others can benefit from cleared ROWs, as reestablished vegetation communities can serve as functional pollinator habitats. Maintenance activities continually reset habitats within the ROW to earlier seral or successional stages, which increases the physical structure and creates edge habitat. This promotes growth and reproduction of understory plants, many of which are flowering species. Field studies have shown that pollinator species diversity in these habitats is much higher than expected and habitats support many species of butterflies, moths, bees, and flies (Wojcik and Buchmann 2012). One study of native bees showed more diverse and more abundant communities of native bees within power line ROWs (Russell et al. 2005 as cited in Wojcik and Buchmann 2012). Potential long-term beneficial impacts to pollinator habitats could result from ROW clearing and maintenance activities.

Electric and magnetic fields associated with high-voltage power lines are suspected to affect honey bees. Several studies suggest that honey bees located underneath high-voltage electrical wires show elevated levels of aggression and have lower productivity (Wojcik and Buchmann 2012). Additionally, a study conducted by Shepherd et al. (2018) showed that transient exposure of honey bees to electric and magnetic fields at strengths found near high-voltage power lines resulted in reduced motor, cognitive, and feeding behaviors. However, these studies were done with captured bees in laboratory settings and similar data are not available for native bees (Shepherd et al. 2018; Wojcik and Buchmann 2012), but the evidence strongly indicates that exposure of honey bees to electric and magnetic fields could lead to colony level stress and lower productivity at the colony level. Therefore, impacts to honey bees from electric and magnetic fields is considered moderate and long-term.

3.4.2.3.1 Special Status Species

Federally Listed Species

Whooping Crane

Individuals from the eastern non-essential experimental population of whooping cranes can experience direct impacts through collision with transmission lines or structures during their migration. Wetland stopover habitat suitability may be modified by construction or degraded during construction. However, during coordination with the USFWS, it was determined that the project would have no effect to whooping cranes.

Federally Listed Mussel Species

There would be no C-HC Project construction within the ordinary high-water mark (OHWM) of streams or rivers, where the three federally listed mussel species occur. However, construction of structures or grading required for ancillary features near streams may result in siltation. Erosion control BMPs would be implemented to avoid indirect effects to all waterways. As such, there are no anticipated impacts to federally listed mussel species or their habitat. During coordination with the USFWS, it was determined that the project would have no effect to these federally listed mussel species.

Hine's Emerald Dragonfly

Though the Hine's emerald dragonfly is considered potentially present within the resource evaluation area, through coordination with the USFWS and WDNR it was determined that the species is likely absent from the analysis area. Therefore, there are no anticipated impacts to the Hine's emerald dragonfly.

Iowa Pleistocene Snail

The USFWS provided locations for potential suitable habitat for the Iowa Pleistocene snail within the analysis area. During field surveys by the Utilities, no suitable habitat for the species was found (RUS 2018). Direct effects to the Iowa Pleistocene snail are not anticipated as construction activities would not occur on algific talus slopes. Vegetation removal along other portions of the line may indirectly affect sensitive habitats but are anticipated to be minimized by the environmental commitments described in Table 3.1-4 to the point that impacts would be unlikely (USFWS 2019a).

Northern Long-Eared Bat

The analysis area contains suitable roosting and foraging habitat within the forested areas, and northern long-eared bats are presumed present for the purposes of this analysis. Clearing of trees would be required under all alternatives, though in varying quantities. Direct mortality could result from clearing occupied roost trees, though the Utilities have committed to avoiding tree removal activities during the "pup season," the time of year when juveniles are unable to fly and therefore maternity colonies are most sensitive (see Table 3.1-4). Removal of roosting and foraging habitat can degrade the existing suitable habitat within the analysis area. Habitat fragmentation has been minimized by collocating the proposed ROW with existing cleared areas; however, some tree clearing would be required.

Direct mortality of individual bats from collision with moving construction equipment is unlikely given that construction activities would occur during daylight hours when bats would not be active. In addition, bats are highly maneuverable and can fly up and over or down and under the power lines, rapidly changing course. Since the diameter of the C-HC Project conductor is over a third of the bat's body length (the average 345-kV conductor is approximately 1.4 inches in diameter), and bats have advanced sonar detection systems, it is unlikely that a bat would fly into a static cable that large relative to their body size. Similarly, it is unlikely that bats would collide with the stationary transmission line structures (RUS 2018).

Noise associated with construction, maintenance, and operation of the C-HC Project may potentially cause an indirect effect to bats. The presence of construction and maintenance noise, as well as increased human activity, may indirectly disrupt the bats and cause them to flush from day roosts or potentially leave the area. Furthermore, auditory disruption or nuisance from the audible noise produced from the corona generated by the energized transmission line may potentially cause indirect effects. Electric corona results when high-voltage lines ionize the air around the line, which then also becomes a conductor, and an audible hissing sound can be heard. Corona is more prevalent near sharp corners in the line, nicks or scrapes in the line, snow/rain/frost on the line, or around bird flight diverters (APLIC 2012). Because the corona noise dissipates quickly and because corona is more pronounced during rainy conditions when bats are less likely to be flying, potential indirect effects due to line noise are not expected to be significant, even in areas where the C-HC Project crosses through suitable foraging habitat.

To minimize adverse impacts to the northern long-eared bat, the Utilities will implement the species-specific environmental commitments described in Table 3.1-4. During consultation with USFWS, it was determined that the project may affect, but would not result in prohibited take of the northern long-eared bat (USFWS 2019a).

Rusty Patched Bumble Bee

Direct impacts to rusty patched bumble bees could occur if construction vehicles or temporary construction matting cover, crushes, or collapses a nest colony or hibernation area. Soil compaction during construction activities could affect the ability of queens to excavate an overwintering site as well as reduce the ability of rodents to excavate burrows, which would reduce the ability of colonies to find appropriate nest locations. Individual bees could also be disturbed by construction activities; thereby disrupting foraging, nesting, and hibernating activities. Habitat modification of herbaceous plant communities could degrade suitable habitat, adversely impacting the species. However, there could be a net gain of suitable habitat through creation of herbaceous plant communities where forested areas are converted to grassland as part of construction of the C-HC Project. ROW maintenance, specifically herbicide application, could adversely impact the rusty patched bumble bee by diminishing the variety and abundance of food resources. These maintenance activities are primarily used for treating areas dominated by woody vegetation, rather than suitable rusty patched bumble bee nesting and foraging habitat. To minimize adverse impacts to the rusty patched bumble bee, the Utilities will implement the species-specific environmental commitments described in Table 3.1-4. During consultation with the USFWS, it was determined that construction and operation of the Cardinal-Hickory Creek 345-kV transmission line as proposed is not likely to jeopardize the continued existence of the rusty patched bumble bee (USFWS 2019a).

USFWS concluded in the BO (USFWS 2019a), that the following reasonable and prudent measures are necessary and appropriate to minimize take of the rusty patched bumble bee:

- Minimize preconstruction vegetation clearing and ground disturbance.
- Use native plant species in restoration activities.
- Maintain suitable habitat within the permanent ROW.
- Document and report to the USFWS the timing and extent of disturbances within suitable habitat for rusty patched bumble bee to help inform future consultations.

To implement the reasonable and prudent measures listed above, the Utilities are required to comply with the following terms and conditions:

- Minimize clearing, grading, and vegetation removal within suitable habitat areas in the High Potential Zone.
- Reseed all construction ROW areas (temporary and permanent) within the High Potential Zone with pollinator-friendly native seed mixes consistent with recommendations provided by the USFWS. When possible, include species preferred by the rusty patched bumble bee and ensure that some plants are in bloom through the season when the rusty patched bumble bee may be present. The USFWS provides a list of plants favored by the species (USFWS 2019b).
- Provide a written summary of the suitable habitat impacted, the timing of impact as it pertains to the rusty patched bumble bee active and inactive seasons, and the estimated percentage of disturbed ground at completion of transmission line construction and other associated activities.

3.4.2.4 ALTERNATIVE 1

Under Alternative 1, 524 acres of forested habitat would be permanently converted to maintained ROW, which is 51% of the forested habitat within the analysis area and 0.07% within the six counties the project overlaps (Table 3.4-3). An additional 11 acres of forest would be temporarily cleared for construction of access roads. For forest-dwelling wildlife species sensitive to fragmentation this is anticipated to be a moderate and long-term impact.

Table 3.4-3. Acres of Habitat Types within the Alternative 1 Analysis Area

	Within ROW	Outside ROW and within Analysis Area	Hill Valley Substation	Access Roads	Laydown Yards
Total Analysis Area	**1,891**	**1,699**	**22**	**204**	**213**
Land Cover Class					
Forest	524	496	0	11	0
Grassland	228	153	0	40	0
Wetland	110	73	0	4	0
Open Water	15	10	0	0	0

There are 228 acres of existing grassland habitat within the ROW of Alternative 1, which is 0.02% of the grassland habitat within the six counties the C-HC Project overlaps, and an additional 153 acres outside the ROW but within the analysis area (see Table 3.4-3). Impacts to grassland habitat and species that use it are expected to be primarily temporary, mostly limited to the duration of construction, and minor. Grassland habitat is expected to return to preconstruction conditions after construction is complete and revegetation occurs; however, long-term minor impacts to plant diversity within grasslands could occur from herbicide applications necessary to maintain the ROW. Within these acres presented in Table 3.4-3 effects to species that use grassland and forested habitat described under Impacts Common to All Action Alternatives would be expected to occur.

There are 110 acres of wetland and 15 acres open water habitat within the proposed permanent ROW of Alternative 1 (see Table 3.4-3). This represents approximately 0.11% of the wetland habitat and 0.02% of the open water habitat that exists within the six counties the C-HC Project overlaps. Impacts to wetlands and open water habitat, and the species that use them, are expected to be temporary and minor (conversion of forested wetlands is included with the analysis of forested habitat conversion described above). Emergent wetlands may experience temporary disturbance during construction, though these impacts would be minimized through the measures described in Section 3.1, Table 3.1-4.

Construction of Alternative 1 would result in 99 miles of transmission line, 62 miles of which would be collocated with existing transmission lines. This results in 37 miles of new collision risk to raptors and other large birds through construction of Alternative 1, which would be a moderate impact to birds.

The ROW of Alternative 1 contains 140 and 1,096 acres of rusty patched bumble bee High Potential and Low Potential Zones, respectively. The area outside the ROW but within the 300-foot analysis area contains 142 and 1,110 acres of rusty patched bumble bee High Potential and Low Potential Zones, respectively. Alternative 1 includes transmission line Segment Y, which has been surveyed and verified to contain small patches of high-quality rusty patched bumble bee foraging and nesting habitat, and Segment P, which has been determined to contain a mix of low-quality and poor-quality rusty patched bumble bee habitat (RUS 2018). Alternative 1 would impact approximately 9 acres of foraging-only habitat, 14 acres of foraging and nesting habitat, and 123 acres of overwintering habitat (USFWS 2019a). Temporary impacts that would occur to the rusty patched bee during construction under Alternative 1 would be moderate, though temporary. Ongoing impacts during operation of the C-HC Project (i.e., vegetation maintenance activities) are anticipated to be minor due to the proposed conservation measures.

Alternative 1 includes a 1.4-mile crossing of the Refuge. Wildlife species unique to the Refuge are expected to experience minor impacts through construction of Alternative 1 given the habitat types present within the analysis area. Under Alternative 1, the existing transmission line ROW would be decommissioned and revegetated. This element of Alternative 1 would have long-term beneficial impacts to wildlife within the Refuge because habitat would be improved along the existing transmission line ROW over the next 25 to 50 years.

Retirement of the N-9 Transmission Line and Construction of a New 69-kV Tap Line

The decommissioning of the N-9 transmission line and construction of the tap line is not anticipated to impact or alter any protected species or their critical habitats or result in short- or long-term impacts. The impact analysis area does not contain any High Potential or Low Potential Zones for the federally endangered rusty patched bumble bee.

Potential impacts from the retirement of the N-9 transmission line include the loss, degradation, and/or fragmentation of breeding, rearing, foraging, and dispersal habitats; collisions with and crushing by construction vehicles; loss of burrowing animals and burrows in areas where grading would occur; increased invasive species establishment and spread; and increased noise and vibration levels. These decommissioning and construction-related impacts would be moderate and short term.

Noise and vibration associated with construction activities would change habitat use patterns for some species. Some individuals would move away from the source(s) of the noise/vibration to adjacent or nearby habitats, which may increase competition for resources within these areas. Noise/vibration and other disturbances may also lead to increased stress on individuals, which could decrease their overall fitness due to increased metabolic expenditures. These effects would be temporary and moderate, and the impacts would cease with the completion of construction activities.

Decommissioning and construction activities would require disturbance of suitable habitat for wildlife species, such as birds, mammals, reptiles, and amphibians. Minor, temporary impacts to wildlife habitat and individuals would occur due to noise and human activity during decommissioning and construction. This would result in short-term temporary displacement of species and would temporarily deter wildlife species from using habitats within the vicinity of construction; however, once construction of the tap line is complete, wildlife species would return. No long-term adverse impacts to wildlife species are expected to occur.

The retirement of the N-9 transmission line would result in a permanent beneficial impact to wildlife. After the removal of the structures and transmission line, the ROW would be abandoned, and no transmission line infrastructure would remain. All maintenance activities associated with the transmission line would end, and habitat would be restored and/or return to a more natural state with fewer occurrences of human disturbance. The ongoing maintenance of the existing ROW fragments forested and wetland habitats within the Refuge. Abandonment and restoration of the ROW would reduce habitat fragmentation over the long term as the ROW is gradually revegetated through active habitat restoration efforts and/or natural succession. In the short term, the effects of habitat fragmentation on wildlife uses would remain.

3.4.2.5 ALTERNATIVE 2

Under Alternative 2, 530 acres of forested habitat would be converted to maintained ROW, which is 51% of the forested habitat within the analysis area and 0.07% within the six counties the project overlaps (Table 3.4-4). An additional 11 acres of forest would be temporarily cleared for construction of access roads. For forest-dwelling wildlife species sensitive to fragmentation this is anticipated to be a moderate and long-term impact.

Table 3.4-4. Acres of Habitat Types within the Alternative 2 Analysis Area

	Within ROW	Outside ROW and within Analysis Area	Hill Valley Substation	Access Roads	Laydown Yards
Total Analysis Area	**2,008**	**1,766**	**22**	**210**	**213**
Land Cover Class					
Forest	530	500	0	11	0
Grassland	249	171	0	42	0
Wetland	121	77	0	3	0
Open Water	13	8	0	0	0

There are 249 acres of existing grassland habitat within the ROW of Alternative 2, which is 0.03% of the grassland habitat within the six counties the C-HC Project overlaps, and an additional 171 acres outside the ROW but within the analysis area (see Table 3.4-4). Impacts to grassland habitat and species that use it are expected to be primarily temporary, mostly limited to the duration of construction, and minor. Grassland habitat is expected to return to preconstruction conditions after construction is complete and revegetation occurs; however, long-term minor impacts to plant diversity within grasslands could occur from herbicide applications necessary to maintain the ROW. Within these acres presented in Table 3.4-4. effects to species that use grassland and forested habitat described under Impacts Common to All Action Alternatives would be expected to occur.

There are 121 acres of wetland and 13 acres open water habitat within the proposed permanent ROW of Alternative 2 (see Table 3.4-4). This represents approximately 0.12% of the wetland habitat and 0.02% of the open water habitat that exists within the six counties the C-HC Project overlaps. Impacts to wetlands and open water habitat, and the species that use them, are expected to be temporary and minor (conversion of forested wetlands is included with the analysis of forested habitat conversion described above). Emergent wetlands may experience temporary disturbance during construction, though these impacts would be minimized through the measures described in Section 3.1, Table 3.1-4.

Construction of Alternative 2 would result in 105 miles of transmission line, 63 miles of which would be collocated with existing transmission lines. This results in 42 miles of new collision risk to raptors and other large birds through construction of Alternative 2, which would be a moderate impact to birds.

The ROW of Alternative 2 contains 141 and 1,109 acres of rusty patched bumble bee High Potential and Low Potential Zones, respectively. The area outside the ROW but within the 300-foot analysis area contains 141 and 1,119 acres of rusty patched bumble bee High Potential and Low Potential Zones, respectively. Additionally, Alternative 2 includes transmission line Segment Y, Segment Y, which has been surveyed and verified to contain small patches of high-quality rusty patched bumble bee foraging and nesting habitat, and Segments P and Z, which have been determined to contain a mix of low-quality and poor-quality rusty patched bumble bee habitat (RUS 2018). Alternative 2 would impact approximately 9 acres of foraging-only habitat, 14 acres of foraging and nesting habitat, and 123 acres of overwintering habitat (USFWS 2019a). Temporary impacts that occur to the rusty patched bee during construction of Alternative 2 are considered moderate, though temporary. Ongoing impacts during operation of the project (i.e., vegetation maintenance activities) are anticipated to be minor due to the proposed conservation measures.

Alternative 2 includes a 1.5-mile crossing of the Refuge; however, the proposed route would follow an existing transmission line ROW. Wildlife species unique to the Refuge are expected to experience minor impacts through construction of Alternative 2, given the existence of the current ROW.

Retirement of the N-9 Transmission Line and Construction of a New 69-kV Tap Line

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.4.2.6 ALTERNATIVE 3

Under Alternative 3, 504 acres of forested habitat would be converted to maintained ROW, which is 50% of the forested habitat within the analysis area and 0.07% within the six counties the project overlaps (Table 3.4-5). An additional 12 acres of forest would be temporarily cleared for construction of access roads. For forest-dwelling wildlife species sensitive to fragmentation this is anticipated to be a moderate and long-term impact.

Table 3.4-5. Acres of Habitat Types within the Alternative 3 Analysis Area

	Within ROW	Outside ROW and within Analysis Area	Hill Valley Substation	Access Roads	Laydown Yards
Total Analysis Area	**2,210**	**2,016**	**22**	**157**	**213**
Land Cover Class					
Forest	504	504	0	12	0
Grassland	302	198	0	27	0
Wetland	107	66	0	3	0
Open Water	11	6	0	0	0

There are 302 acres of existing grassland habitat within the ROW of Alternative 3, which is 0.03% of the grassland habitat within the six counties the C-HC Project overlaps, and an additional 198 acres outside the ROW but within the analysis area (see Table 3.4-5. Impacts to grassland habitat and species that use it are expected to be primarily temporary, mostly limited to the duration of construction, and minor.

Grassland habitat is expected to return to preconstruction conditions after construction is complete and revegetation occurs; however, long-term, minor impacts to plant diversity within grasslands could occur from herbicide applications necessary to maintain the ROW. Within these acres presented in Table 3.4-5 effects to species that use grassland and forested habitat described under Impacts Common to All Action Alternatives would be expected to occur.

There are 107 acres of wetland and 11 acres of open water habitat within the proposed permanent ROW of Alternative 3 (see Table 3.4-5). This represents approximately 0.11% of the wetland habitat and 0.02% of the open water habitat that exists within the six counties the C-HC Project overlaps. Impacts to wetlands and open water habitat, and the species that use them, are expected to be temporary and minor (conversion of forested wetlands is included with the analysis of forested habitat conversion described above). Emergent wetlands may experience temporary disturbance during construction, though these impacts would be minimized through the environmental commitments described in Section 3.1, Table 3.1-4.

Construction of Alternative 3 would result in 117 miles of transmission line, 71 miles of which would be collocated with existing transmission lines. This results in 46 miles of new collision risk to raptors and other large birds through construction of Alternative 3, which can be considered a moderate impact to birds.

The ROW of Alternative 3 contains 141 and 1,157 acres of rusty patched bumble bee High Potential and Low Potential Zones, respectively. The area outside the ROW but within the 300-foot analysis area contains 143 and 1,165 acres of rusty patched bumble bee High Potential and Low Potential Zones, respectively. Additionally, Alternative 3 includes transmission line Segment Y, which has been surveyed and verified to contain small patches of high-quality rusty patched bumble bee foraging and nesting habitat, and Segment P, which has been determined to contain a mix of low-quality and poor-quality rusty patched bumble bee habitat (RUS 2018). Alternative 3 would impact approximately 9 acres of foraging-only habitat, 14 acres of foraging and nesting habitat, and 123 acres of overwintering habitat (USFWS 2019a). Temporary impacts that occur to the rusty patched bee during construction of Alternative 3 are considered moderate, though temporary. Ongoing impacts during operation of the project (i.e., vegetation maintenance activities) are anticipated to be minor due to the proposed conservation measures.

Alternative 3 would have the same impacts to wildlife within the Refuge as Alternative 2.

Retirement of the N-9 Transmission Line and Construction of a New 69-kV Tap Line

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.4.2.7 ALTERNATIVE 4

Under Alternative 4, 236 acres of forested habitat would be converted to maintained ROW, which is 52% of the forested habitat within the analysis area and 0.03% within the six counties the project overlaps (Table 3.4-6). An additional 7 acres of forest would be temporarily cleared for construction of access roads. For forest-dwelling wildlife species sensitive to fragmentation this is anticipated to be a moderate and long-term impact.

Table 3.4-6. Acres of Habitat Types within the Alternative 4 Analysis Area

	Within ROW	Outside ROW and within Analysis Area	Hill Valley Substation	Access Roads	Laydown Yards
Total Analysis Area	**2,246**	**2,083**	**22**	**116**	**213**
Land Cover Class					
Forest	236	216	0	7	0
Grassland	433	317	0	19	0
Wetland	69	28	0	2	0
Open Water	11	6	0	0	0

There are 433 acres of existing grassland habitat within the ROW of Alternative 4, which is 0.05% of the grassland habitat within the six counties the C-HC Project overlaps, and an additional 317 acres outside the ROW but within the analysis area (see Table 3.4-6). Impacts to grassland habitat and species that use it are expected to be primarily temporary, mostly limited to the duration of construction, and minor. Grassland habitat is expected to return to preconstruction conditions after construction is complete and revegetation occurs; however, long-term minor impacts to plant diversity within grasslands could occur from herbicide applications necessary to maintain the ROW. Within these acres presented in Table 3.4-6 effects to species that use grassland and forested habitat described under Impacts Common to All Action Alternatives would be expected to occur.

There are 69 acres of wetland and 11 acres of open water habitat within the proposed permanent ROW of Alternative 4 (see Table 3.4-6). This represents approximately 0.07% of the wetland habitat and 0.02% of the open water habitat that exists within the six counties the C-HC Project overlaps. Impacts to wetlands and open water habitat, and the species that use them, are expected to be temporary and minor (conversion of forested wetlands is included with the analysis of forested habitat conversion described above). Emergent wetlands may experience temporary disturbance during construction, though these impacts would be minimized through the measures described in Section 3.1, Table 3.1-4.

Construction of Alternative 4 would result in 119 miles of transmission line, 82 miles of which would be collocated with existing transmission lines. This results in 37 miles of new collision risk to raptors and other large birds through construction of Alternative 4, which can be considered a moderate impact to birds.

The ROW of Alternative 4 contains 93 and 1,183 acres of rusty patched bumble bee High Potential and Low Potential Zones, respectively. The area outside the ROW but within the 300-foot analysis area contains 99 and 1,221 acres of rusty patched bumble bee High Potential and Low Potential Zones, respectively. Additionally, Alternative 4 includes transmission line Segment Y, which has been surveyed and verified to contain small patches of high-quality rusty patched bumble bee foraging and nesting habitat, and Segment S, which has been determined to contain a mix of low quality and poor quality rusty patched bumble bee habitat (RUS 2018). Alternative 4 would impact approximately 9 acres of foraging-only habitat, 0 acres of foraging and nesting habitat, and 25 acres of overwintering habitat (USFWS 2019a). Temporary impacts that occur to the rusty patched bee during construction of Alternative 4 are considered moderate, though temporary. Ongoing impacts during operation of the project (i.e., vegetation maintenance activities) are anticipated to be minor due to the proposed conservation measures.

Alternative 4 would have the same impacts to wildlife within the Refuge as Alternative 2.

Retirement of the N-9 Transmission Line and Construction of a New 69-kV Tap Line

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.4.2.8 ALTERNATIVE 5

Under Alternative 5, 245 acres of forested habitat would be converted to maintained ROW, which is a 54% change of forested habitat availability within the analysis area and 0.03% within the six counties the project overlaps (Table 3.4-7). An additional 7 acres of forest would be temporarily cleared for construction of access roads. For forest-dwelling wildlife species sensitive to fragmentation this is anticipated to be a moderate and long-term impact.

Table 3.4-7. Acres of Habitat Types within the Alternative 5 Analysis Area

	Within ROW	Outside ROW and within Analysis Area	Hill Valley Substation	Access Roads	Laydown Yards
Total Analysis Area	**2,431**	**2,230**	**22**	**129**	**213**
Land Cover Class					
Forest	245	216	0	7	0
Grassland	454	338	0	22	0
Wetland	66	35	0	2	0
Open Water	10	8	0	0	0

There are 454 acres of existing grassland habitat within the ROW of Alternative 5, which is 0.05% of the grassland habitat within the six counties the C-HC Project overlaps, and an additional 338 acres outside the ROW but within the analysis area (see Table 3.4-7). Impacts to grassland habitat and species that use it are expected to be primarily temporary, mostly limited to the duration of construction, and minor. Grassland habitat is expected to return to preconstruction conditions after construction is complete and revegetation occurs; however, long-term minor impacts to plant diversity within grasslands could occur from herbicide applications necessary to maintain the ROW. Within these acres presented in Table 3.4-7 effects to species that use grassland and forested habitat described under Impacts Common to All Action Alternatives would be expected to occur.

There are 66 acres of wetland and 10 acres of open water habitat within the proposed permanent ROW of Alternative 5 (see Table 3.4-7). This represents approximately 0.07% of the wetland habitat and 0.02% of the open water habitat that exists within the six counties the C-HC Project overlaps. Impacts to wetlands and open water habitat, and the species that use them, are expected to be temporary and minor (conversion of forested wetlands is included with the analysis of forested habitat conversion described above). Emergent wetlands may experience temporary disturbance during construction, though these impacts would be minimized through the measures described in Section 3.1, Table 3.1-4.

Construction of Alternative 5 would result in 127 miles of transmission line, 75 miles of which would be collocated with existing transmission lines. This results in 52 miles of new collision risk to raptors and other large birds through construction of Alternative 5, which can be considered a moderate impact to birds.

The ROW of Alternative 5 contains 73 and 822 acres of rusty patched bumble bee High Potential and Low Potential Zones, respectively. The area outside the ROW but within the 300-foot analysis area contains 78 and 1,008 acres of rusty patched bumble bee High Potential and Low Potential Zones, respectively. Additionally, Alternative 5 includes transmission line Segment Y, which has been surveyed and verified to contain small patches of high-quality rusty patched bumble bee foraging and nesting habitat, and Segment S, which has been determined to contain a mix of low-quality and poor-quality rusty patched bumble bee habitat (RUS 2018). Alternative 5 would impact approximately 9 acres of foraging-only habitat, 0 acres of foraging and nesting habitat, and 25 acres of overwintering habitat (USFWS 2019a). Temporary impacts that occur to the rusty patched bee during construction of Alternative 5 are considered moderate, though temporary. Ongoing impacts during operation of the C-HC Project (i.e., vegetation maintenance activities) are anticipated to be minor due to the proposed conservation measures.

Alternative 5 would have the same impacts to wildlife within the Refuge as Alternative 1.

Retirement of the N-9 Transmission Line and Construction of a New 69-kV Tap Line

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.4.2.9 ALTERNATIVE 6

Under Alternative 6,250 acres of forested habitat would be converted to maintained ROW, which is 56% of the forested habitat within the analysis area and 0.03% within the six counties the project overlaps (Table 3.4-8). An additional 6 acres of forest would be temporarily cleared for construction of access roads. For forest-dwelling wildlife species sensitive to fragmentation this is anticipated to be a moderate and long-term impact.

Table 3.4-8. Acres of Habitat Types within the Alternative 6 Analysis Area

	Within ROW	Outside ROW and within Analysis Area	Hill Valley Substation	Access Roads	Laydown Yards
Total Area	**1,936**	**1,773**	**22**	**163**	**213**
Land Cover Class					
Forest	250	201	0	6	0
Grassland	352	273	0	32	0
Wetland	76	38	0	2	0
Open Water	14	10	0	0	0

There are 352 acres of existing grassland habitat within the ROW of Alternative 6, which is 0.04% of the grassland habitat within the six counties the C-HC Project overlaps, and an additional 273 acres outside the ROW but within the analysis area (see Table 3.4-8). Impacts to grassland habitat and species that use it are expected to be primarily temporary, mostly limited to the duration of construction, and minor.

Grassland habitat is expected to return to preconstruction conditions after construction is complete and revegetation occurs; however, long-term minor impacts to plant diversity within grasslands could occur from herbicide applications necessary to maintain the ROW. Within these acres presented in Table 3.4-8 effects to species that use grassland and forested habitat described under Impacts Common to All Action Alternatives would be expected to occur.

There are 76 acres of wetland and 14 acres of open water habitat within the proposed permanent ROW of Alternative 6 (see Table 3.4-8). This represents approximately 0.07% of the wetland habitat and 0.02% of the open water habitat that exists within the six counties the C-HC Project overlaps. Impacts to wetlands and open water habitat, and the species that use them, are expected to be temporary and minor (conversion of forested wetlands is included with the analysis of forested habitat conversion described above). Emergent wetlands may experience temporary disturbance during construction, though these impacts would be minimized through the measures described in Section 3.1, Table 3.1-4.

Construction of Alternative 6 would result in 101 miles of transmission line, 70 miles of which would be collocated with existing transmission lines. This results in 31 miles of new collision risk to raptors and other large birds through construction of Alternative 6, which can be considered a moderate impact.

The ROW of Alternative 6 contains 87 and 814 acres of rusty patched bumble bee High Potential and Low Potential Zones, respectively. The area outside the ROW but within the 300-foot analysis area contains 93 and 846 acres of rusty patched bumble bee High Potential and Low Potential Zones, respectively. Additionally, Alternative 6 includes transmission line Segment Y, which has been surveyed and verified to contain small patches of high-quality rusty patched bumble bee foraging and nesting habitat, and Segments Z and S, which have been determined to contain a mix of low-quality and poor-quality rusty patched bumble bee habitat (RUS 2018). Alternative 6 would impact approximately 9 acres of foraging-only habitat, 0 acres of foraging and nesting habitat, and 25 acres of overwintering habitat (USFWS 2019a). Temporary impacts that occur to the rusty patched bee during construction of Alternative 6 are considered moderate, though temporary. Ongoing impacts during operation of the project (i.e., vegetation maintenance activities) are anticipated to be minor due to the proposed conservation measures.

Alternative 6 would have the same impacts to wildlife within the Refuge as Alternative 1.

Retirement of the N-9 Transmission Line and Construction of a New 69-kV Tap Line

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.4.3 *Summary of Impacts*

Table 3.4-9 provides a summary of wildlife habitat availability, miles of new transmission line, rusty patched bumble bee occurrence zones, and a comparison of impacts within the Refuge for the ROW of each proposed alternative. Alternative 2 would convert the largest amount of forested habitat to grassland, while Alternative 4 would convert the least amount of forested habitat to grassland. Alternative 2 and 3 would cross the largest amount of rusty patched bumble bee high potential zone, compared with Alternative 5, which would cross the least amount of rusty patched bumble bee high potential zone.

Table 3.4-9. Impact Summary Table for Wildlife and their Habitat

	Total ROW (acres)	Forested Habitat (acres)	Grassland Habitat (acres)	Wetland Habitat (acres)	Open Water (acres)	Non-Collocated, New Transmission Line (miles)	Rusty Patched Bumble Bee High Potential Zone (acres)	Rusty Patched Bumble Bee Low Potential Zone (acres)	Miles within the Refuge
Alternative 1	1,891	524	228	110	15	37	140	1,096	1.4
Alternative 2	2,008	530	249	121	13	42	141	1,109	1.5
Alternative 3	2,210	504	302	107	11	46	141	1,157	1.5
Alternative 4	2,246	236	433	69	11	37	93	1,183	1.5
Alternative 5	2,431	245	454	66	10	52	73	822	1.4

	Total ROW (acres)	Forested Habitat (acres)	Grassland Habitat (acres)	Wetland Habitat (acres)	Open Water (acres)	Non-Collocated, New Transmission Line (miles)	Rusty Patched Bumble Bee High Potential Zone (acres)	Rusty Patched Bumble Bee Low Potential Zone (acres)	Miles within the Refuge
Alternative 6	1,936	250	352	76	14	31	87	814	1.4

The N-9 transmission line decommissioning that would occur within the Refuge would result in temporary and moderate impacts to wildlife during decommissioning. There would be long-term beneficial impacts to wildlife after decommissioning. The N-9 transmission line decommissioning and tap line construction on private land would also result in temporary to moderate impacts to wildlife during decommissioning. There would be long-term beneficial impacts to wildlife after decommissioning. There would be no impact to wildlife, including special status species, from substation improvements.

Table 3.4-10 summarizes the effect determinations under the Endangered Species Act for the federally listed species that may occur in the C-HC Project analysis area.

Table 3.4-10. Federally Listed Species with Potential to Occur in the Analysis Area and the Effect Determinations for Each in the RUS Biological Assessment

Species	Federal Status	Effect Determination from RUS BA
Whooping crane	Nonessential, experimental population	No effect
Higgins eye pearly mussel	Endangered	No effect
Sheepnose mussel	Endangered	No effect
Spectaclecase mussel	Endangered	No effect
Hine’s emerald dragonfly	Endangered	No effect
Iowa Pleistocene snail	Endangered	May Affect, Not Likely to Adversely Affect
Northern long-eared bat	Threatened	May Affect, Not Result in Prohibited Take
Rusty patched bumble bee	Endangered	May Affect, Likely to Adversely Affect

3.5 Water Resources and Quality

This section discusses water resources within the project analysis area, including surface water, floodplains, groundwater resources, water quality, and other special status waters such as outstanding and exceptional waters, trout streams, sovereign meandered rivers, and protected streams. Information regarding wetlands can be found in Section 3.3.

3.5.1 *Affected Environment*

The analysis area for water resources and quality is defined by the seven watersheds that are crossed by the six action alternatives presented in Chapter 2. Each watershed is assigned a unique eight-digit Hydrologic Unit Code [HUC-8] by the USEPA.

Watersheds included in the analysis area for the project are the Maquoketa River (IA, 07060006), Turkey River (IA, 07060004), Grant-Little Maquoketa Rivers (WI, 07060003), Lower Wisconsin River (WI, 07070005), Apple-Plum River (WI, 07060005), Pecatonica River (WI, 07090003), and Sugar River watersheds (WI, 07090004) (HUC-8 watersheds). Major surface water features within the analysis area and the HUC-8 watersheds crossed by the project alternatives are shown in Figure 3.5-1 (USEPA 2018a).

3.5.1.1 SURFACE WATER

The analysis area includes the Mississippi River near Cassville, Wisconsin, just south of the Mississippi River and Turkey River confluence. Additional named rivers and streams within the analysis area include (USEPA 2018a):

- North Fork Maquoketa River (IA)
- Bluebell Creek (IA)
- Furnace Branch (WI)
- Mill Branch (WI)
- Rattlesnake Creek (WI)
- Beetown Branch (WI)
- Grant River (WI)
- Pigeon Creek (WI)
- Moore Branch (WI)
- Platte River (WI)
- Martinville Creek (WI)
- Pecatonica River (WI)
- Little Platte River (WI)
- Mounds Branch (WI)
- Bonner Branch (WI)
- Badger Hollow Creek (WI)
- Sugar River (WI)
- Black Earth Creek (WI)
- Garfoot Creek (WI)
- Vermont Creek (WI)
- East Branch Blue Mounds Creek (WI)
- West Branch Blue Mounds Creek (WI)
- White Hollow Creek (WI)
- Mill Creek (WI)
- Lowery Creek (WI)
- Otter Creek (WI)
- Galena River (WI)
- Blockhouse Creek (WI)
- Whig Branch (WI)
- Boice Creek (WI)
- McCartney Branch (WI)
- Sudan Branch (WI)
- Laxey Creek (WI)
- Mineral Point Branch (WI)
- Dodge Branch (WI)
- East Branch Pecatonica River (WI)
- Gordon Creek (WI)
- West Branch Sugar River (WI)
- Deer Creek (WI)
- Fryes Feeder (WI)

The analysis area also includes Black Hawk Lake, Twin Valley Lake, Cox Hollow Lake, and Halverson Lake in Iowa County, Wisconsin; and Stewart Lake in Dane County, Wisconsin. Additional surface waters found throughout the analysis area include scattered small farm ponds, retention basins, and sediment basins (USEPA 2018a).

The USACE defines traditional navigable water as a regulated WUS. Section 10 of the Rivers and Harbors Act of 1899 (33 CFR 322) requires authorization from the USACE for the construction of any structure in or over any traditional navigable WUS, including transmission lines. The Mississippi River (in Iowa and Wisconsin) and the Pecatonica River (in Wisconsin) are the two traditional navigable WUS in the analysis area.

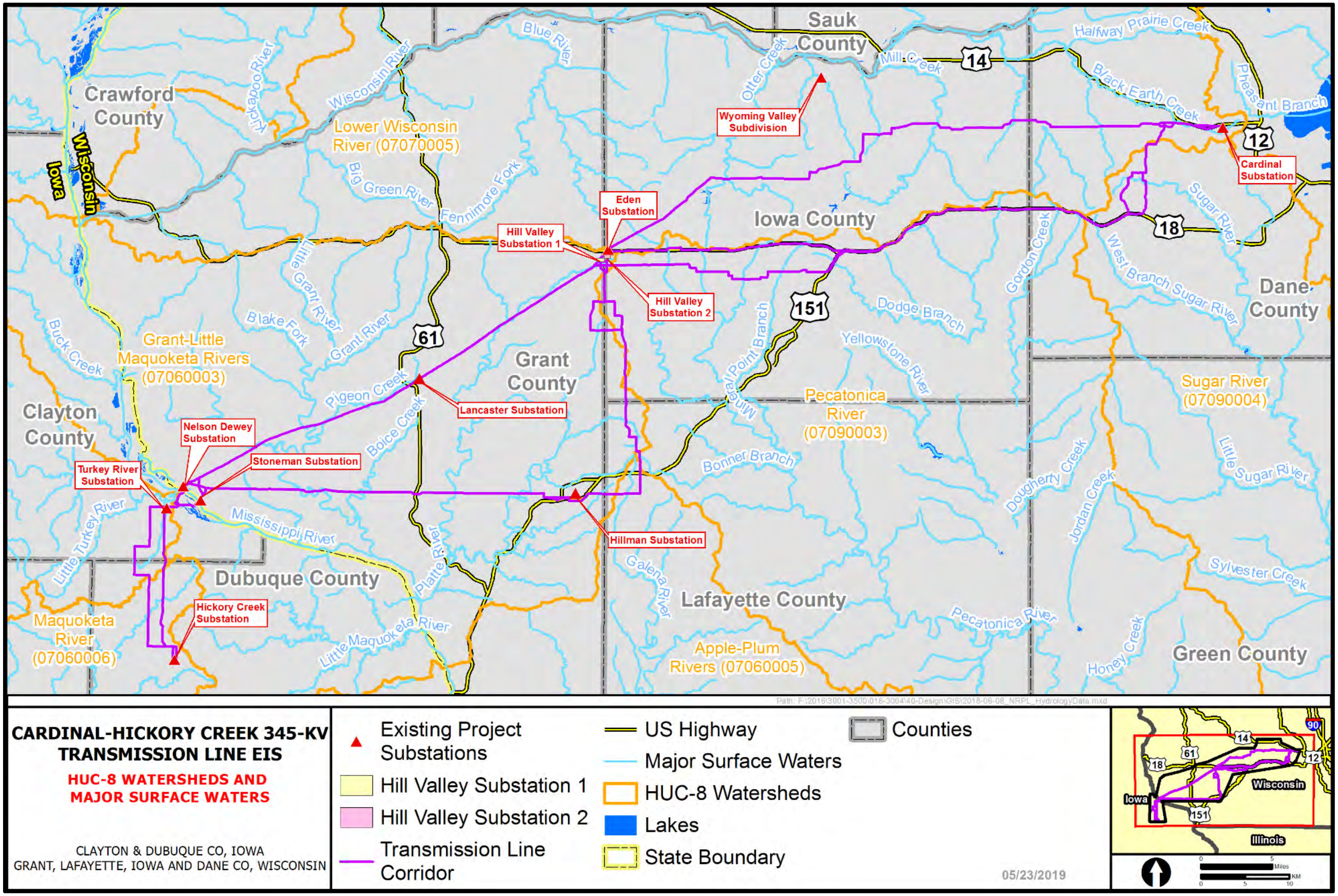

Figure 3.5-1. HUC-8 watersheds and major surface waters in the action area.

3.5.1.2 WATER QUALITY

Iowa and Wisconsin both publish lists of waters designated as impaired every 2 years (lists are published within the Integrated Report), as required by Section 303(d) of the CWA. The list includes streams, lakes and other water bodies that are not meeting their designated uses because of excess pollutants, or pollutants that are present in concentrations higher than the thresholds set in water quality standards. The USEPA regulations that govern 303(d) listing can be found in 40 CFR 130.7. The WDNR (2018e) and IDNR (2016) have jurisdiction over impaired waters (as defined in the WDNR 2018 and the IDNR 2016) for their respective states. As required under Section 303(d) of the CWA, both the WDNR and IDNR have identified impaired water bodies that require the development of a total maximum daily load (TMDL) management plan. A TMDL is defined in the CWA as a management plan for restoring impaired waters that identifies the maximum amount of a pollutant that a body of water can receive while still meeting water quality standards established by the USEPA.

Impaired waters are categorized as follows (IDNR 2016; WDNR 2018f):

- Category 1: All designated uses (e.g., for water contact recreation, aquatic life, and/or drinking water) are met.
- Category 2: Some of the designated uses are met but insufficient information exists to determine whether the remaining uses are met.
- Category 3: Insufficient information exists to determine whether any uses are met.
- Category 4: The waterbody is impaired but a TMDL is not required.
- Category 5: The waterbody is impaired and a TMDL is required.

Category 5 waters are considered the State’s 303(d) list of impaired waters. There are four Category 5 waters in the Iowa portion of the analysis area: Turkey River, Little Turkey River, North Fork Maquoketa River, and Middle Fork Little Maquoketo River. The impairments include low aquatic macroinvertebrate levels, fish kills due to fertilizer spills, and *E. coli*.

In Wisconsin, there are 31 Category 5 waters within the analysis area. Impairments include: Sediment/Total Suspended Solids, Total Phosphorous, Unknown Pollutant, Ammonia, and Biochemical Oxygen Demand. The reach of the Mississippi River within the analysis area is also a Category 5 water, with Aluminum as the impairment.

3.5.1.3 OUTSTANDING AND EXCEPTIONAL WATERS

In Wisconsin, waters designated by the WDNR as Outstanding Resource Waters or Exceptional Resource Waters (WAC Chapter NR 102.10 and Chapter NR 1.02.11) 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 89 Outstanding Resource Waters and Exceptional Resource Waters within the Wisconsin portion of the analysis area, including 10 that are within 150 feet of, or crossed by, the C-HC Project under one or more of the action alternatives.

The IDNR manages the Outstanding Iowa Waters program. This program gives certain surface waters the classification as Outstanding Resource Waters based on water quality standards, thereby warranting special protection (IAC 567 Chapter 61). No current Outstanding Iowa Waters are within the analysis area (IDNR 2018a).

3.5.1.4 TROUT STREAMS

Designated trout streams are abundant in sections of northeast Iowa (IDNR 2018b) and parts of Wisconsin included in the analysis area. Trout generally require cold water streams with low sediment loads, stable and consistent flow, high diversity of aquatic habitat, and good water quality. Trout streams provide recreational opportunities and the relatively cool, clear waters support wildlife. They are an important environmental and economic resource.

Within Wisconsin, there are approximately 216 trout streams in the analysis area (WDNR 2018g). Sixty-eight of the streams are considered Class I trout streams. Class I trout streams are typically smaller streams with high-quality trout fishing. Class I trout streams can support naturally reproducing trout populations, and do not require stocking from a hatchery. These high-quality Class I trout streams are most often associated with headwaters and the uppermost reaches within a watershed. Approximately 130 streams are Class II trout streams. Class II streams may support some natural reproduction of trout but are not capable of maintaining a sustainable trout population without restocking from a hatchery. Class II streams have good survival and carry-over of adult trout, often producing some larger-than-average fish. The remaining 18 trout streams are considered Class III trout streams. Class III trout streams provide marginal trout habitat with no natural reproduction occurring. They require annual stocking of trout to maintain trout populations. Generally, there is no carryover of trout from one year to the next. When assessing impacts to trout streams, only those trout streams supporting natural reproduction (Class I and II) are included. Within Wisconsin, two Class I trout streams and 18 Class II trout streams are within 150 feet of the six action alternatives.

There is one trout stream in Iowa that falls within the analysis area. There are no trout streams in Iowa within 150 feet of the six action alternatives.

3.5.1.5 MEANDERED SOVEREIGN RIVERS

Meandered Sovereign Rivers are defined and administered by IDNR and are “those rivers which, at the time of the original Federal government surveys, were surveyed as navigable and important water bodies and were transferred to the states upon their admission to the union to be transferred or retained by the public in accordance with the laws of the respective states upon their admission to the union” (IAC 571 Chapter 13; IDNR 2018c). The Mississippi River is the only Meandered Sovereign River in the analysis area. A Sovereign Lands Construction Permit would be required for proposed construction activities that may impact the Mississippi River (IAC 571 Chapter 13).

WDNR does not have a Meandered Sovereign River designation.

3.5.1.6 PROTECTED STREAMS

Protected Streams are those defined and administered by the IDNR as those streams where “channel changes are not allowed on protected streams because of actual or potential significant adverse effects on fisheries, water quality, flood control, flood plain management, wildlife habitat, soil erosion, public recreation, the public health, welfare and safety, compatibility with the state water plan, rights of other landowners, and other factors relevant to the control, development, protection, allocation, and utilization of the stream” (IAC 567 chapter 72). Middle Fork Little Maquoketa River and White Pine Hollow are the two protected streams in Iowa. The protected segments are both at the outer edge of the analysis area and are not near the six action alternatives. Wisconsin does not have a Protected Stream designation.

3.5.1.7 FLOODPLAINS

Floodplains are areas adjacent to stream, rivers, or other water bodies that experience flooding or inundation during periods of high flow or water discharge. Floodplains are generally thought to provide numerous benefits such as

- Attenuation and reduction of flood severity
- Water quality maintenance
- Groundwater recharge
- Erosion and scour reduction in drainageways
- Habitat for fish, wildlife, and plants
- Open spaces and recreational opportunities
- Fertile and productive areas for agriculture, aquaculture, and forestry

With regard to floodplains, the Federal Emergency Management Agency (FEMA), through the National Flood Insurance Program, has responsibility for developing and implementing regulations and procedures to control development in areas subject to flooding. The National Flood Insurance Program was established by the U.S. Congress with the passage of the National Flood Insurance Act of 1968 (42 U.S.C. 4001 et seq.). To implement the National Flood Insurance Program, FEMA prepares Flood Insurance Rate Maps (FIRMs) that show special flood hazard areas, commonly referred to as floodplains. The floodplain boundary most commonly used to regulate floodplain activities is the 100-year flood, or base flood. The 100-year flood is the flood event that has a 1 in 100, or 1%, chance of being equaled or exceeded in any given year. The FEMA-designated 100-year floodplains within the analysis area are shown in Figure 3.5-2.

EO 11988, Floodplain Management (44 CFR 9), directs Federal agencies to take action to reduce or eliminate flood loss risks; minimize the impacts of floods on human health, safety, and welfare; and restore and preserve the natural and beneficial values served by floodplains. The order also requires agencies to elevate structures or buildings above the base flood elevation, where possible. Revisions to EO 11988, made in conjunction with EO 13690, Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input, require federally funded projects and critical facilities, such as hospitals, fire stations, and emergency management control centers to be elevated above the 500-year flood, or 0.2% annual chance event of being equaled or exceeded in any given year. The objective of the order is to avoid the short- and long-term adverse impacts associated with activities or facilities that modify the floodplain and to avoid direct or indirect support of floodplain development when a practicable alternative exists.

There are numerous FEMA-designated 100-year floodplains within the analysis area. The largest of which is the Mississippi River floodplain. Since detailed mapping was performed for the Mississippi River, a floodway has also been designated along the river. The floodway is the portion of the floodplain where buildings and structures for human habitation are prohibited, to preserve the ability of that area to convey flood flows. The floodway for the Mississippi River, the portion of the floodplain where buildings and structures for human habitation are prohibited, is approximately 1.5 miles wide within the analysis area.

In Iowa, floodplain development is managed by the applicable local agency. The IDNR also regulates construction activities within floodplains and floodways. Any person who desires to construct or maintain a structure, dam, obstruction, deposit or excavation, or allow the same in any floodplain or floodway must contact the IDNR prior to the beginning of any work. In Wisconsin, floodplain development is managed by the applicable local agency. The local agency must have floodplain ordinances that meet the minimum requirements of the National Flood Insurance Program and the Wisconsin Administrative Code.

Federal Civil Works projects, including levees and other flood control structures are common along reaches of the Mississippi River. Section 14 of the Rivers and Harbors Act of 1899 (33 U.S.C. 408), also referred to as Section 408, mandates that any use or alteration of a Civil Works project by another party is subject to the approval of USACE. Upon a determination that the alteration proposed will not be injurious to the public interest and will not impair the usefulness of the Civil Works project, the USACE is authorized to permit the alteration. The analysis area does not include any mapped Mississippi River levees, floodwalls, or other known Civil Works projects; however, the analysis area does cross USACE-managed and -owned real estate within the refuge, which is subject to Section 408 review. The USACE will follow the procedures outlined in Engineer Circular 1165-2-220 when conducting this review (USACE 2018).

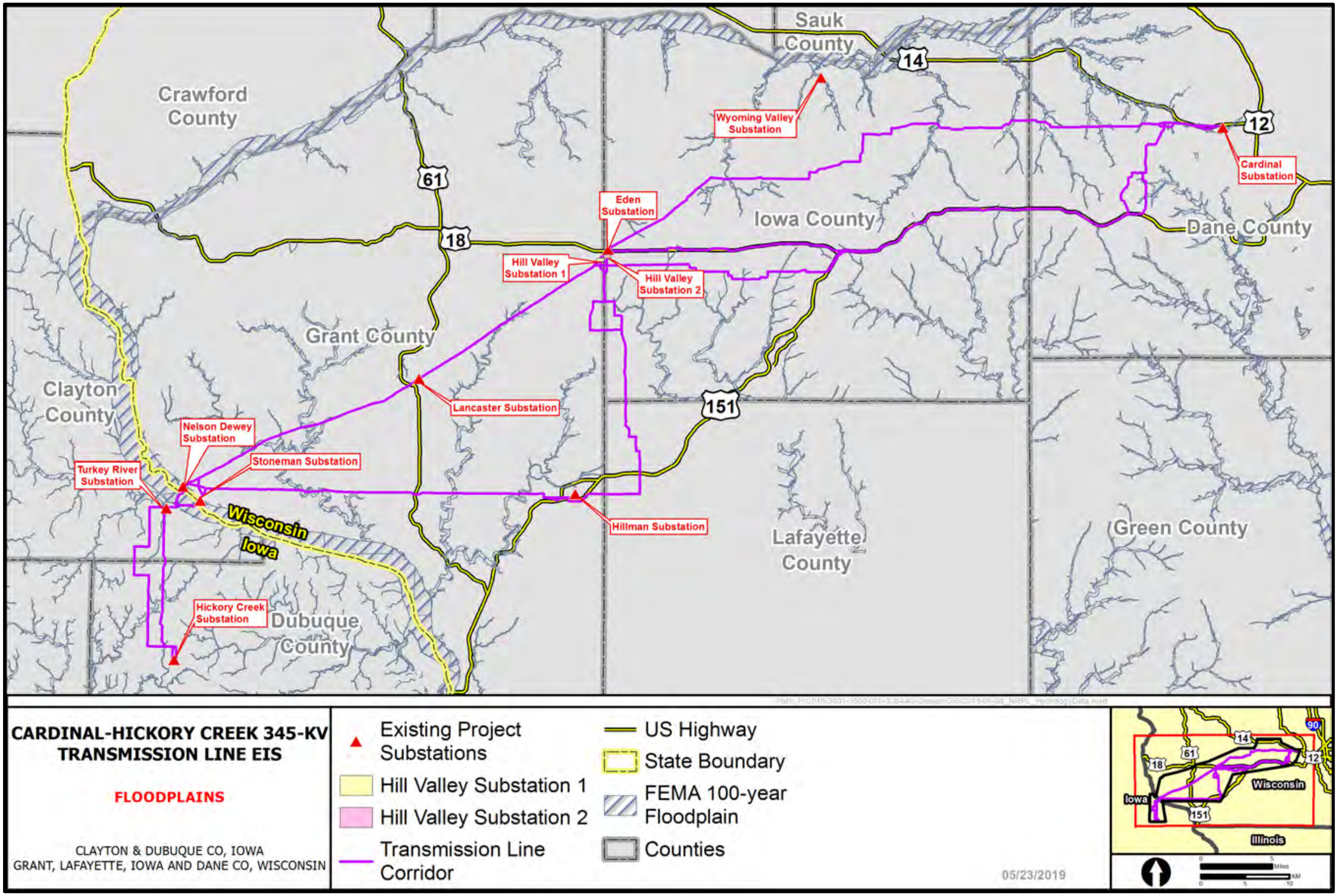

Figure 3.5-2. Floodplains in the action area.

3.5.1.8 GROUNDWATER RESOURCES

Groundwater is water stored underground in rock crevices and in the pores of geologic materials. An aquifer is a geologic formation that can accumulate, store, and yield a usable quantity of groundwater. In the analysis area there are three types of aquifers: 1) sand and gravel aquifers; 2) sandstone and dolomite aquifers; and 3) crystalline aquifers. As is clear by their name, each aquifer type exists within different geologic materials and with these divergent geologic materials, the quantity and quality of the water varies.

Sand and gravel aquifers exist along a small portion of the northeastern edge of the analysis area and along the Mississippi River. The sand and gravel aquifers are very productive sub-regional aquifers. The thick sandy deposits, along the Wisconsin River Valley and the northeastern edge of the analysis area, were deposited by a large outwash river fed by melting glaciers. These deposits have great storage and conductivity properties, resulting in an aquifer allowing for rapid infiltration and for large quantities to be extracted with relative ease.

Sandstone and dolomite aquifers are the principal bedrock aquifer within the study area because of their ability to provide good quality and adequate quantities of groundwater. Spatially, these aquifers exist beneath nearly the entire analysis area. As described previously in Section 3.2, groundwater can dissolve dolomite overtime creating karst and where karst form the potential for sinkhole development exists.

Crystalline bedrock aquifers are comprised of cracks and fractures storing and transmitting water in granite-type crystalline rock and exist beneath the entire study area. Extent and severity of fractures vary spatially and are difficult to predict. The crystalline bedrock aquifer often cannot provide adequate quantities of water for larger water users and may have dissolved minerals that compromise the water quality.

The depth to groundwater across the project study area is highly variable ranging from a few feet in valleys and along the Mississippi River to over 100 feet in the higher elevation areas. In general, where sand and gravel aquifers exist, they are the shallowest aquifers. The sandstone and dolomite aquifers occur beneath the sand and gravel aquifers and above the crystalline aquifers.

Groundwater resources throughout the analysis area are used by agriculture producers, industrial, domestic, and municipal users. Groundwater is regulated by the IDNR and WDNR with respect to drinking water, wellhead protection, and source water protection. There are five communities within the area of analysis that have groundwater protection plans in place: Lancaster (WI), Fennimore (WI), Montfort (WI), Dodgeville (WI), Blue Mounds (WI).

3.5.1.8.1 Refuse Hideaway Landfill

The Refuse Hideaway Landfill is a closed landfill located in rural Dane County, Wisconsin, approximately 2 miles west of Middleton and 4 miles east of Cross Plains (Figure 3.5-3). The landfill was operational between 1974 and 1988, and contained commercial and industrial waste. The landfill was closed in 1988 when volatile organic compounds (VOCs) were discovered in several private wells southwest of the site and in groundwater surrounding the site. Contaminated groundwater from the Refuse Hideaway Landfill is found beneath around a half-mile portion of all proposed alternative routes for the C-HC Project due west of the Cardinal Substation, as shown in Figure 3.5-3.

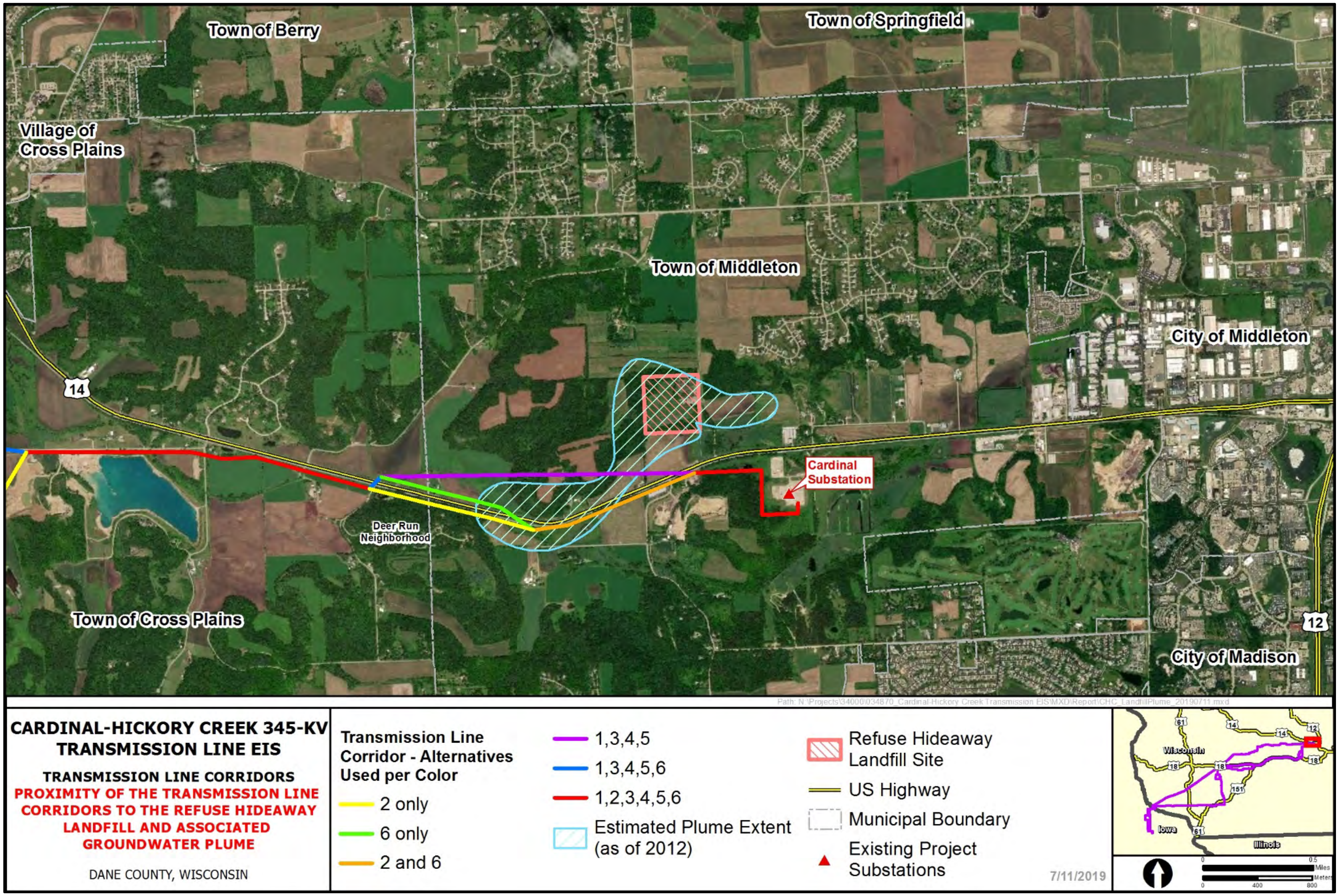

Figure 3.5-3. Refuse Hideaway Landfill site

Groundwater impacts from the Refuse Hideaway Landfill are being remediated through the USEPA's Superfund program. Cleanup oversight is completed by the USEPA and WDNR and remediation status reports are available on the WDNR website (https://dnr.wi.gov/topic/Brownfields/WRRD.html). Currently, residents near the site rely on groundwater for drinking water and other domestic uses. According to the most recent site review report (USEPA 2017a), with continued operation of the site remedy and treatment units, groundwater does not currently pose a public health hazard to nearby residents that obtain their drinking water from private wells. In the future, there could be potential for contaminated groundwater to flow into drinking water wells 1 mile west-southwest of the site in the Deer Run Heights neighborhood, located south of U.S. Highway 14. As noted in the most recent site review report, groundwater monitoring of domestic and monitoring wells has not shown detectable levels of VOCs in the Deer Run Heights neighborhood. The site has continued to be monitored and according to the current WDNR Refuse Hideaway Landfill Case Manager, the plume has been stable in its configuration for several years (WDNR 2019a).

To ensure protection for future water users in the areas, WDNR established a special drinking water well casing requirement for the area. The requirement compels well drillers proposing to drill new water supply wells within the area surrounding the Refuse Hideaway Landfill to contact WDNR for a specific well casing depth requirement to avoid the zone of potentially contaminated groundwater.

3.5.1.8.2 Sole Source Aquifers

The USEPA defines a sole source aquifer as one where the aquifer supplies at least 50% of the drinking water for its service area, or one where there are no reasonably available alternative drinking water sources should the aquifer become contaminated. At the time of this study, no aquifers within the analysis area are designated as sole source aquifers (USEPA 2018b).

3.5.2 *Environmental Consequences*

This section describes potential impacts to water resources and quality, associated with the construction, operation, and maintenance of the C-HC Project. Impacts are presented in terms of crossing surface water features, disturbance with drainages, and changes to water quality.

3.5.2.1 DATA SOURCES, METHODS, AND ANALYSIS ASSUMPTIONS

The following impact indicators were considered when analyzing impacts to water resources:

- Number of potential jurisdictional waterways to be crossed by the C-HC Project. Provides a measure of potential direct and indirect impact to surface waters.
- Acres of disturbance within potential jurisdictional drainages.
- Potential impacts to groundwater resources due to project construction or project facilities.
- Potential changes in surface water contaminants of concern, including increases in sediment from erosion, compared to applicable state surface water standards and concentrations of groundwater contaminants of concern compared to applicable state groundwater standards.
- Potential impacts to floodplains measured as expected changes in surface flow capacities, velocities, and stages due to temporary or permanent disturbances; and expected changes in downstream channel morphology.

The following assumptions based upon construction methods, permitting requirements, and water resources identified within the analysis area were applied to assess potential impacts of the project:

- According to the Utilities application to the Public Service Commission of Wisconsin, no transmission line structures would be placed below the ordinary high-water mark (OHWM) of waterways and no temporary structures would be placed below the OHWM. Therefore, there would be no disturbance within potential jurisdictional drainages under any of the action alternatives.
- In Iowa and Wisconsin, Floodplain Development Permits would be required for proposed construction activities within a regulatory floodplain. In Iowa, a permit from the local floodplain management agency (county, city, town, etc.) would generally be required for any construction in the floodplain. In Iowa, depending on the size of the contributing drainage area of the stream crossed, a Joint Permit may also be required from the USACE and the IDNR. There is no known Joint Permit requirement within Wisconsin.
- Many floodplains can be freely spanned. In general, if a floodplain crossing is greater than 1,000 feet, it cannot be freely spanned, and structure(s) would need to be placed in the floodplain. Structures would be placed so the transmission lines span the channel, preferably with transmission line structures located several hundred feet outside the channel banks. For each alternative, floodplain crossings greater than 1,000 feet are assumed to require support structures within the mapped 100-year floodplain. Floodplain crossings greater than 1,000 feet wide are identified below for each alternative.
- Erosion and sediment control measures, including measures for stabilization of disturbed areas during and at the completion of construction, would be defined in the SWPPP for the project. Not all areas would be disturbed at the same time.
- The Utilities have identified locations where temporary clear span bridges (TCSBs) and permits would be required. Wisconsin law requires a permit for construction of temporary bridges over navigable waters. There is no known permit specific to TCSBs over navigable waters in Iowa; however, applicable local, state, and Federal permits would be required for temporary bridges over waterways with respect to potential impacts to floodplains, flood control structures, wetlands, and other water resources throughout the extent of the project. In Wisconsin, documentation and coordination with the WDNR will be required for Outstanding or Exceptional Waters to demonstrate the proposed project meets the requirements of the antidegradation rule (WAC Chapter NR 207).

Table 3.5-1 defines the impact thresholds for defining impacts to water resources and quality. These thresholds are used in this section to characterize the intensity and duration of impacts that are estimated for each alternative.

Table 3.5-1. Water Resources and Quality Impact Intensity Definitions

	Minor Impact	Moderate Impact	Major Impact
Water Resources and Quality	The effect on groundwater or surface waters would be measurable or perceptible, but small and localized. The effect would not alter the physical or chemical characteristics of the groundwater or surface water or aquatic influence zone resource.	The effect on groundwater or surface waters would be measurable or perceptible and could alter the physical or chemical characteristics of the surface water resources in a localized area, but not to large areas. The functions typically provided by the groundwater or surface water or aquatic influence zone would not be substantially altered.	The impact would cause a measurable effect on groundwater or surface waters and would modify physical or chemical characteristics of the groundwater or surface waters. The impacts would be substantial and highly noticeable. The character of the surface water or aquatic influence zone would be changed so that the functions typically provided by the groundwater or surface water or aquatic influence zone would be substantially altered.

3.5.2.2 NO ACTION

The No Action Alternative would result in no impacts to water resources and quality within the analysis area. The proposal would not be constructed or operated. As such, water resources and quality would not be impacted.

3.5.2.3 IMPACTS COMMON TO ALL ACTION ALTERNATIVES

Most water resource impacts would be associated with construction of the C-HC Project. These impacts fall into one of three broad categories: (1) potential adverse impacts on water quality due to the effect of construction activities on discharges, (2) potential changes to water quantity because of diversion or use of water, primarily during construction, and (3) impacts to floodplains due to fill associated with project footprints. The first two impacts are short term. The third impact is long term.

Materials would be used during construction, including petroleum products (oil, gasoline, diesel) and other hazardous materials, that are potential contaminants that could impact surface water or shallow groundwater. The C-HC Project includes environmental commitments and BMPs that are intended to minimize the risk of water contamination from these construction-related sources (see Table 3.1-4 in Section 3.1). These BMPs are standard industry practices and are typically effective at minimizing risk for accidental release of contaminants to surface water or shallow ground water when implemented properly.

Surface Water

The most common contaminant from construction activity is the movement of sediment by stormwater into nearby surface waters, due to ground disturbance. The C-HC Project includes environmental commitments and BMPs that are intended to stabilize disturbed ground, control erosion from disturbed areas, and prevent sediment from entering surface waters. The SWPPP(s) required to be prepared for the construction activities would identify the specific structural control measures and BMPs to be implemented. When implemented properly, as required under Section 402 of the CWA, these activities minimize the risk for erosion and movement of sediment in stormwater. Once the areas disturbed by construction activities are revegetated, runoff from the ROW and the substation areas would contain minimal sediment and would not be likely to impact surface water quality. Adverse impacts from sedimentation is expected to be short term for all alternatives.

Taller (approximately 196 feet), tubular steel, H-frame support structures may be required at the channel crossings, so the transmission line can span the channel and still provide adequate clearance for river-going vessels. At either crossing location, the transmission line would need to have a free span of approximately 1,600 feet in order to span the channel. With the support structures outside the channel and the transmission line elevated according to U.S. Coast Guard standards, the impacts to the Mississippi River would be temporary and minor.

The removal of tall vegetation from areas adjacent to surface water bodies can cause water temperatures to rise and may adversely affect aquatic habitat, especially cold-water systems, like trout streams. Depending on the height of the vegetation along the banks of the surface water body, removal of vegetation for construction and operation of the C-HC Project may be necessary for safety reasons. The removal of tall vegetation that provides shade to the nearby water body could result in long-term adverse impacts to aquatic habitat, especially if sufficiently tall vegetation cannot be allowed to reestablish within the ROW for safety reasons. Therefore, impacts to trout streams are expected to be moderate and long term.

Similar BMPs and control measures identified above for construction activities would be implemented during operation and maintenance to minimize the risk for accidental release of potential contaminants, erosion, and movement of sediment in stormwater due to ground disturbance. It is anticipated that environmental commitments and BMPs would be incorporated during operation and maintenance of the project, and therefore any potential impacts to WUS would be minor.

No transmission line structures would be placed below the OHWM of waterways and no temporary structures would be placed below the OHWM. Therefore, there would be no disturbance within potential jurisdictional drainages under any of the action alternatives.

Floodplains

Projects that involve construction activities in a regulatory floodway must demonstrate that they would not result in increases to flood elevations ("no rise") upstream. Should the project be unable to demonstrate "no rise," a Conditional Letter of Map Revision must be submitted and approved by FEMA prior to construction. The Mississippi River floodway is the only regulatory floodway that would be crossed by the proposed alternatives. All of the alternatives would cross the Mississippi River floodway. The support structures for the transmission line would be small when compared to the Mississippi River floodway dimensions, as would be the grading required at the base of the structures. Neither the structures nor the grading at the base would be significant obstructions to the flood flows in the Mississippi River floodway. "No rise" conditions would likely be met for the proposed project, regardless of proposed Mississippi River crossing location. Modeling would be performed to demonstrate "no rise" conditions are met.

Groundwater

Some minor localized and short-term impacts to groundwater could occur in areas with shallow groundwater where construction of tower foundations requires dewatering. Dewatering requirements would be determined on a case-by-case basis for each tower construction site based on the required depth of drilling and depth to groundwater.

Regarding the impacts to groundwater flow in karst features, as stated in Section 3.2.2.3, karst features would not be expected to be directly impacted with any of the action alternatives. Karst features, such as sinkholes and caverns, would be identified and stationing between structures can be adjusted to position the structures a sufficient distance away from any karst features. This would ensure that surface water drainage patterns, groundwater flow pathways, and unstable soil and rock conditions that are associated with karst conditions would be avoided. Furthermore, any impacts would be temporary and would only be required during installation of the structural footings for the transmission towers.

The footprint of an individual foundation would be a maximum of 12 feet in diameter or 0.003 acre, and the impermeable surface that the structure would create would be small in comparison to the groundwater flows within an aquifer. In areas where the structure foundations intersect groundwater, any deflections in groundwater flow would be highly localized because groundwater would readily flow around the impermeable cylinder. No long-term impacts to groundwater are anticipated.

Refuse Hideaway Landfill

As noted above, groundwater contamination exists in the aquifer beneath the area surrounding the Refuse Hideaway Landfill. Depending on the exact location of the tower foundations, contaminated groundwater could be encountered during foundation construction along the approximately 0.5-mile section of the proposed alternatives that overlie the impacted groundwater, as shown in Figure 3.5-3.

Since residents in the area, including the Deer Run Heights subdivision, rely on groundwater as their source of drinking water, comments were submitted during the DEIS review period about the impacts of C-HC Project construction on groundwater flow and plume configuration. The structure foundations for the C-HC Project are not expected to change the rate or direction of groundwater flow except around the immediate perimeter of the foundation structure. The overall rate and direction of groundwater flow in the area would not be altered by the foundations (WDNR 2019a). Therefore, only localized groundwater impacts could occur at each tower foundation, resulting in no long-term impact on the configuration of the groundwater plume. However, if dewatering of the foundation boreholes is needed during construction, then additional evaluation by WDNR would be needed to determine possible impacts to the groundwater plume (WDNR 2019).

During construction in the area overlying the Refuse Hideaway Landfill groundwater plume, health and safety requirements and contaminated material handling requirements would be followed. Specifically, the Utilities would follow Occupational Safety and Health Administration (OSHA) requirements associated with working with potentially contaminated soil and groundwater. Furthermore, once the final project route is selected and final design is underway, the Utilities would develop a geotechnical investigation plan which would include an environmental sampling plan for collection of groundwater and soil samples. The environmental sampling plan would be provided to the WDNR Refuse Hideaway Landfill Case Manager for review and input. After the environmental samples have been collected, the sampling results would be provided to WDNR. In addition, the Utilities would draft a Contaminated Soil and Groundwater Management Plan, as appropriate, for the C-HC Project in the vicinity of the Refuse Hideaway Landfill site for WDNR review. In the unlikely event that the sample results indicate a formal approval process is required by WDNR, an approval process consistent with the WAC Department of Natural Resources Chapters NR 700-754 would be followed. The Contaminated Soil and Groundwater Management Plan would identify appropriate disposal methods for contaminated soil and groundwater intercepted during construction of the C-HC Project.

3.5.2.4 ALTERNATIVE 1

The water resources that would be crossed by Alternative 1 are provided in Table 3.5-2. Alternative 1 would cross approximately 9,091 feet of floodway and 43,661 feet of 100-year floodplain. Alternative 1 would also cross one Meandered Sovereign River (the Mississippi River), eight 303(d) Impaired Waters, three Outstanding and Exceptional Waters, and 14 trout streams. A description of potential impacts to these water resources is provided under Impacts Common to All Alternatives (above).

Table 3.5-2. Water Resources Crossed by Alternative 1

	Floodplain Crossed (linear feet)	Floodway Crossed (linear feet)	Crossings > 1,000 feet Wide (number)	Meandered Sovereign River (number)	Impaired Waters (number)	Outstanding and Exceptional Waters (number)	Trout Streams (number)
Alternative 1	43,661	9,091	14	1	8	3	14

A summary of floodplain crossings, including those greater than 1,000 feet in length, is included in Table 3.5-3. For Alternative 1, there are 14 floodplain crossings that would be greater than 1,000 feet. In these locations, it is likely that transmission line structures would be placed within the 100-year floodplain. It is anticipated the Utilities would need to coordinate with the applicable floodplain management agencies to ensure consistency with floodplain regulations and ordinances.

Table 3.5-3. 100-Year Floodplain Crossings Greater than 1,000 feet under Alternative 1

River or Stream Name	Crossings > 1,000 feet Wide (number)	Floodplain Crossed (linear feet)
Black Earth Creek	3	3,440
Vermont Creek and Tributary	1	4,340
East Branch Blue Mounds Creek	1	1,290
West Branch Blue Mounds Creek	1	1,590
Platte River	1	1,510
Platte River	1	3,950
Pigeon Creek	1	1,560
Grant River	1	4,830
Rattlesnake Creek	2	5,400
Mississippi River	1	9,131
North Fork Maquoketa River	1	1,310

Retirement of the N-9 Transmission Line and Construction of a New 69-kV Tap Line

Decommissioning of the N-9 transmission line would result in removal of the N-9 line within approximately 18.8 acres of 100-year floodplain in the Refuge. Disturbance in the floodplain would be limited to the decommissioning period within the ROW. During decommissioning, ground cover and soils would be temporarily disturbed. This would result in a temporary minor impact. Upon completion of decommissioning, existing transmission structures would be removed from the 100-year floodplain. This would result in a long-term beneficial impact as the floodplain acreage would be restored to a more natural state, benefitting the floodplain function and regaining a small amount of floodplain storage.

The construction of the tap line would occur in 0.3 acre of floodplain outside of the Refuge. Temporary construction impacts would be similar to those discussed for the decommissioning of the N-9 line. During construction, ground cover and soils would be temporarily disturbed. Impacts in the floodplains would be temporary in nature and the area not occupied by the transmission structures would be reclaimed and revegetated to preconstruction conditions. Permanent disturbance in the floodplain would be limited to the area needed for the new transmission line structures. There would be a minor, long-term impact to the 0.3 acre of floodplain where the new tap line would be constructed.

Impacts to groundwater and surface waters are not anticipated. Construction-related liquids (e.g., equipment lubricants) would be managed to avoid spills and vehicle fueling would occur off-site. Ground-disturbing construction activities including the operation of construction vehicles adjacent to waterways involves some risk to water quality; ground disturbance resulting from excavation, grading, and construction traffic may lead to sediments reaching surface waters. The most common contaminant from construction activity is the movement of sediment by stormwater into nearby surface waters, due to ground disturbance. When implemented properly, as required under Section 402 of the Clean Water Act, these activities minimize the risk for erosion and movement of sediment in stormwater. Once the areas disturbed by construction activities are revegetated, runoff from the ROW and the substation areas would contain minimal sediment and would not be likely to impact surface water quality. Any adverse impact from sedimentation is expected to be short term for the decommissioning the N-9 transmission line and construction of the 0.2-mile tap line.

3.5.2.5 ALTERNATIVE 2

The water resources that would be crossed by Alternative 2 are provided in Table 3.5-4. Alternative 2 would cross approximately 8,620 feet of floodway and 40,100 feet of 100-year floodplain. Alternative 2 would also cross one Meandered Sovereign River, eight 303(d) Impaired Waters, four Outstanding and Exceptional Waters, and 15 trout streams. A description of potential impacts to these water resources is provided under Impacts Common to All Alternatives (above).

Table 3.5-4. Alternative 2 Water Resource Impacts

	Floodplain Crossed (linear feet)	Floodway Crossed (linear feet)	Crossings > 1,000 feet Wide (number)	Meandered Sovereign River (number)	Impaired Waters (number)	Outstanding and Exceptional Waters (number)	Trout Streams (number)
Alternative 2	40,100	8,620	14	1	8	4	15

A summary of floodplain crossings, including those greater than 1,000 feet in length, is included in Table 3.5-5. For Alternative 2, there are 14 floodplain crossings that would be greater than 1,000 feet. In these locations, it is likely that transmission line structures would be placed within the 100-year floodplain. It is anticipated the Utilities would need to coordinate with the applicable floodplain management agencies to ensure consistency with floodplain regulations and ordinances.

Table 3.5-5. 100-Year Floodplain Crossings Greater than 1,000 feet under Alternative 2

River or Stream Name	Crossings > 1,000 feet Wide (number)	Floodplain Crossed (linear feet)
Black Earth Creek	1	1,040
Black Earth Creek	1	1,710
Unnamed	1	1,710
Vermont Creek and Tributary	1	4,340
East Branch Blue Mounds Creek	1	1,290
West Branch Blue Mounds Creek	1	1,590
Platte River	2	5,460
Pigeon Creek	1	1,560
Grant River	1	4,830
Rattlesnake Creek	2	5,400
Mississippi River	1	9,240
North Fork Maquoketa River	1	1,080

Retirement of the N-9 Transmission Line and Construction of a New 69-kV Tap Line

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.5.2.6 ALTERNATIVE 3

The water resources that would be crossed by Alternative 3 are provided in Table 3.5-6. Alternative 3 would cross approximately 8,620 feet of floodway and 28,310 feet of 100-year floodplain. Alternative 3 would also cross one Meandered Sovereign River, five 303(d) Impaired Waters, five Outstanding and Exceptional Waters, and 10 trout streams. A description of potential impacts to these water resources is provided under Impacts Common to All Alternatives (above).

Table 3.5-6. Alternative 3 Water Resource Impacts

	Floodplain Crossed (linear feet)	Floodway Crossed (linear feet)	Crossings > 1,000 feet Wide (Number)	Meandered Sovereign River (Number)	Impaired Waters (number)	Outstanding and Exceptional Waters (number)	Trout Streams (number)
Alternative 3	28,310	8,620	10	1	5	5	10

A summary of floodplain crossings, including those greater than 1,000 feet in length, is included in Table 3.5-7. For Alternative 3, there are 10 floodplain crossings that would be greater than 1,000 feet. In these locations, it is likely that transmission line structures would be placed within the 100-year floodplain. It is anticipated the Utilities would need to coordinate with the applicable floodplain management agencies to ensure consistency with floodplain regulations and ordinances.

Table 3.5-7. 100-Year Floodplain Crossings Greater than 1,000 feet under Alternative 3

River or Stream Name	Crossings > 1,000 feet Wide (number)	Floodplain Crossed (linear feet)
Black Earth Creek	3	3,440
Vermont Creek and Tributary	1	4,340
East Branch Blue Mounds Creek	1	1,290
West Branch Blue Mounds Creek	1	1,590
Platte River	1	1,150
Grant River	1	1,050
Mississippi River	1	9,240
North Fork Maquoketa River	1	1,310

Retirement of the N-9 Transmission Line and Construction of a New 69-kV Tap Line

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.5.2.7 ALTERNATIVE 4

The water resources that would be crossed by Alternative 4 are provided in Table 3.5-8. Alternative 4 would cross approximately 8,620 feet of floodway and 21,150 feet of 100-year floodplain. Alternative 4 would also cross one Meandered Sovereign River, eight 303(d) Impaired Waters, eight Outstanding and Exceptional Waters, and seven trout streams. A description of potential impacts to these water resources is provided under Impacts Common to All Alternatives (above).

Table 3.5-8. Alternative 4 Water Resource Impacts

	Floodplain Crossed (linear feet)	Floodway Crossed (linear feet)	Crossings > 1,000 feet Wide (Number)	Meandered Sovereign River (Number)	Impaired Waters (number)	Outstanding and Exceptional Waters (number)	Trout Streams (number)
Alternative 4	21,150	8,620	8	1	8	8	7

A summary of floodplain crossings, including those greater than 1,000 feet in length, is included in Table 3.5-9. For Alternative 4, there are eight floodplain crossings that would be greater than 1,000 feet. In these locations, it is likely that transmission line structures would be placed within the 100-year floodplain. It is anticipated the Utilities would need to coordinate with the applicable floodplain management agencies to ensure consistency with floodplain regulations and ordinances.

Table 3.5-9. 100-Year Floodplain Crossings Greater than 1,000 feet under Alternative 4

River or Stream Name	Crossings > 1,000 feet Wide (Number)	Floodplain Crossed (linear feet)
Black Earth Creek	3	3,440
Pecatonica River and Tributaries	1	1,150
Platte River	1	1,150
Grant River	1	1,050
Mississippi River	1	9,240
North Fork Maquoketa River	1	1,310

Retirement of the N-9 Transmission Line and Construction of a New 69-kV Tap Line

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.5.2.8 ALTERNATIVE 5

The water resources that would be crossed by Alternative 5 are provided in Table 3.5-10. Alternative 5 would cross approximately 9,091 feet of floodway and 21,051 feet of 100-year floodplain. Alternative 5 would also cross one Meandered Sovereign River, nine 303(d) Impaired Waters, eight Outstanding and Exceptional Waters, and eight trout streams. A description of potential impacts to these water resources is provided under Impacts Common to All Alternatives (above).

Table 3.5-10. Alternative 5 Water Resource Impacts

	Floodplain Crossed (linear feet)	Floodway Crossed (linear feet)	Crossings > 1,000 feet Wide (number)	Meandered Sovereign River (number)	Impaired Waters (number)	Outstanding and Exceptional Waters (number)	Trout Streams (number)
Alternative 5	21,051	9,091	7	1	9	8	8

A summary of floodplain crossings, including those greater than 1,000 feet in length, is included in Table 3.5-11. For Alternative 5, there are seven floodplain crossings that would be greater than 1,000 feet. In these locations, it is likely that transmission line structures would be placed within the 100-year floodplain. It is anticipated the Utilities would need to coordinate with the applicable floodplain management agencies to ensure consistency with floodplain regulations and ordinances.

Table 3.5-11. 100-Year Floodplain Crossings Greater than 1,000 feet under Alternative 5

River or Stream Name	Crossings > 1,000 feet Wide (number)	Floodplain Crossed (linear feet)
Black Earth Creek	3	3,440
Platte River	1	1,150
Grant River	1	1,050
Mississippi River	1	9,131
North Fork Maquoketa River	1	1,310

Retirement of the N-9 Transmission Line and Construction of a New 69-kV Tap Line

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.5.2.9 ALTERNATIVE 6

The water resources that would be crossed by Alternative 6 are provided in Table 3.5-12. Alternative 6 would cross approximately 9,091 feet of floodway and 35,091 feet of 100-year floodplain. Alternative 6 would also cross one Meandered Sovereign River, six 303(d) Impaired Waters, seven Outstanding and Exceptional Waters, and 12 trout streams. A description of potential impacts to these water resources is provided under Impacts Common to All Alternatives (above).

Table 3.5-12. Alternative 6 Water Resource Impacts

	Floodplain Crossed (linear feet)	Floodway Crossed (linear feet)	Crossings > 1,000 feet Wide (number)	Meandered Sovereign River (number)	Impaired Waters (number)	Outstanding and Exceptional Waters (number)	Trout Streams (number)
Alternative 6	35,091	9,091	11	1	6	7	12

A summary of floodplain crossings, including those greater than 1,000 feet in length, is included in Table 3.5-13. For Alternative 6, there are 11 floodplain crossings that would be greater than 1,000 feet. In these locations, it is likely that transmission line structures would be placed within the 100-year floodplain. It is anticipated the Utilities would need to coordinate with the applicable floodplain management agencies to ensure consistency with floodplain regulations and ordinances.

Table 3.5-13. 100-Year Floodplain Crossings Greater than 1,000 feet under Alternative 6

River or Stream Name	Crossings > 1,000 feet Wide (number)	Floodplain Crossed (linear feet)
Black Earth Creek	3	3,440
Pecatonica River and Tributaries	1	1,150
Platte River	2	5,460
Pigeon Creek	1	1,560
Grant River	1	4,830

River or Stream Name	Crossings > 1,000 feet Wide (number)	Floodplain Crossed (linear feet)
Rattlesnake Creek	2	5,400
Mississippi River	1	9,131
North Fork Maquoketa River	1	1,310

Retirement of the N-9 Transmission Line and Construction of a New 69-kV Tap Line

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.5.3 *Summary of Impacts*

The potential impacts to water resources as a result of the C-HC Project are summarized in Table 3.5-14. Alternative 1 would cross the largest floodplain acreage and water body crossings greater than 1,000 feet wide. Alternative 5 would cross the least floodplain acreage and the fewest water body crossings greater than 1,000 feet. Alternative 5 would cross the greatest number of impaired water bodies, while Alternative 3 would cross the least. Alternatives 4 and 5 would cross the greatest number of Outstanding and Exceptional Waters, while Alternative 1 would cross the least. Alternative 2 would cross the greatest number of trout streams, while Alternative 4 would cross the least.

Impacts to surface water during construction would be temporary and primarily due to potential sediment discharges from disturbed areas, including temporary crossings at streams. Where the transmission line crosses the riparian corridor, the removal of trees and clearing and grubbing within the ROW would also cause temporary disturbance, until permanent vegetative cover is reestablished. If preconstruction vegetation cover along riparian areas is not allowed to become reestablished due to safety precautions associated with the transmission line, impacts to surface water would be long term. Under all action alternatives, transmission line structures may need to be placed within floodplains and this floodplain development would require coordination with the applicable floodplain management agencies. As a result, impacts to both surface water and groundwater are expected to be short and long term and minor. Maintenance activities would likely have minimal impacts. Maintenance work on the transmission line or structures would be done above or outside the stream crossings, respectively. Work done on the ground to manage vegetation in the ROW would need to be done with care, to avoid sediment discharges to the adjacent streams. Furthermore, in accordance with its environmental commitments, the Utilities will employ a Certified Pesticide Applicator for all herbicide applications within the C-HC Project.
The Certified Pesticide Applicators will only use herbicides registered and labeled by the USEPA and will follow all herbicide product label requirements. Herbicides approved for use in wetland and aquatic environments will be used in accordance with label requirements, as conditions warrant.

The N-9 transmission line decommissioning that would occur within the Refuge would result in temporary minor impacts to floodplains during decommissioning. There would be long-term beneficial impacts to 18.8 acres of floodplains. There would be no impacts to surface waters or groundwater.
The N- transmission line decommissioning and tap line construction on private land would result in minor long-term impacts to 0.3 acres of floodplain. There would be no impacts to surface waters or groundwater. There would be no impact to water resources and quality from substation improvements.

Table 3.5-14. Water Resource Impacts Summary

	Floodplain Crossed (linear feet)	Floodway Crossed (linear feet)	Crossings > 1,000 feet Wide (Number)	Meandered Sovereign River (Number)	Impaired Waters (number)	Outstanding and Exceptional Waters (number)	Trout Streams (number)
Alternative 1	43,661	9,091	14	1	8	3	14
Alternative 2	40,100	8,620	14	1	8	4	15
Alternative 3	28,310	8,620	10	1	5	5	10
Alternative 4	21,150	8,620	8	1	8	8	7
Alternative 5	21,051	9,091	7	1	9	8	8
Alternative 6	35,091	9,091	11	1	6	7	12

3.6 Air Quality and Climate Change

This section describes air quality conditions that occur within the C-HC Project's analysis area. For air quality, the analysis area contains portions of six counties: Clayton and Dubuque Counties in Iowa; and Dane, Grant, Iowa, and Lafayette Counties in Wisconsin. Air pollutants tend to disperse into the atmosphere, becoming more spread out as they travel away from a source of pollution, and therefore cannot be confined within defined boundaries, such as the boundary of the ROW or county lines. Because of the nature of air pollutants, the air quality analysis area extends 5 miles in all directions beyond the project ROW.

Air quality is characterized by meteorology and climate, ambient air quality standards, and county emission inventories. Calculated estimates of how much of each pollutant the C-HC Project will create are compared to the county emission inventories in order to show the amount of pollution caused by the C-HC Project, compared with the annual pollution contribution of each county.

3.6.1 *Affected Environment*

3.6.1.1 METEOROLOGY AND CLIMATE

Wisconsin and Iowa are located in the interior of the United States, exposing them to a climate with large ranges in temperature. The project area experiences cold winters and mild to hot summers. The lack of mountains to the north or south allows for incursions of bitterly cold air masses from the Arctic, as well as warm and humid air masses from the Gulf of Mexico, further increasing the range of conditions that can affect these two states. The winter season is dominated by dry and cold air with occasional intrusions of milder air from the west and south. The summer is characterized by frequent warm air masses, either hot and dry continental air masses from the Arid West and Southwest, or warm and moist air from the South. However, periodic intrusions of cooler air from Canada provide breaks from summer heat.
The average winter temperature (January–March) is 25°F and 19.0°F in Iowa and Wisconsin, respectively, while the average summer temperature (June–August) is 71.5°F and 66.5°F, respectively (National Oceanic and Atmospheric Administration [NOAA] National Centers for Environmental Information 2018a). Precipitation varies widely across Iowa and Wisconsin, with the project area portion of the states receiving around 30 inches annually. Much of the project area's precipitation falls during the summer months. Snowfall averages around 40 inches in the project area (NOAA National Centers for Environmental Information 2018b, 2018c).

3.6.1.2 AMBIENT AIR QUALITY STANDARDS

Federal regulations that govern air quality resources have established the following National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. The NAAQS are presented in Table 3.6-1. Ambient Air Quality Standards. The USEPA assigns classifications to geographic areas based on monitored ambient air quality conditions. Areas that meet both the primary and secondary standards of a pollutant subject to NAAQS are classified as being in attainment for that pollutant. Areas that do not meet the NAAQS for a pollutant are designated as being in nonattainment for that pollutant. Areas that cannot be classified based on available information for a pollutant are designated as being unclassified. An area's attainment status is designated separately for each criteria pollutant; one area may have all three classifications. Previously designated nonattainment areas for one of the NAAQS that have since met the NAAQS standards are referred to as attainment areas with a maintenance plan. To ensure that the air quality in those areas continues to meet the standards, a maintenance plan is developed and implemented. The analysis area is in attainment for criteria pollutants. There is a 1.6-square-mile portion of Dane County, outside the analysis area, that is designated as a maintenance area for sulfur dioxide (SO_2).The maintenance area is 10 miles to the east of Cardinal Substation and surrounds the Dane County Regional Airport.

The Wisconsin Ambient Air Quality Standards are codified in WAC, Chapter NR 404, Article 4. Rules pertaining to air quality are found in Chapters 400 through 499, of the WAC, administered by the WDNR. Under the provisions of the Clean Air Act, any state can have requirements that are more stringent than those of the national program. In addition to the NAAQS established by the USEPA, Wisconsin has additional ambient air quality standards that apply. The Wisconsin Ambient Air Quality Standards are presented in Table 3.6-1. Iowa does not have any separate ambient air quality standards (IAC 567, Chapter 28, part 1).

In 1999, the USEPA announced an effort to improve air quality and visibility in 156 national parks and wilderness areas designated as Class I, known as the Regional Haze Rule (USEPA 1999). Regional haze reduces long-range visibility over a wide region. Section 169A of the Clean Air Act sets forth a national goal for visibility. States are required by the rule to demonstrate reasonable progress toward the "prevention of any future, and the remedying of any existing, impairment in Class I areas which impairment results from manmade air pollution." The nearest Class I area is 441 km northeast of the project in the upper peninsula of Michigan, too far for the project to affect.

The General Conformity Rule was established under the Clean Air Act Section 176(c)(4) and serves to ensure that Federal actions do not inhibit state's attainment plans for areas designated as non-attainment or maintenance. The rule effectively applies to all Federal actions that take place in areas designated as non-attainment or maintenance. De minimis levels, established under the General Conformity Rule, are based on the severity of an area's air quality problem and establish a threshold for determining if a general conformity determination must be performed. Activities below this threshold level are assumed to have no significant impact on air quality. De minimis levels for hazardous air pollutants (HAPs) and greenhouse gases (GHGs) are not yet defined. Exceptions to the General Conformity Rule include the following: actions covered under the transportation conformity rule; actions with associated emissions below specified de minimis levels; and other actions that are exempt or presumed to conform. The 1.6 square mile portion of Dane County that is designated as a maintenance area for SO_2 falls outside the air quality analysis area for this FEIS. The maintenance area is 10 miles to the east of Cardinal Substation and surrounds the Dane County Regional Airport. Thus, the General Conformity Rule does not apply.

Table 3.6-1. Ambient Air Quality Standards

Pollutant	Averaging Time	National		Wisconsin	
		Primary Standards	Secondary Standards	Primary Standards	Secondary Standards
CO	1 hour [a] 8 hour [a]	35 ppm 9 ppm	– –	35 ppm 9 ppm	– –
Pb	3 months (rolling) [b]	0.15 µg/m^3	Same as primary	0.15 µg/m^3	1.5 µg/m^3
NO_2	Annual [c] 1 hour [d]	0.053 ppm 0.100 ppm	Same as primary --	0.053 ppm 0.100 ppm	Same as primary --
O_3	1 hour [a] 8 hour [e]	-- 0.07 ppm	-- Same as primary	0.12 ppm 0.07 ppm	Same as primary 0.08 ppm
PM_{10}	24 hour [f]	150 µg/m^3	Same as primary	150 µg/m^3	Same as primary
$PM_{2.5}$	24 hour [g] Annual [h]	35 µg/m^3 12 µg/m^3	Same as primary 15 µg/m^3	35 µg/m^3 12 µg/m^3	Same as primary 15 µg/m^3
SO_2	1 hour [i] 3 hour [j]	0.075 ppm --	-- 0.5 ppm	0.075 ppm --	-- 0.5 ppm

Sources: USEPA (2018a); WAC, Chapter NR 404, Section NR 404.04

Notes:

µg/m^3: micrograms per cubic meter.

ppm: parts per million.

ppb: parts per billion.

[a] Not to be exceeded more than once per year.

[b] Not to be exceeded.
[c] Annual mean.
[d] The 3-year average of the 98th percentile of the daily maximum 1-hour average must not exceed this standard.
[e] The 3-year average of the 4th highest daily maximum 8-hour average O_3 concentration measured at each monitor within an area over each year must not exceed this standard.
[f] Not to be exceeded more than once per year on average over 3 years.
[g] The 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed this standard.
[h] The 3-year average of the annual arithmetic mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed this standard.
[i] The 3-year average of the annual 99th percentile of the 1-hour daily maximum must not exceed this standard.
[j] Not to be exceeded more than once per year.
[k] Not to be exceeded more than once per year.
[l] Annual geometric mean.

3.6.1.3 EMISSION INVENTORIES FOR COUNTIES IN THE ANALYSIS AREA

Emission inventories are useful in comparing emission source categories to determine which industries or practices are contributing to the general level of pollution in the six counties crossed by the C-HC Project. Emission inventories provide an overview of the types of pollution sources in the area, as well as the amount of pollution being emitted on an annual basis by said sources. For the purposes of this assessment, the most recent National Emissions Inventory conducted in 2014 was summarized.

The National Emissions Inventory is a detailed annual estimate of criterial pollutants and HAPs from air emission sources. Data are collected from State, local and tribal air agencies and supplemented with data from the USEPA (2018d). The emissions inventory includes estimates of emissions from many sources including point sources, nonpoint sources, on-road sources, non-road sources, and event sources, in order to create as complete an inventory as possible. Point sources are sources of air pollutants located at a fixed point. Point sources include facilities such as power plants and airports, as well as commercial sources. Nonpoint sources are those which are too small to pinpoint as point sources. Nonpoint sources include emission sources such as asphalt paving, solvent use, and residential heating. On-road sources are emissions from on-road vehicles. Non-road sources are mobile sources of emissions that operate off road such as construction equipment, lawn and garden equipment, trains, and emissions from barges, ships, and other marine vessels. Event sources include emissions from sources such as wildfires. This inventory is a good estimate of how much each county and state is contributing to air pollution for a given year. The emission inventory data for 2014 for each county are presented in Table 3.6-2.

Table 3.6-2. 2014 County Emissions Inventories in Tons per Year

Category	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC	HAPs
Dane County, WI							
Agriculture	0	0	7,160	1,436	0	88	23
Biogenics[1]	1,257	461	0	0	0	5,948	909
Dust	0	0	7,763	906	0	0	0
Fires	2,588	54	285	240	25	603	198
Fuel Combustion	5,130	2,143	1,069	994	158	660	166
Industrial Processes	41	52	342	104	5	416	20
Miscellaneous[2]	457	11	188	171	0	5,630	653
Mobile	68,079	11,727	752	545	64	6,314	1,852
Waste Disposal	3,495	131	426	342	43	281	34
Total	**81,048**	**14,579**	**17,985**	**4,739**	**295**	**19,941**	**3,854**
Grant County, WI							
Agriculture	0	0	7,639	1,532	0	109	22
Biogenics[1]	1,285	466	0	0	0	6,999	947
Dust	0	0	3,811	414	0	0	0
Fires	1,416	26	152	128	13	332	101
Fuel Combustion	1,887	2,306	420	343	3,858	260	89
Industrial Processes	1	4	74	31	0	1	2
Miscellaneous[2]	48	1	13	12	0	708	76
Mobile	8,501	3,086	153	128	7	1,194	354
Waste Disposal	341	17	72	63	4	52	16
Total	**13,479**	**5,905**	**12,335**	**2,652**	**3,881**	**9,654**	**1,607**
Iowa County, WI							
Agriculture	0	0	2,858	577	0	46	11
Biogenics[1]	961	315	0	0	0	6,061	715
Dust	0	0	2,216	247	0	0	0
Fires	1,070	19	115	97	9	248	74
Fuel Combustion	973	86	161	158	16	144	22
Industrial Processes	0	0	19	3	0	3	0
Miscellaneous[2]	26	1	9	8	0	366	37
Mobile	5,985	1,094	74	59	5	1,005	313
Waste Disposal	207	10	42	37	2	16	7
Total	**9,221**	**1,526**	**5,494**	**1,186**	**32**	**7,890**	**1,179**
Lafayette County, WI							
Agriculture	0	0	5,647	1,135	0	58	14
Biogenics[1]	749	361	0	0	0	2,998	556

Category	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC	HAPs
Dust	0	0	1,906	205	0	0	0
Fires	400	9	46	38	4	90	32
Fuel Combustion	964	56	160	159	18	145	21
Industrial Processes	0	0	36	21	0	0	0
Miscellaneous[2]	16	0	2	2	0	246	25
Mobile	5,002	897	72	61	3	1,080	347
Waste Disposal	101	6	29	26	1	8	6
Total	**7,232**	**1,329**	**7,897**	**1,646**	**26**	**4,625**	**1,002**
Clayton County, IA							
Agriculture	0	0	3,233	610	0	262	17
Biogenics[1]	896	359	0	0	0	4,095	666
Dust	0	0	1,062	121	0	0	0
Fires	1,850	35	197	167	17	439	83
Fuel Combustion	684	56	97	97	7	102	17
Industrial Processes	0	0	231	29	0	1	0
Miscellaneous[2]	20	0	7	6	0	298	25
Mobile	6,170	1,307	72	63	3	883	279
Waste Disposal	126	7	32	29	1	10	6
Total	**9,746**	**1,766**	**4,931**	**1,121**	**28**	**6,090**	**1,092**
Dubuque County, IA							
Agriculture	0	0	3,455	680	0	218	19
Biogenics[1]	727	313	0	0	0	3,352	547
Dust	0	0	1,630	188	0	0	0
Fires	500	10	53	45	5	119	23
Fuel Combustion	1,373	374	162	157	20	179	27
Industrial Processes	2	2	22	10	0	168	9
Miscellaneous[2]	98	2	48	44	0	1,579	182
Mobile	13,205	2,248	142	104	9	1,430	421
Waste Disposal	597	25	90	75	7	83	13
Total	**16,503**	**2,975**	**5,601**	**1,303**	**40**	**7,127**	**1,241**

Source: USEPA (2018d)

Note: Column totals may not sum exactly due to rounding.

[1] Biogenic emissions are those emissions derived from natural processes (such as vegetation and soil).

[2] Miscellaneous categories include bulk gasoline terminals, commercial cooking, gas stations, miscellaneous non-industrial (not elsewhere classified), and solvent use.[3] CO_2e (CO_2 equivalent) assumes a USEPA recommended global warming potential of 25 for methane (CH_4) and 298 for nitrous oxide (N_2O).

The above table shows that out of the six counties crossed by the C-HC Project, Dane County contributed the most to all pollutants except SO_2 in 2014. Grant County contributed the most SO_2 pollution. In Dane County, mobile emissions are the biggest contributors to carbon monoxide (CO), nitrogen oxides (NO_X), VOCs, and HAP pollution. Particulate matter 10 (PM_{10}) pollution is mostly caused by dust emissions, agriculture contributes most to $PM_{2.5}$ pollution, and fuel combustion contributes most to SO_2 pollution. In Grant, Iowa, Lafayette, and Dubuque Counties, mobile emissions are the biggest contributors to CO and NO_X pollution, VOC and HAP pollution are mostly caused by biogenic emissions, agriculture contributes most to PM_{10} and particulate matter 2.5 ($PM_{2.5}$) pollution, and fuel combustion contributes most to SO_2 pollution. In Clayton County, mobile emissions are the biggest contributors to CO and NO_X pollution, VOC and HAP pollution are mostly caused by biogenic emissions, agriculture contributes most to PM_{10} and $PM_{2.5}$ pollution, and fires contribute most to SO_2 pollution. For all six counties, CO was emitted the most out of the seven pollutants.

3.6.1.4 CLIMATE CHANGE

Climate change is a global issue that results from several factors, including, but not limited to, the release of GHGs, land use management practices, and the albedo effect, or reflectivity of various surfaces (including reflectivity of clouds). Specific to the proposed project, GHGs are produced and emitted by various sources during the development and operational phases of transmission lines. The primary sources of GHGs associated with transmission lines and substations are carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) from fuel combustion in construction and maintenance vehicles and equipment, as well as operational emissions of sulfur hexafluoride (SF_6) associated with potential leakage from gas-insulated circuit breakers at the substation.

An analysis of regional climate impacts prepared by the Third National Climate Assessment (Garfin et al. 2014) concludes that the rate of warming in the Midwest has markedly accelerated over the past few decades. The higher temperatures and continued human pollution increases the number of heat events and extreme rain events that cause flooding. The higher temperatures also extend the duration of the pollen season, which contributes to poor air quality. Analysis of past records and future projections indicates an overall increase in regional temperatures, including in the project area vicinity, and the observed increase has been happening more rapidly at night and during winter. The most recently available data on GHG emissions in the United States indicate that annual GHG emissions in 2016 were an estimated 6,511 million metric tons of GHG (USEPA 2018e).

3.6.2 *Environmental Consequences*

This section describes the potential impacts to air quality associated with the construction, operation and maintenance of the transmission line and improved substations. Impacts to air quality are discussed in terms of project emissions of criteria air pollutants, HAPs, and GHGs. Impacts to climate change are also discussed in a qualitative manner.

3.6.2.1 DATA SOURCES, METHODS, AND ANALYSIS ASSUMPTIONS

Impact indicators used to analyze impacts to air quality include:

- Emission estimates for regulated pollutants and GHGs.
- Comparison of project emission estimates to county emission inventories.
- Class I or II Prevention of Significant Deterioration increments or air quality-related values.
- General conformity de minimis levels.

Emissions calculations for the project were subdivided into construction-related emissions (those emissions that are expected to be temporary in nature) and operational-related emissions (those emissions that are expected to occur throughout the operational lifetime of the project). Construction-related emissions include:

- Exhaust from on- and off-road construction vehicles and equipment.

- Exhaust from on-road construction worker commuter vehicles.
- Exhaust from on-road construction material and equipment delivery vehicles.
- Fugitive dust from vehicle travel on paved and unpaved roads.
- Fugitive dust from earthmoving and general construction activities.

The following assumptions were used to complete the air quality impact analysis for the C-HC Project:

- Emissions associated with heavy-duty on-road construction equipment were estimated using South Coast Air Quality Management District (SCAQMD). SCAQMD emission factors for Heavy-Heavy-Duty-Vehicles (with vehicle weights ranging from 33,001 to 60,000 pounds) for 2018 (SCAQMD 2007a).
- Emissions from off-road construction equipment and vehicles were estimated using composite off-road emission factors for the 2018 vehicle fleet from the California Air Resource Board's Off-Road Model (SCAQMD 2007b). The type of equipment used for construction and the quantity of each type was based on similar projects. The appropriate emission factor, equipment type, quantity of equipment needed, and duration of use during construction of the project were used in determining emissions from construction equipment.
- Exhaust emissions from construction worker commute, some on-road construction equipment, and equipment delivery were calculated using SCAQMD's emission factors for On-Road Passenger Vehicles and Delivery Trucks for the 2018 vehicle fleet (SCAQMD 2007a).
- An estimated maximum number of 120 construction worker commuters are assumed to commute from Madison, Wisconsin—an average distance of 104 miles round trip per day.
- Heavy-hauling trucks would be used to deliver materials and equipment from McFarland, Wisconsin (approximately 43 miles away) or Wautoma, Wisconsin (approximately 84 miles away).
- Concrete trucks would be used for about 4 months during construction of the transmission line and substation construction and improvements, commuting approximately 86 miles per round trip.
- Fugitive dust emissions from vehicle travel on paved and unpaved roads were estimated using emission factor calculations from USEPA's Compilation of Air Pollutant Emission Factors Sections 3.2.1 and 3.2.2 (USEPA 2006, 2011).
- Fugitive dust emissions from earthmoving were estimated using the Western Regional Air Partnership's (2006) Fugitive Dust Handbook.

Impact intensity thresholds for the air quality impact analysis is provided in Table 3.6-3.

Table 3.6-3. Impact Thresholds and Descriptions for Air Quality

	Minor Impact	Moderate Impact	Major Impact
Air Quality	The impact on air quality associated with emissions from the construction, operation, and maintenance is measurable, but localized and small.	The impact on air quality would be measurable and primarily localized, but have the potential to result in regional impacts.	The impact on air quality would be measurable on a local and regional scale. Emissions from construction, operation, and maintenance are high.

3.6.2.2 NO ACTION

Under the No Action Alternative, the transmission line would not be developed. No surface disturbance would occur, and air resources would not be affected. Climate change would continue as defined by current trends.

3.6.2.3 IMPACTS COMMON TO ALL ACTION ALTERNATIVES

Impacts to air quality would be common to all alternatives. As a worst-case scenario assessment, only the emissions from constructing the longest route (Alternative 5) have been calculated. The other alternatives would have a shorter route and would have less air emissions than the longest alternative (Alternative 5).

3.6.2.3.1 Construction

Construction activities would result in air pollutant emissions from equipment exhaust, including the use of helicopters during construction; vehicle exhaust from travel to and from the project site; and fugitive dust from soil disturbance. Table 3.6-4 presents the estimated total criteria, HAPs, and GHG emissions that would occur from the project.

Table 3.6-4. Estimated Total Project Construction Emissions in Tons

Construction Emission Source	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	VOC	HAPs	CO_2e
Construction equipment (off-road)	15.76	22.80	0.10	1.03	0.92	3.28	0.33	4,175
Worker and on-road construction equipment commuting	4.07	1.61	0.01	120.53	12.33	0.52	0.05	1,032
Equipment/material delivery	13.38	14.20	0.04	22.98	3.74	2.03	0.20	3,745
Fugitive dust from construction operations	-	-	-	481.52	48.15	-	-	-
Total	**33.21**	**38.61**	**0.15**	**626.06**	**65.15**	**5.83**	**0.58**	**8,952**
Clayton County, IA Emissions Inventory (EI) Total	9,746	1,766	28	4,931	1,121	6,090	1,092	-
Percent of Clayton County EI Total	0.34%	2.19%	0.52%	12.70%	5.81%	0.10%	0.05%	-
Dubuque County, IA EI Total	16,503	2,975	40	5,601	1,303	7,127	1,241	-
Percent of Dubuque County EI Total	0.20%	1.30%	0.37%	11.18%	5.00%	0.08%	0.05%	-
Dane County, WI EI Total	81,048	14,579	295	17,985	4,739	19,941	3,854	-
Percent of Dane County EI Total	0.04%	0.26%	0.05%	3.48%	1.37%	0.03%	0.02%	-
Grant County, WI EI Total	13,479	5,905	3,881	12,335	2,652	9,654	1,607	-
Percent of Grant County EI Total	0.25%	0.65%	<0.01%	5.08%	2.46%	0.06%	0.04%	-
Iowa County, WI EI Total	9,221	1,526	32	5,494	1,186	7,890	1,179	-
Percent of Iowa County EI Total	0.36%	2.53%	0.46%	11.40%	5.49%	0.07%	0.05%	-
Lafayette County, WI EI Total	7,232	1,329	26	7,897	1,646	4,625	1,002	-
Percent of Lafayette County EI Total	0.46%	2.90%	0.57%	7.93%	3.96%	0.13%	0.06%	-

Note: Carbon dioxide equivalent (CO_2e) is expressed in metric tons.

Construction emissions would span 2 years and be dispersed across the length of the power line, small amounts being emitted at each substation and each pole installation point. Table 3.6-4 presents the estimated total project construction emissions over the 2-year construction period. The top of the table presents construction activity emission sources by pollutant. The next segment of the table presents total emissions at the county level and emissions from the construction of the C-HC Project as a percentage of the county's total emissions. Overall the total pollutants emitted from the C-HC Project construction in each county would be much smaller than the county's total projected annual emissions. The overall projected emission estimate for each pollutant from the construction of the C-HC Project is small in comparison to the proportion each pollutant contributes to each county's annual emissions. Furthermore, this comparison would be even smaller when the project construction emission contribution is divided annually between the six counties. The C-HC Project's construction emissions would be temporary and transient in nature. Construction of the project would have short-term, minor impacts on air quality.

During the public comment period for the DEIS, commenters expressed concerns about the impact of the C-HC Project and associated removal of forest vegetation on climate change and carbon sequestration. Acreages of landcover changes and impacts to landcover are discussed in greater detail in Sections 3.3 and 3.10. All alternatives would result in permanent impacts to landcover ranging from approximately 236 to 502 acres of forest converted to grasslands. Carbon dioxide uptake by forests in the contiguous United States offsets about 12% to 19% of total CO_2 emissions each year (Ryan et al. 2010, cited in U.S. Forest Service 2017). Carbon storage is typically greater within forest ecosystems when compared to lands that are used for settlements or agriculture (Pacala et al. 2007, cited in U.S. Forest Service 2017). Ecosystem factors such as climate, soil, vegetation type, and interaction between these factors determine the duration of time that carbon stays in an ecosystem, or the turnover. Furthermore, carbon storage within grasslands is sensitive to management and vulnerable to losses in soil carbon (U.S. Forest Service 2017).

In the Midwest, many soils have lost 30% to 50% of carbon from conversion to agriculture and these losses are primarily caused by soil disturbance (Lal 2002, cited in U.S. Forest Service 2017). Studies by the U.S. Forest Service stress the importance of land (including forest) management and restoration of degraded grasslands.

A study from the University of California – Davis found that grasslands and rangelands are more resilient carbon sinks than forests in twenty-first century California. While this study is limited to California, the study found that grasslands store more carbon than forests because they are less impacted by droughts and fire. Grasslands sequester most of their carbon underground, whereas forests store it mostly in woody biomass and leaves (Kerlin 2018). Therefore, although the C-HC Project would result in landcover conversion for up to approximately 500 acres of forest to grassland, this conversion does not remove the opportunity for the natural carbon sequestration process to occur within the project area.

Retirement of the N-9 Transmission Line and Construction of a New 69-kV Tap Line

During decommissioning of the N-9 transmission line and construction of the tap line, small amounts of air pollutants would be temporarily generated by exhaust from construction equipment and vehicles as well as fugitive dust from ground-disturbing activities. These emissions would be greatest during the initial site preparation activities and would vary from day to day depending on the construction phase, level of activity, and prevailing weather conditions. All of these emissions would be temporary in nature, fall off rapidly with distance from the construction zone, and would not result in any long-term impacts. Once these activities are completed, emissions would subside, and ambient air quality would return to pre-decommissioning levels.

Greenhouse gas emissions would also be generated from the use of trucks and construction equipment but would not result in any long-term climate change impacts.

3.6.2.3.2 Operations

Operations-related emissions are summarized in Table 3.6-5 and include:

- Emissions from inspection activities such as exhaust from on-road inspection vehicles and fugitive dust from paved and unpaved roads.

- Emissions from maintenance activities including exhaust from worker vehicles and any needed equipment as well as fugitive dust from paved and unpaved roads.
- Emissions of SF_6 from operation of any new gas-insulated circuit breakers.

Table 3.6-5 shows operational-related emissions per year. The table is organized with emissions by operational activities at the top, followed by the total operational emissions, and then operational emissions as a percentage of county total emissions. Operation and maintenance emissions would include vehicle exhaust from travel to substations and the transmission line for routine inspection, as well as potential SF_6 emissions from operation of the additional gas-insulated circuit breakers at the new Hill Valley Substation and expanded substations. Emissions from vehicle travel during operation and maintenance would be minimal, and mileage for vehicle travel to the substations and along the transmission line for routine inspection would be much less than during construction. Emissions from vehicle exhaust during operation and maintenance are significantly lower than construction emissions from the use of construction equipment as shown in Table 3.6-4 above. Therefore, impacts to air quality resources from operations would be minor but long term and these emissions would be much lower than construction emissions and impacts.

GHG emissions from the construction, operation, and maintenance of the project (including potential SF_6 leaks from circuit breakers) would result in a minor (relative to local, national, and/or global GHG emissions) long-term increase in GHGs over the 60-year life of the C-HC Project.

Table 3.6-5. Operational-Related Emissions in Tons per Year

Source	Emissions (tons)							Emissions (mt)
	CO	NO_X	SO_X[1]	PM_{10}	$PM_{2.5}$	VOC	HAPs	GHG[2]
Inspection and Maintenance Activities	0.23	0.48	0.01	0.61	0.08	0.04	0.00	47
SF_6 Emissions	-	-	-	-	-	-	-	455
Total	**0.23**	**0.48**	**0.01**	**0.61**	**0.08**	**0.04**	**<0.01**	**497**
Percent of Clayton County Emissions Inventory (EI) Total	< 0.01%	0.03%	0.04%	0.01%	0.01%	< 0.01%	< 0.01%	N/A[3]
Percent of Dubuque County EI Total	< 0.01%	0.02%	0.03%	0.01%	0.01%	< 0.01%	< 0.01%	-
Percent of Dane County EI Total	< 0.01%	< 0.01%	< 0.01%	< 0.01%	< 0.01%	< 0.01%	< 0.01%	-
Percent of Grant County EI Total	< 0.01%	0.01%	< 0.01%	< 0.01%	< 0.01%	< 0.01%	< 0.01%	-
Percent of Iowa County EI Total	< 0.01%	0.03%	0.04%	0.01%	0.01%	< 0.01%	< 0.01%	-
Percent of Lafayette County EI Total	< 0.01%	0.04%	0.05%	0.01%	0.01%	< 0.01%	< 0.01%	-

Notes:

[1] All oxides of sulfur (including SO_2). For purposes of comparison, SO_2 emissions reported in the county inventory are assumed to be equal to SO_X.

[2] GHG are based on the GWP of CO_2 (1) and CH_4 (25) and are reported in metric tons per year.

[3] CO_2e emissions are not reported for all sources in the county inventory. Therefore, CO_2e emissions are not compared to the county inventory.

[4] 100,000 tons = 90,718.474 metric tons.

3.7 Noise

This section describes noise conditions that occur within the C-HC Project's analysis area. Noise is characterized by defining general noise terminology and sources, corona noise, and vibration. For noise, the analysis area is 300 feet in all directions of the transmission line and substation.

3.7.1 *Affected Environment*

Noise is generally defined as loud, unpleasant, unexpected, or undesired sound that is typically associated with human activity and that interferes with or disrupts normal activities. Although prolonged exposure to high noise levels has been demonstrated to cause hearing loss, the principal human response to environmental noise is annoyance. The response of individuals to similar noise events is diverse and influenced by the type of noise; the perceived importance of the noise, and its appropriateness in the setting; the time of day and the type of activity during which the noise occurs; and the sensitivity of the individual.

Noise could also disrupt wildlife life-cycle activities of foraging, resting, migrating, and other patterns of behavior. While wildlife already existing in proximity to human development may already be habituated to noise from land use and human disturbance, changes to these baseline activities may still result in wildlife disruption. Additionally, sensitivity to noise varies from species to species, making it difficult to identify how a noise source would affect all flora and fauna in an area.

The following sections discuss local noise regulations, how noise levels and increases in noise levels are perceived by the general human population, corona noise generated by transmission lines, and causes and effects of vibration.

3.7.1.1 NOISE REGULATIONS

There are state and local noise regulations applicable to the project. These regulations are reviewed in Table 3.7-1.

Table 3.7-1. State and Local Noise Regulations

Location	Noise Regulation
State of Wisconsin	All registered motor vehicles operated on a highway must be equipped with an adequate muffler in constant operation.
State of Iowa	Every motor vehicle shall at all times be equipped with a muffler in good working order and in constant operation to prevent excessive or unusual noise.
Iowa County, WI	No individual shall be unreasonably loud at any time between 11.00 p.m. and 8.00 a.m. within the confines of Blackhawk Lake Recreation Area. “Unreasonably loud” means a level of noise that tends to cause or provoke a disturbance (Iowa County Ordinances 2001).
City of Dodgeville, WI	Except for City employees, between the hours of 10:00 P.M. and 6:00 A.M. no person shall do construction work or operate any chain saw, lawn mower or any other loud machinery of a similar nature (Dodgeville City Ordinances 2018).
City of Middleton, WI	No person shall operate any heavy construction or other heavy machinery, tools or equipment used for construction, including, but not limited to, pile drivers, bulldozers, pneumatic hammers, derricks, dump trucks, cement trucks, cement mixers, steam or electric hoists, or any other similar equipment other than between the hours of 7:00 a.m. and 6:00 p.m. Monday through Friday, except Federal and State holidays, unless such operation is not plainly audible at any time from within any occupied residential structure (Middleton City Code of Ordinances 2018).

Location	Noise Regulation
Village of Mount Horeb, WI	No operation or activity shall transmit any noise exceeding 75 A-weighted decibels (dBA) from 7:00 a.m. to 11:00 p.m. and 70 dBA from 11:00 p.m. to 7:00 a.m. beyond the property line. The following noises are exempt from the regulations: (a)Noises not directly under the control of the property owner. (b)Noises from temporary construction or maintenance activities during daylight hours. (c)Noises from emergency, safety, or warning devices. The operation of any pile driver, steam shovel, pneumatic hammer, derrick, steam or electric hoist, other than between the hours of 6:30 a.m. and 8:00 p.m., Monday through Saturday, is prohibited; provided, however, the Building Inspector shall have the authority, upon determining that the loss or inconvenience which would result to any party in interest would be extraordinary and of such nature as to warrant special consideration, to grant a permit for hours other than those herein specified during which time such work and operation may take place (Mount Horeb Municipal Code 2013).

3.7.1.2 PERCEPTION OF NOISE LEVELS

The general human response to changes in noise levels that are similar in frequency content (such as comparing increases in continuous [Leq] traffic noise levels) are summarized as follows:

- A 3-decibel (dB) change in sound level is considered to be a barely noticeable difference.
- A 5-dB change in sound level typically is noticeable.
- A 10-dB increase is considered to be a doubling in loudness.

Community sound levels are generally presented in terms of A-weighted decibels (dBA).
The A-weighting network measures sound in a similar fashion to how a person perceives or hears sound, thus achieving a strong correlation with how people perceive acceptable and unacceptable sound levels. Table 3.7-2 presents A-weighted sound levels and the general subjective responses associated with common sources of noise in the physical environment.

Table 3.7-2. Typical Sound Levels Measured in the Environment and Industry

Noise Source at a Given Distance	Sound Level in A-weighted Decibels (dBA)	Qualitative Description
Carrier deck jet operation	140	
Civil defense siren (100 feet)	130	Pain threshold
Jet takeoff (200 feet)	120	Deafening
Auto horn (3 feet) Pile driver (50 feet) Rock music concert environment	110	Maximum vocal effort
Jet takeoff (100 feet) Shout (0.5 foot) Ambulance siren (10 0 feet) Newspaper press (5 feet) Power lawn mower (3 feet)	100	
Heavy truck (50 feet) Power mower Motorcycle (25 feet) Propeller plane flyover (1,000 feet)	90	Very loud/annoying; Hearing damage (8-hour, continuous exposure)
Pneumatic drill (50 feet) Garbage disposal (3 feet) High urban environment	80	Very loud
Passenger car, 65 mph (25 feet) Living room stereo (15 feet) Vacuum cleaner (3 feet)	70	Loud/Intrusive (telephone use difficult)

Noise Source at a Given Distance	Sound Level in A-weighted Decibels (dBA)	Qualitative Description
Air conditioning unit (20 feet) Human voice (3 feet) Department store environment	60	
Light auto traffic (50 feet) Residential air conditioner (50 feet) Private business office environment	50	Moderate/Quiet
Living room/Bedroom Bird calls (distant)	40	
Library Soft whisper (5 feet) Quiet bedroom environment	30	Very quiet
Broadcasting/Recording studio	20	Faint
	10	Just audible
	0	Threshold of human audibility

Source: Adapted from Table E, “Assessing and Mitigating Noise Impacts” (New York Department of Environmental Conservation 2001) and *Handbook of Environmental Acoustics* (Cowan 1993).

The American National Standards Institute (ANSI) has published a standard (Acoustical Society of America S12.9-1993/Part 3) (ANSI 1993) with estimates of general ambient noise levels (Leq [energy average noise level] and Ldn [day-night average noise level]) based on detailed descriptions of land use categories. The ANSI document organizes land use based on six categories. Table 3.7-3 provides existing conditions for the analysis area and the associated estimated daytime and nighttime Leq ambient noise levels.

Table 3.7-3. Representative Existing Conditions for the Analysis Area Based on Land Use

Category	Land Use	Description	Estimated Existing Daytime Leq (dBA)	Estimated Existing Nighttime Leq(dBA)
1	Noisy Commercial and Industrial Areas	Very heavy traffic conditions, such as in busy downtown commercial areas, at intersections of mass transportation and other vehicles including trains, heavy motor trucks, and other heavy traffic, and street corners where motor buses and heavy trucks accelerate.	69	61
2	Moderate Noisy Commercial and Industrial Areas, and Noisy Residential Areas	Heavy traffic areas with conditions similar to Category 1 but with somewhat less traffic, routes of relatively heavy or fast automobile traffic but where heavy truck traffic is not extremely dense, and motor bus routes.	64	56
3	Quiet Commercial Areas, Industrial Areas, Normal Urban Areas, and Noisy Residential Areas	Light traffic conditions where there are no mass transportation vehicles and relatively few automobiles and trucks pass, and where these vehicles generally travel at low speeds. Residential areas and commercial streets and intersections with little traffic comprise this category.	58	52
4	Quiet Urban Areas and Normal Residential Areas	These areas are similar to Category 3 but, for this group, the background noise is either distant traffic or is unidentifiable.	53	47
5	Quiet Suburban Residential Areas	Isolated areas far from significant sources of sound.	48	42
6	Very Quiet, Sparse Suburban or Rural Areas	These areas are similar to Category 5 but are usually in unincorporated areas and, for this group, there are few if any near neighbors.	43	37

Source: ANSI (1993)

3.7.1.3 CORONA NOISE

Corona generates audible noise during operation of high-voltage transmission lines. Under certain conditions, the localized electric field near an energized conductor can be sufficiently concentrated to produce a tiny electric discharge that can ionize air close to the conductors. This partial discharge of electrical energy is called corona discharge, or corona. Several factors, including conductor voltage, shape and diameter, and surface irregularities such as scratches, nicks, dust, or water drops, can affect a conductor's electrical surface gradient and its corona performance. Corona is the physical manifestation of energy loss and can transform discharge energy into very small amounts of sound, radio noise, heat, and chemical reactions of the air components.

Transmission lines can generate a small amount of sound energy during corona activity. This audible noise from the line can barely be heard in fair weather conditions on higher voltage lines. During wet weather conditions (such as rain or fog), water drops collect on the conductor and increase corona activity so that a crackling or humming sound may be heard near the line. This noise is caused by small electrical discharges from the water drops. However, during heavy rain, the ambient noise generated by the falling raindrops will typically be greater than the noise generated by corona.

3.7.1.4 VIBRATION

Ground-borne vibration may be induced by traffic and construction activities, such as pile driving and earthmoving. The effects of ground-borne vibration may include perceptible movement of building floors, interference with vibration-sensitive instruments, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. The rumbling sounds heard is the noise radiated from the motion of the room surfaces. Annoyance from vibration often occurs when the vibration exceeds the threshold of perception by only a small margin. A vibration level that causes annoyance would be well below the damage threshold for normal buildings. Ground-borne vibration is almost never annoying to people who are outdoors; without the effects associated with the shaking of a building, the rumble noise of vibrations is not perceptible. Unlike noise, human response to vibration is not dependent on existing vibration levels. Humans respond to a new source of vibration based on the frequency of such events.

3.7.2 *Environmental Consequences*

This section describes the potential noise impacts from the C-HC Project associated with the construction, operation and maintenance of the transmission line and improved substations. Noise impacts are discussed in terms of sensitive noise receptors within the analysis area for the C-HC Project alternatives, project noise generation, and vibration impacts.

3.7.2.1 DATA SOURCES, METHODS, AND ANALYSIS ASSUMPTIONS

Impact indicators used to analyze noise impacts from the C-HC Project include:

- Changes in ambient noise levels (measured in decibels) at sensitive noise receptor sites, including nearby residences, state parks and the refuge.

Existing land use in the project analysis area was estimated based on aerial photography. The project is adjacent to or runs through quiet, sparsely populated suburban or rural areas. Therefore, estimated existing daytime Leq is considered to be 43 dBA and estimated existing nighttime Leq is considered to be 37 dBA.

The construction noise level was estimated using the Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM). The RCNM is FHWA's national model for the prediction of construction noise. This software is based on actual sound-level measurements from various equipment types taken during the Central Artery/Tunnel project conducted in Boston, Massachusetts, during the early 1990s. FHWA RCNM has noise levels for various types of equipment pre-programmed into the software; therefore, the noise level associated with the equipment is typical for the equipment type and not based on any specific make or model. The maximum noise levels presented at a specified distance from the source are based on a roster of likely construction equipment operating. Although the project is not a road construction project, the RCNM includes the same types of equipment that would be used in the construction of the project.

Worker commutes and material delivery vehicles would cause noise that would be short term and have little effect on the hourly average noise level. Therefore, this traffic was not included in the construction noise analysis.

3.7.2.1.1 Definition of Noise Sensitive Receptors

Noise-sensitive receptors generally are defined as locations where people reside or where the presence of unwanted sound may adversely affect the existing land use. Typically, noise-sensitive land uses include residences, hospitals, places of worship, libraries, performance spaces, offices, and schools, as well as nature and wildlife preserves, recreational areas, and parks. Sensitive receptors within 300 feet of the transmission line route and Hill Valley Substation were analyzed for potential impacts as a result of project construction and operation.

The project goes through the Blackhawk Lake Recreation Area, Black Earth Creek Wildlife Area Sunnyside Unit, and Thompson Memorial Prairie State Natural Area, which are all noise sensitive areas. Trails would also be considered noise-sensitive areas and there are several trails within the noise analysis area. There are also noise-sensitive receptors, including residences, daycares, and schools, within the noise analysis area. The majority of the analysis area consists of open space.

Impact intensity thresholds for the noise impact analysis are provided in Table 3.7-4.

Table 3.7-4. Impact Thresholds and Descriptions for Noise

	Minor Impact	Moderate Impact	Major Impact
Noise	Noise impacts could attract attention but would not dominate the soundscape or detract from current user activities.	Noise impacts would attract attention and contribute to the soundscape but would not dominate. User activities would remain unaffected.	Impacts on the characteristic soundscape would be considered significant when those impacts dominate the soundscape and detract from current user activities.

3.7.2.2 NO ACTION

Under the No Action Alternative, the transmission line would not be developed. No new noise sources would occur, and current noise levels would not be affected.

3.7.2.3 IMPACTS COMMON TO ALL ACTION ALTERNATIVES

Noise impacts common to all alternatives include noise from the proposed Hill Valley Substation, construction and operation noise from the transmission line ROW, and vibration impacts.

3.7.2.3.1 Substation Construction and Improvements

Estimates of noise from the construction of the Hill Valley Substation are based on a roster of the maximum amount of construction equipment used at the station on a given day analyzed from the center of the substation construction area to the nearest residence (for ease of calculation, all equipment is assumed to be operating at this single point). The RCNM has noise levels for various types of equipment pre-programmed into the software; therefore, the noise level associated with the equipment is typical for the equipment type and not based on any specific make or model. The construction equipment used in the analysis is given in Table 3.7-5.

Table 3.7-5. Hill Valley Substation Construction Equipment Roster Used for Noise Analysis

Equipment Type	Quantity	Typical Maximum Noise Levels (dBA at 50 feet)
Bulldozer	1	82
Hole digger	1	84
Crane	1	81
Bucket truck	1	75
Forklift	1	79
2-ton truck	1	77
Pickup truck	1	75
Flatbed truck	1	74
Bobcat	1	81

The nearest sensitive receptor to Hill Valley Substation Option #1 is a residence 3,846 feet north of the center of the substation. The nearest sensitive receptor to Hill Valley Substation Option #2 is a residence 2,885 feet north of the center of the substation. The estimated construction noise level at the nearest sensitive receptor for each substation location option is given in Table 3.7-6, below.

Table 3.7-6. Calculated Noise Levels at Nearest Sensitive Receptor due to Hill Valley Substation Construction

	Calculated L_{max} (dBA)	Calculated L_{eq} Total (dBA)	Noise Level, Ambient + Construction (dBA)
			L_{day}
Ambient Baseline Noise Level*	--	--	43.0
Noise Level at Nearest Sensitive Receptor to Location Option 1 (3,846 feet from Substation)	46.6	46.4	48.0
Noise Level at Nearest Sensitive Receptor to Location Option 2 (2,885 feet from Substation)	49.1	48.9	49.9

* Baseline noise level obtained based on estimated local land use.

The noise level at the nearest sensitive receptor to location option 1 would increase by approximately 5 dBA, which is a noticeable change from the ambient noise level but approximately equivalent to hearing light traffic or a residential air conditioning unit. The noise level at the nearest sensitive receptor to location option 2 would increase by approximately 7 dBA, which is louder than the increase in option 1 but still would be comparable to hearing light traffic or a residential air conditioning unit.

Impacts due to the noise generated by the construction of the Hill Valley Substation would be minor and short term. There are no noise sensitive receptors within the ROW or outside the ROW within the analysis area for the Hill Valley Substation.

For the improvements at the other seven substations, there would be fewer construction activities and less equipment associated with improvements than with the construction activity and equipment required to build the proposed Hill Valley Substation. The closest sensitive noise receptors at the other seven substations are listed in Table 3.7-7. Eden and Stoneman Substations are the closest to sensitive noise receptors, which are located approximately 780 and 737 feet away. The farthest sensitive receptor is over 14,000 feet from Hickory Creek Substation.

Table 3.7-7. Closest Sensitive Noise Receptor to Each Substation

Substation	Construction Duration	Receptor Type	Distance (feet)
Cardinal Substation	3 months	Residential – Home	2,562
Eden Substation	3 weeks	Residential – Home	780
Wyoming Valley Substation	Less than 1 week	Residential – Home	1,000
Nelson Dewey Substation	3 months	Residential – Home	3,465
Stoneman Substation	2 months	Residential – Home	737
Turkey River Substation	6 months	Residential – Home	4,464
Hickory Creek Substation	3 months	Residential – Home	14,687

Table 3.7-8 shows the estimated construction noise levels at the closest sensitive noise receptor for the substation improvements. Impacts from substation construction would be limited to the construction period and would be localized to the proposed substation/switchyard areas.

Table 3.7-8. Estimated Construction Noise Levels at the Nearest Sensitive Noise Receptor for Each Improved Substation

	Calculated L_{max} (dBA)	Calculated L_{eq} Total (dBA)	Noise Level, Ambient + Construction (dBA)
			L_{day}
Ambient Baseline Noise Level*	–	–	43.0
Cardinal Substation	50.2	49.9	50.7
Eden Substation	60.5	60.3	60.3
Wyoming Valley Substation	58.3	58.1	58.2
Nelson Dewey Substation	47.5	47.3	48.7
Stoneman Substation	61.0	60.8	60.8
Turkey River Substation	45.3	45.1	47.2
Hickory Creek Substation	35.0	34.8	43.6

* Baseline noise level obtained based on estimated local land use.

Table 3.7-9 shows the comparable noise level environments relative to the change in ambient noise level at the nearest sensitive receptor due to substation construction. The change in ambient noise levels at the nearest receptor’s ranges from 0.6 dBA at Hickory Creek Substation to 17.8 at Stoneman Substation. A change of 3 dB is considered to be a barely noticeable difference, so the change in ambient noise at

Hickory Creek would be negligible. A change of 5 dB is typically noticeable and a 10-dB increase is considered to be a doubling in loudness. An approximate 5-dB increase is expected to occur from the substation construction at Hill Valley Substation – Location Option 1, Nelson Dewey Substation, and Turkey River Substation. Eden, Wyoming Valley, and Stoneman Substations all have changes over 10 dB, which is equivalent to air conditioning units at 20 feet, a human voice at 3 feet, or a department store environment.

Table 3.7-9. Change in Ambient Noise Level at Nearest Receptor due to Substation Construction and Improvements with Comparable Noise Level Environments

Substation	Change in Ambient Noise Level at Nearest Receptor due to Substation Construction (dBA)	Equivalent Measured Noise Level Environment
Hill Valley Substation – Location Option 1	5.0	Light auto traffic (50 feet) Residential air conditioner (50 feet) Private business office environment
Hill Valley Substation – Location Option 2	7.0	Light auto traffic (50 feet) Residential air conditioner (50 feet) Private business office environment
Cardinal Substation	7.7	Light auto traffic (50 feet) Residential air conditioner (50 feet) Private business office environment
Eden Substation	17.3	Air conditioning unit (20 feet) Human voice (3 feet) Department store environment
Wyoming Valley Substation	15.2	Air conditioning unit (20 feet) Human voice (3 feet) Department store environment
Nelson Dewey Substation	5.7	Light auto traffic (50 feet) Residential air conditioner (50 feet) Private business office environment
Stoneman Substation	17.8	Air conditioning unit (20 feet) Human voice (3 feet) Department store environment
Turkey River Substation	4.2	Light auto traffic (50 feet) Residential air conditioner (50 feet) Private business office environment
Hickory Creek Substation	0.6	Living room/Bedroom Bird calls (distant)

Sources: Cowan (1993); New York Department of Environmental Conservation (2001)

3.7.2.3.2 Transmission Line Construction

Estimates of noise from the construction of the transmission line route are based on a roster of maximum amount of construction equipment used at one time in one place to construct the transmission line. Table 3.7-10 shows the construction equipment that has been analyzed (for ease of calculation, all equipment is assumed to be operating at this single point). The RCNM has noise levels for various types of equipment pre-programmed into the software; therefore, the noise level associated with the equipment is typical for the equipment type and not based on any specific make or model.

Table 3.7-10. Transmission Line Construction Equipment Roster Used for Noise Analysis

Equipment Type	Quantity	Typical Maximum Noise Levels (dBA at 50 feet)
Backhoe	2	78
Concrete truck	3	79
Tractor trailer	1	84
Pickup truck	3	75
Crane	1	81
Utility truck	1	75
Water truck	2	75
Bucket truck	3	75
Line truck	3	75
2-ton truck	3	77

The RCNM assumes that the L_{max} is the maximum sound level for the loudest piece of equipment. L_{max} at a distance of 50 feet from the point source will be 84.1 dBA, and at 1,312 feet, it will attenuate to 55.6 dBA. The approximate noise generated by the construction equipment used at the transmission line has been conservatively calculated based on the maximum amount of construction equipment that would be used in constructing or reconductoring the transmission line at one time, and not taking into account further attenuation due to atmospheric interference, intervening structures, or implementation of any environmental commitments. The results of the RCNM construction noise calculations are given in Table 3.7-11.

Table 3.7-11. Calculated Noise Levels due to Transmission Line Construction

	Calculated L_{max} (dBA)	Calculated L_{eq} Total (dBA)	Noise Level, Ambient + Construction (dBA)
			L_{day}
Ambient Baseline Noise Level*	--	--	43.0
Noise Level Attenuated to Nearest Sensitive Receptor (50 feet)	84.1	86.5	86.5
Attenuated to 300 feet	68.6	71.0	71.0

* Baseline noise level obtained based on estimated local land use.

During construction, the noise level at the nearest sensitive receptor along the transmission line would be very loud, approximately equivalent to a pneumatic drill or heavy truck from 50 feet away. The noise level at the edge of the analysis area would be comparable to listening to a vacuum cleaner or living room stereo. The noise level would be loud and intrusive.

Noise due to construction of the transmission line would be temporary. Total construction duration for the transmission line would occur over a 2-year period. During this time, construction activities would occur along discrete portions of the transmission line; therefore, noise impacts would occur over a shorter time frame at any given location. For those sensitive receptors closest to the ROW, adverse noise impacts from construction of the C-HC Project would be major and short term (lasting less than the total construction duration).

3.7.2.3.3 Other Sources of Potential Construction Noise Impacts

As noted in Chapter 2, helicopters may be used to install transmission structures when the use of cranes is not feasible. A large single-rotor helicopter such as the Bell 214 produces a maximum sound level of about 79 dBA at a distance of 500 feet under level flight conditions (Nelson 1987). This is comparable to hearing a pneumatic drill operating 50 feet away. At 100 feet, the sound level would be about 93 dBA, similar to hearing a power mower or a heavy truck from 50 feet away. A small single-rotor helicopter such as the Hughes 500 produces a maximum sound level of 75 dBA at a distance of 500 feet under level flight conditions (Nelson 1987). This corresponds to a sound level of about 89 dBA at 100 feet. The sound levels of both types of helicopters would be perceived similarly. A helicopter would hover at central staging areas on average from a few to several minutes per tower as it picked up each tower section, and would then hover at each tower site from a few to several minutes while the tower is placed on the foundation. Helicopters could produce noise in the range of 89 to 93 dBA in the vicinity of residences as close as 100 feet to helicopter staging areas. Noise from helicopters operating above pole installation locations could be as close as about 250 feet to residences. At this distance, helicopter noise levels could be in the range of about 83 to 87 dBA, comparable to hearing other construction-related noise. However, helicopter use would be temporary and only occur during the established daily hours of construction, thus the impact would be minor and short term.

Blasting is not anticipated in the construction of the project. However, if unanticipated geotechnical conditions are discovered, blasting may be the best method for excavation. All local, state, and Federal regulations applicable to controlled blasting and blast vibration limits with regard to structures and underground utilities would be adhered to while performing these activities. Nearby residents could potentially be disturbed by the project’s temporary blasting activities, if blasting is required. Blasting would only take place during the daytime. Special care would be taken to monitor and assess blasting within 150 feet of dwellings and private or public water supply wells. Due to the intermittent and temporary nature of blasting activities (if any), the noise generated would not substantially impair residential land uses.

During construction of the C-HC Project, potential noise impacts to livestock may be temporarily generated when heavy construction equipment is in use near farming operations. A study in the United Kingdom reviewing noise impacts to livestock states that “no link was found between reproduction and milk production rates in connection with maximum noise levels as a result of aircraft noise” at maximum noise levels ranging from 73 to 99 dBA (House of Commons Select Committee on the High Speed Rail 2017). For comparison, the construction noise from this project at 300 feet from the source is calculated at 71 dBA, as shown in Table 3.7-11.

Cattle tolerate moderate levels of noise and easily adapt to intensity levels of 60–90 dB (Hamed Esmail 2017). Construction noise resulting from construction activities is estimated to range between 74 and 84 dB at 50 feet and would decrease in intensity at greater distances. Additionally, equipment used for construction activities is similar to equipment typically used on farms and ranches, including flatbed trucks, 2-ton pickups, and bobcats. Large farming equipment, including tractors and combines, produce higher noise levels ranging between 70 and 120 dB (Smith 2011). The noise threshold expected to cause a behavioral response in cattle, including retreating, freezing, or strong startle response, is greater than 90 dB. Behavioral responses to helicopter flyovers include running away but do not result in adverse impacts to immediate or long-term welfare (Hamed Esmail 2017). Adverse impacts to livestock from construction activities would be minor and short term.

Construction of the transmission line, substation, and substation improvements would comply with all applicable local noise ordinances. Construction impacts due to construction of the transmission line, substation, and substation improvements would be temporary. Impacts due to construction of the transmission line would vary as the distance to a sensitive receptor would change as construction progressed. The number of sensitive receptors within proximity of the C-HC Project are presented below, by alternative.

3.7.2.3.4 Operation and Maintenance

Noise impacts during operation and maintenance of the proposed project are expected to be negligible. Maintenance activities for the transmission line would include driving the length of the transmission line, inspecting the transmission line aerially via helicopter, and making any necessary repairs which may involve construction equipment. The noise impacts due to maintenance activities would be temporary and would have less of an impact than construction of the transmission line. The operation of the proposed transmission line would result primarily in corona generated noise, occurring in the atmosphere near the conductor. Changes to local atmospheric pressure may result in a hissing or cracking sound that may be heard directly under the transmission line or within a few feet of the ROW depending on weather, altitude, and system voltage, with the level of corona noise receding with distance. Maximum noise levels associated with corona noise typically do not exceed 50 dBA as heard from the edge of the ROW, during extreme weather events, and noise levels typically do not exceed 25 dBA during fair weather events—less than the ambient sound levels of a library (USEPA 1974).

Hill Valley Substation would create noise due to the 345/138-kV autotransformer and associated cooling fans. Transformers are the loudest piece of operational equipment in a substation. Transformer noise is principally a result of core vibration and is a function of the surface area, whether the transformer is air-filled or oil-filled, and the power rating. In addition to core vibration noise, transformer cooling fans and oil pumps at larger transformer stations generate broadband noise but are limited to periods when additional cooling is required. The fan noise is relatively low and is generally considered secondary to the core vibration noise source. Equipment noise levels may be obtained from manufacturers, equipment tendering documents, or test results. Transformer noise propagates and attenuates at different rates depending on size, voltage rating, and design, but typically generates a noise level ranging from 60 to 80 dBA. Conservatively, operational noise from the transformer at the Hill Valley Substation would be no louder than the loudest construction equipment, the tractor trailer with a dBA of 84 as shown in Table 3.7-10. Therefore, when operational noise from the transformer is attenuated to the nearest sensitive receptor, it would be less than or equal to 53 dBA which is twice as loud as the ambient noise level. This 0is comparable to hearing light traffic or a residential air conditioning unit, as shown in Table 3.7-6. Impacts due to the noise generated by the operation of the Hill Valley Substation would be minor and long term.

3.7.2.3.5 Vibration

Construction activities (e.g., ground-disturbing activities, including grading and movement of heavy construction equipment) may generate localized groundborne vibration and noise. Blasting activities are not anticipated in the construction of the C-HC Project. However, if blasting is necessary, the vibration generated would result in a temporary, minor to moderate impact on nearby sensitive receptors. Generally, construction-related groundborne vibration is not expected to extend beyond 25 feet from the generating source, and no sensitive receptors are within 25 feet of areas of construction. As a result, no vibration-related impacts to sensitive receptors, such as local residents, would occur due to construction. There would be no source of groundborne vibration due to operation of the substation or transmission line. Thus, there is no vibration-related impact to sensitive receptors due to operation.

3.7.2.4 ALTERNATIVE 1

Table 3.7-12 presents the number of sensitive receptors within the C-HC Project ROW and also presents the number of sensitive receptors outside the ROW, but within the analysis area for Alternative 1. There are two residential noise sensitive receptors within the ROW and 19 residential sensitive receptors within the 300-foot analysis area.

Table 3.7-12. Noise Sensitive Receptors within Close Proximity of Alternative 1

	Noise Sensitive Receptors within ROW		Noise Sensitive Receptors Outside ROW, within Analysis Area	
	Quantity	Type	Quantity	Type
Alternative 1	2	Residences	19	Residences

Noise impacts to the sensitive receptors in close proximity to Alternative 1 are described in detail under Impacts Common to All Alternatives.

Retirement of the N-9 Transmission Line and Construction of a New 69-kV Tap Line

The following discussion of noise impacts applies to both the Refuge portion and private land portion of the N-9 transmission line.

The closest sensitive receptor to the N-9 transmission line is a house approximately 100 feet to the north of the portion of the N-9 transmission line that would be decommissioned and approximately 200 feet from the new tap line. In addition, approximately 170 feet from the N-9 transmission line and approximately 350 feet from the new tap line is a winery tasting room, which is open to the public. According to the definition of noise sensitive receptors in Section 3.7.2.1.1, the house would be considered a sensitive receptor, whereas the winery tasting room is not considered a sensitive receptor for this analysis.

Estimates of noise from these actions are based on a roster of the maximum amount of construction equipment used at the station on a given day analyzed from the transmission line to the nearest residence (for ease of calculation, all equipment is assumed to be operating at this single point). The equipment used in the analysis is given in Table 3.7-13.

Table 3.7-13. Construction Equipment Roster

Equipment Type	Quantity	Typical Maximum Noise Levels at 50 feet, Each (dBA)
Crane	1	81
Bucket truck	2	75
Reel trailer	1	74
Wirepuller	1	77
Stringing equipment	2	75

Note: dBA = A-weighted decibels

The nearest sensitive receptor is a residence 100 feet away from the N-9 transmission line. The estimated noise level at the closest sensitive receptor is 73.2 dBA, which is a major increase from the ambient noise level of 43.0 dBA (Table 3.7-14). However, these impacts due to the noise generated by the retirement of the N-9 line and construction of the new tap line would be intermittent and only last during the decommissioning of the N-9 line and construction period for the tap line close to the house. During construction and decommissioning, the noise level at the nearest sensitive receptor along the transmission line would be very loud, approximately equivalent to a pneumatic drill or heavy truck from 50 feet away. The noise level would be loud and intrusive. This noise level would result in a temporary adverse impact during the construction and decommissioning in close proximity to the sensitive receptor. As construction and decommissioning move along the lines, the volume of the activities would fluctuate at this receptor, resulting in a more moderate and minor temporary impact. Dairyland would coordinate with landowners prior to decommissioning activities.

Table 3.7-14. Estimated Construction Noise Levels at the Nearest Sensitive Noise Receptor

	Ambient Noise Level (dBA)	Calculated L_{max} (dBA)	Calculated L_{eq} Total (dBA)	Noise Level, Ambient + Construction (dBA)
				L_{day}
N-9 line	43.0	74.5	73.2	73.2

Note: dBA = A-weighted decibels; Lmax = maximum noise level; Leq = energy average noise level; Lday = Day equivalent level

3.7.2.5 ALTERNATIVE 2

Table 3.7-15 presents the number of sensitive receptors within the C-HC Project ROW and also presents the number of sensitive receptors outside the ROW, but within the analysis area for Alternative 2. There are three sensitive receptors within the ROW: two residences and one school. Within the 300-foot analysis area, noise sensitive receptors include 26 residences, one daycare, and one school.

Table 3.7-15. Noise Sensitive Receptors within Close Proximity of Alternative 2

	Noise Sensitive Receptors within ROW		Noise Sensitive Receptors Outside ROW, within Analysis Area	
	Quantity	Type	Quantity	Type
Alternative 2	2	Residences	26	Residences
	-	-	1	Daycare
	1	School	1	School

Noise impacts to the sensitive receptors in close proximity to Alternative 2 are described in detail under Impacts Common to All Alternatives.

Retirement of the N-9 Transmission Line and Construction of a New 69-kV Tap Line

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.7.2.6 ALTERNATIVE 3

Table 3.7-16 presents the number of sensitive receptors within the C-HC Project ROW and also presents the number of sensitive receptors outside the ROW, but within the analysis area for Alternative 3. There are four sensitive receptors within the ROW: three residences and one school. Within the 300-foot analysis area, noise sensitive receptors include 34 residences, one daycare, and two schools.

Table 3.7-16. Noise Sensitive Receptors within Close Proximity of Alternative 3

	Noise Sensitive Receptors within ROW		Noise Sensitive Receptors Outside ROW, within Analysis Area	
	Quantity	Type	Quantity	Type
Alternative 3	3	Residences	34	Residences
	-	-	1	Daycare
	1	School	2	School

Noise impacts to the sensitive receptors in close proximity to Alternative 3 are described in detail under Impacts Common to All Alternatives.

Retirement of the N-9 Transmission Line and Construction of a New 69-kV Tap Line

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.7.2.7 ALTERNATIVE 4

Table 3.7-17 presents the number of sensitive receptors within the C-HC Project ROW and also presents the number of sensitive receptors outside the ROW, but within the analysis area for Alternative 4. There are 10 sensitive receptors within the ROW: nine residences and one school. Within the 300-foot analysis area, noise sensitive receptors include 52 residences, one daycare, and two schools.

Table 3.7-17. Noise Sensitive Receptors within Close Proximity of Alternative 4

	Noise Sensitive Receptors within ROW		Noise Sensitive Receptors Outside ROW, within Analysis Area	
	Quantity	Type	Quantity	Type
Alternative 4	9	Residences	52	Residences
	-	-	1	Daycare
	1	School	2	School

Noise impacts to the sensitive receptors in close proximity to Alternative 4 are described in detail under Impacts Common to All Alternatives.

Retirement of the N-9 Transmission Line and Construction of a New 69-kV Tap Line

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.7.2.8 ALTERNATIVE 5

Table 3.7-18 presents the number of sensitive receptors within the C-HC Project ROW and also presents the number of sensitive receptors outside the ROW, but within the analysis area for Alternative 1. There are two residential sensitive receptors within the ROW and 53 residential sensitive receptors within the 300-foot analysis area. One school is within the 300-foot analysis area.

Table 3.7-18. Noise Sensitive Receptors within Close Proximity of Alternative 5

	Noise Sensitive Receptors within ROW		Noise Sensitive Receptors Outside ROW, within Analysis Area	
	Quantity	**Type**	**Quantity**	**Type**
Alternative 5	2	Residences	53	Residences
	0	School	1	School

Noise impacts to the sensitive receptors in close proximity to Alternative 5 are described in detail under Impacts Common to All Alternatives.

Retirement of the N-9 Transmission Line and Construction of a New 69-kV Tap Line

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.7.2.9 ALTERNATIVE 6

Table 3.7-19 presents the number of sensitive receptors within the C-HC Project ROW and also presents the number of sensitive receptors outside the ROW, but within the analysis area for Alternative 1. There are eight residential sensitive receptors within the ROW and 35 residential sensitive receptors within the 300-foot analysis area.

Table 3.7-19. Noise Sensitive Receptors within Close Proximity of Alternative 6

	Noise Sensitive Receptors within ROW		Noise Sensitive Receptors Outside ROW, within Analysis Area	
	Quantity	**Type**	**Quantity**	**Type**
Alternative 6	8	Residences	35	Residences

Noise impacts to the sensitive receptors in close proximity to Alternative 6 are described in detail under Impacts Common to All Alternatives.

Retirement of the N-9 Transmission Line and Construction of a New 69-kV Tap Line

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.7.3 *Summary of Impacts*

Noise impacts would occur under all action alternatives. Noise impacts from the construction and improvements at the substations would be minor and short term. There are no noise sensitive receptors within the ROW or outside the ROW for the proposed Hill Valley Substation. Impacts associated with substation improvements at seven other substations would be limited to the construction period and localized to the proposed substation areas. The closest sensitive receptor to these substations is approximately 700 feet away. The largest increase in noise levels associated with these substation improvements is equivalent to an air conditioning unit at 20 feet, human voice at 3 feet, or a department store environment.

Construction-related noise would be adverse, minor, and temporary, effecting those sensitive noise receptors closest to the proposed ROW. For noise sensitive receptors closest to the ROW, construction noise would be loud and comparable to a pneumatic drill or heavy truck from 50 feet away, whereas for noise sensitive receptors at the edge of the analysis area, construction noise would equate to a vacuum cleaner or living room stereo. Alternative 1 would adversely impact the fewest sensitive noise receptors, and Alternative 4 would impact the greatest number of sensitive noise receptors (Table 3.7-20).

Table 3.7-20. Impact Summary Table

	Noise Sensitive Receptors within ROW			Noise Sensitive Receptors Outside ROW, within Analysis Area			Total
	Residences	**Daycares**	**Schools**	**Residences**	**Daycares**	**Schools**	
Alternative 1	2	-	-	19	-	-	**21**
Alternative 2	2	-	1	26	1	1	**31**
Alternative 3	3	-	1	34	1	2	**41**
Alternative 4	9	-	1	52	1	2	**65**
Alternative 5	2	-	-	53	-	1	**56**
Alternative 6	8	-	-	35	-	-	**43**

Noise impacts during operation and maintenance of the transmission line are expected to be negligible and comparable to the ambient sound level of a library. No vibration-related impacts to sensitive receptors, such as local residents, would occur due to construction.

There would be noise impacts from the N-9 transmission line decommissioning that would occur within the Refuge. The N-9 transmission line decommissioning and tap line construction on private land would result in temporary adverse impact during decommissioning at one sensitive receptor.

3.8 Transportation

The transportation section describes the existing roadway, railway, river crossings, and airports located within the transportation analysis area and the related potential impacts to them based on the alternatives proposed. Transportation resources were identified based on a review of aerial photographs, mapping, and available public data.

3.8.1 *Affected Environment*

The analysis area for transportation includes a 5-mile area surrounding the proposed action alternatives presented in Chapter 2. The western end point of the proposed project is in Dubuque County, Iowa, with the eastern end point in the town of Middleton, Wisconsin, in Dane County.

Transportation resources in the analysis area include roadways, railway, river crossings, and airports. This section identifies the transportation resources that could be affected by construction, operations, maintenance, and decommissioning of the project.

3.8.1.1 ROADWAYS

The transportation analysis area is served by a network of Federal, state, county, and local roadways. Roads throughout the transportation analysis area are managed by the U.S. Department of Transportation

[USDOT], Federal Highway Administration, Iowa Department of Transportation [Iowa DOT], Wisconsin Department of Transportation [WisDOT], and local agencies. A greater number of state and county roads are concentrated in town centers, while many areas that are more rural are served by a single state and county road. Local roads provide access from Federal, state, and county roads to homes, farms, and businesses. Some local roads are unpaved. Major roadways, defined as state and U.S. highways within 5 miles of the project alternatives, are shown in Table 3.8-1 (U.S. Census Bureau 2017a).

The construction of a transmission line along highway corridors in Iowa and Wisconsin requires close coordination with WisDOT and Iowa DOT to account for future planned roadway expansion or modifications. The total number of roadway segments within the transportation analysis area, including Federal, state, and local roads is approximately 2,700, with the majority of roads categorized as local roads. Average daily traffic (ADT) volumes on segments of major roadways vary throughout the transportation analysis area, from 1,020 in the rural areas of the area to over 10,200 in the more urban areas (see Table 3.8-1) (Iowa DOT 2016; WisDOT 2014). These roadways may be used during the construction phases of the project by construction workers and material delivery trucks to reach assembly points, yards, and work sites along the project alternatives. However, after the construction phase is complete, very little traffic is generated by the project while in operation.

For all roadways, permitting from the above agencies will need to be coordinated for construction, location, installation, maintenance, or use of pole lines, wires, guys, anchors, or other related fixtures within designated ROWs.

Table 3.8-1. Major Roadways and Average Daily Traffic Volume

Roadway	Description	Average Daily Traffic Volume
U.S. Route 12	Runs east-west across the western to southeast portions of WI. Primarily a 4-lane freeway.	10,133
U.S. Route 14	Runs northwest-southeast across the western to southwest portions of WI. Primarily 2-lane surface road, a few multilane urban arterials and freeway sections near Madison.	Iowa Co – 10,262; Dane Co – 10,133
U.S. Route 18/ U.S. Route 18W	Runs east-west across the southern portion of WI and crosses the Mississippi River at Marquette, IA, and Prairie du Chien, WI. Primarily 2-lane surface road, with several multilane sections within communities.	Grant Co – 2,620; Iowa Co – 10,262; Dane Co – 10,133
U.S. Route 52	Runs north-south across state. Generally 4-lane surface road.	Clayton Co – 2,833; Dubuque Co – 3,571
U.S. Route 61	Generally follows the Mississippi River and designated the Great River Road for much of the roadway. Primarily multilane facility.	2,620
U.S. Route 151 /151B / EUS151B / WUS151B	Follows northeasterly path through WI and IA. Limited access highway for much of the route.	2,620
WI SH23	WI SH23 is a north-south route in WI, generally with either a 2-lane surface road or urban multilane arterial, and some freeway segments near larger communities.	2,127
WI SH78	WI SH78 is a north-south trunk route in WI. Primarily a 2-lane surface road.	8,531
WI SH80	WI SH80 is a north-south WI state trunk highway in southwest and west central WI. Primarily a 2-lane surface road.	Grant Co – 2,953; Iowa Co – 2,127
WI SH81	WI SH81 runs east-west in southwest and south-central WI. Primarily a 2-lane surface road.	2,953
WI SH126	WI SH126 is a short north-south highway in Western Lafayette County. It runs from Belmont to WI SH81.	3,239
WI SH129	WI SH129 is a short WI state highway trunk line constructed as a bypass route near Lancaster.	2,953
WI SH133 / SH133B	WI SH133 is a north-south WI route, which operates in a U-shape running east-west on the top and bottom of the route. Primarily a 2-lane surface road.	2,953

Roadway	Description	Average Daily Traffic Volume
WI SH191 / STRD129	State Trunk Highway 191 runs east–west in south-central Wisconsin from Dodgeville to Hollandale.	2,127–2,953
IA SH3	Runs east to west across the state of Iowa and is the longest state highway in Iowa, at 327.81 miles long.	1,020
IA SH136	IA SH136 runs for 98 miles in eastern Iowa.	2,828

In addition to roadway infrastructure, bridges for highways, railway, bicycle and pedestrian use, and highway overpasses and interchanges are present within the analysis area. The following bridge and overpass structures are in the analysis area (National Bridge Inventory 2018):

- Highway bridges in the defined area range from 38 to 90 structures, depending upon the final routing.
- Railroad bridges in the defined area range from 63 to 85 structures, depending upon the final routing.
- Bicycle and pedestrian bridges in the defined area range from 79 to 90 structures, depending upon the final routing.
- Highway pedestrian bridges in the defined area range from 3 to 7 structures, depending upon the final routing.
- Overpass structures in the defined area range from 136 to 154 structures, depending upon the final routing.

During the construction and operation phases of the project, coordination would be required with the USDOT, FHWA, Iowa DOT, WisDOT, and local agencies to ensure the weight loads and width of the existing facilities are considered in the project planning and delivery of materials and equipment.

Two roadways within the Wisconsin portion of the C-HC Project are designated Rustic Roads—Rustic Road 70 and Rustic Road 75. The Rustic Roads system in Wisconsin was created in 1973 by the State Legislature to preserve Wisconsin's scenic, lightly traveled country roads for recreational enjoyment for bikers, hikers, and motorists (WisDOT 2018). To qualify for the Rustic Roads program, a roadway must have outstanding natural features along its borders such as rugged terrain, native vegetation, and wildlife, or open areas with agricultural vistas that make the road unique. The road should be a lightly traveled, public access road and not scheduled for major improvements which would change its rustic characteristics. Rustic Road 70 is an approximately 10.1-mile gravel road in Grant County. The road leaves U.S. 61 at Liberty Ridge Road and contains portions of Hill Road, Ridge Road, Sleepy Hollow Road, and Scenic Road to County E. Rustic Road 75 is 3.7 miles and paved and is located in Iowa County. This roadway contains portions of Ogden Road, Bromley Road, and Turnbull Road between County A and County G in the town of Mifflin (WisDOT 2018).

3.8.1.2 RAILWAYS

Three mainline railroads are owned and/or operating in the analysis area.

Wisconsin and Southern Railroad (WSOR) is a Class II regional railroad in southern Wisconsin and northeastern Illinois operated by Watco Companies. WSOR has an estimated 19 to 33 miles of track within the analysis area, depending on the action alternative (USDOT 2017).

Burlington Northern-Santa Fe (BNSF) is the largest freight railroad network in North America. BNSF is one of seven North American Class I railroads. BNSF has an estimated 12 to 37 miles of track within the analysis area, depending on the action alternative (USDOT 2017).

Canadian Pacific Railway (CPRS) is a historic Canadian Class I railroad. CPRS has an estimated 11 to 22 miles of track within the analysis area, depending on the action alternative (USDOT 2017).

Daily train volumes for the mainline railroads in the analysis area is presented in Table 3.8-2.

Table 3.8-2. Daily Train Volumes for Mainline Railroads, shown in Trains per Day

	Dane County, WI	Grant County, WI	Iowa County, WI	Lafayette County, WI	Dubuque County, IA
WSOR	4	2	2	N/A	N/A
BNSF	N/A	48	N/A	N/A	N/A
CPRS	3	N/A	20	N/A	8

The active mainline railroads within the analysis area used for freight, and no passenger rail service operates in the defined analysis area. Coordination between the Federal Railroad Administration and with the three rail companies would be required for permitting in areas where the project would encroach on mainline railroad ROW.

3.8.1.3 RIVER CROSSINGS

All Project alternatives include a span of the transmission line crossing the Mississippi River (see Figure 3.1-1) and the Refuge. Coordination efforts for special permitting in these areas would include several agencies—the U.S. Coast Guard, the Utilities, the USFWS, and the USACE.

A car ferry operates out of Cassville, Wisconsin, and connects the Village of Cassville, Wisconsin, on the east side of the Mississippi River, with Iowa, the Refuge, and Oak Road on the west side of the Mississippi River. The ferry served early settlement in the region as early as 1833, and it continues today, making roughly the same trip back and forth across the Mississippi River. It is the oldest operating ferry service in the state of Wisconsin (Village of Cassville 2016). The Cassville Car Ferry operates seasonally with daily service between Memorial Day and Labor Day and limited weekend service in May, September, and October (Village of Cassville 2016).

The Cassville car ferry landing is also used as a river access point, named the Turkey River landing and is located next to the IDNR maintained boat launch area and at the termination of the county-maintained roadway. Other nearby river access points include Cassville Public Access launch and the Wisconsin Power and Light launch on the Wisconsin side of the Mississippi River. The public park in Cassville also serves as a Refuge overlook. Commercial navigation passes through the Refuge.

3.8.1.4 AIRPORTS

Airports, heliports, and landing strips are used for transportation of passengers, cargo and agricultural activities in Wisconsin and Iowa. There are 12 airports and two heliports within the analysis area (USDOT 2017). Table 3.8-3 provides a short description of each facility.

Coordination for permitting with the appropriate local officials, Wisconsin Bureau of Aeronautics, Federal Aviation Administration (FAA), Iowa Department of Aviation, and local airport operators would be required. Specifically related to coordination of agencies, the FAA objective is to ensure safe and efficient use of the navigable airspace for public use, military airports, and heliports (facilities). Once the final project route is selected, notice would be provided to the FAA for review and compatibility with FAA's criteria for structure heights, markings, and/or lighting one or more transmission structures or wire spans.

Table 3.8-3. Airport Information

Airport Name	Type	Community	Description
Cassville Municipal – C74	Airport/Public	Cassville	One runway (11/29) with an asphalt surface that is 3,000 feet in length and runs in a northwest/southeast alignment.
Lancaster Municipal – 73C	Airport/Public	Lancaster	One runway (18/36) with an asphalt surface that is 3,300 feet in length and runs in a north/south alignment.
Platteville Municipal – PVB	Airport/Public	Platteville	Two runways at an elevation of 1,022 feet. One runway has an asphalt surface that is 3,599 feet in length and runs in a southwest/northeast alignment. The second runway has an asphalt surface that is 3,999 feet in length and runs in a northwest/southeast alignment.
Iowa County – MRJ	Airport/Public	Mineral Point	Two runways at Iowa County. The first runway is at an elevation of 1,171 feet, with an asphalt surface that is 3,600 feet in length and runs in a southwest/northeast alignment. The second runway is at an elevation of 1,164 feet, with an asphalt surface that is 5,001 feet in length and runs in a northwest/southeast alignment.
Southwind – 22WN	Airport/Private	Dodgeville	One runway with a turf surface of 1,800 feet in length and runs in a northwest/southeast alignment.
Forseth Field – WI61	Airport/Private	Arena	One runway (10/28) with a turf surface that is 2,500 feet in length and runs in an east/west alignment.
Hallick Farm – WI66	Airport-Heliport/Private	Black Earth	One helipad and one runway at Hallick Farm. The runway is at an elevation of 1,097 feet, with a turf surface 1,550 feet in length, running in a northwest/southeast alignment. Helipad has a concrete surface that is 40 × 40 feet in size.
Memorial Hospital – WI44 / Upland Hills Health	Heliport/Private	Dodgeville	Helipad has an asphalt surface at an elevation of 1,213 and is 39 × 39 feet in size.
Atkins Ridge – WI43	Airport/Private	Daleyville	One runway with a turf surface that is 2,400 feet in length running in a north/south alignment.
Docken Field – 37WI	Airport/Private	Mount Horeb	One runway with a turf surface that is 1,800 feet in length running in a northwest/southeast alignment. Based on aerial imagery, this runway appears to have fallen out of use but is still on file with the FAA.
Hecklers' Strip – 2WI7	Airport/Private	Mount Vernon	One runway with a turf surface that is 2,114 feet in length running in a southwest/northeast alignment.
Middleton Muni – Morey Field – C29	Airport/Public	Middleton	Two runways at Morey Field. The first runway is elevation of 928 feet with a turf surface, 2,000 feet in length and runs in a north/south alignment. The second runway is elevation of 928 feet with an asphalt surface, 4,000 feet in length and runs in an east/west alignment.
Tuschen Airport – 89WI	Airport/Private	Jonesdale	Two runways at Tuschen. The first runway is elevation of 1,060 feet with a turf surface, and 1,584 feet in length. The second runway is turf surface and 483 feet in length.

3.8.2 *Environmental Consequences*

The following section discusses the comparative potential environmental consequences (impacts) of conducting the No Action Alternative and six proposed project alternatives to the existing transportation resources of roadways, railway, river crossings, and airports. The data reviewed focus on Federal, state, and local resources most likely to be affected.

Impacts common to all action alternatives are presented ahead of the discussion of unique impacts of the individual alternatives. For ease in the review of data presented, the discussion of potential impacts from the six proposed alternatives is organized by individual transportation resource (roadways, railways, river crossings, and airports).

3.8.2.1 DATA SOURCES, METHODS, AND ANALYSIS ASSUMPTIONS

The following impact indicators were considered when analyzing potential impacts to transportation:

- Changes in traffic volumes on roadway systems.
- Distances of the C-HC Project to airports and heliports.
- Changes in road transportation, based on information required by Wisconsin and Iowa Department of Transportation ROW permits.
- Changes in rail transportation, based on information required by permits issued by rail operators.
- Changes in waterway transportation, based on information required for USACE permits.

Transportation data for the analysis area were collected and analyzed from highway maps, GIS coverages, route alignment maps, and other maps from various reports and websites of the affected state and local agencies. In addition, WisDOT provided comments informing RUS of ongoing projects in the analysis area (WisDOT 2019b). A review of Federal, state, and local transportation plans was conducted. The transportation analysis area is a 10-mile-wide area spanning the centerline of the proposed transmission line (with 5 miles on either side of the centerline of the six alternatives). The area was assessed to identify existing and proposed Federal, state, and local transportation infrastructure that would be directly and indirectly impacted by construction, operations, and decommissioning of the proposed project.

The methodology for roadway analysis assumes the primary impacts associated with the proposed project would occur within the 2-year construction phase of the project. The roadway analysis considers the existing traffic volumes and analyzes estimated project traffic volumes to determine potential impact. This analysis is also true for bridge impacts, where the project final alignment must adhere to existing permits from the appropriate agencies and consider weight and load restrictions on existing facilities. At the time of the assessment, information related to when and where project-related traffic would occur on specific roads was not available. Therefore, a qualitative approach was taken to assess the potential impacts to roadway resources.

The railway analysis considers any segments of the project that may encroach upon ROW owned by private carriers or local entities. In addition, where potential encroachment is confirmed, project impact load and/or speed restrictions or horizontal clearance on existing or planned facilities is assessed. As mentioned previously, once the final design is identified, the Federal Railroad Administration would be notified for coordination of required permitting.

The river crossings analysis considers the potential impact on navigation activities within the analysis area. Information regarding clearance and restrictions on activities was also considered.

The airport analysis methodology considers the proximity of the proposed project to existing and planned airport facilities. These comparisons provide insight into the potential for impacts that could dictate the requirement for an airspace obstruction analysis by the FAA. A 10-mile corridor is necessary to allow for flexibility of project routing and design, and to allow for errors in the recorded locations and boundaries of some resources.

Table 3.8-4 provides a description of the impact threshold definitions used in the analysis of potential impacts to transportation resources.

Table 3.8-4. Transportation Impact Threshold Definitions

	Minor Impact	Moderate Impact	Major Impact
Transportation	Roadway – Negligible increases in daily traffic volumes resulting in perceived inconveniences to drivers but no actual disruptions to traffic. Perceived inconveniences to drivers due to routine inspections by small vehicles or pickup trucks. Railroad – No impact to existing and planned railroad operations, with adequate horizontal and vertical clearances provided. River Crossing – No impact to either commercial or recreational operations. Airport – No impact to flight paths, runway protection zones, or future airport expansion plans. The proposed path is more than 5 miles from any airport (commercial or general aviation).	Roadway – Detectable increases in daily traffic volumes (with slightly reduced speeds of travel) resulting in slowing down traffic and delays of less than 10%. Railroad – No impact to existing and planned railroad operations; however, additional safety protections are required due to a lack of horizontal clearance. River Crossing – Obstruction constructed within the navigable waterway; however, adequate clearance is available so as not to significantly impede navigation activities. Airport – No impact to flight paths, runway protection zones, or future airport expansion planes. The proposed path is within 5 miles of an airport.	Roadway – Significant increases in daily traffic volumes (with reduced speeds of travel) resulting in an adverse change in travel speeds and delays of more than 10%. Railroad – Operations or expansion plans of railroads impacted, resulting in load restrictions or speed restrictions of railroad operations. River Crossing – Obstructions in navigable waterways are present that place restrictions on recreational or commercial activities. Airport – Impacts and limitations to flight paths, runway protection zones, or future airport expansion plans.

3.8.2.2 NO ACTION

Under the No Action Alternative, the proposed C-HC Project would not be constructed, and the potential environmental impacts associated with construction and operation of the project would not occur. There would be no transportation impacts associated with the No Action Alternative.

3.8.2.3 IMPACTS COMMON TO ALL ACTION ALTERNATIVES

Construction

Impacts to transportation resources that may occur during construction of the project include temporary road/rail line closures and changes to traffic patterns, damage to roadways, interrupted access to private land, and temporary delays resulting from increases in construction vehicle trips. These impacts are anticipated to be short-term, localized to the area of construction, and moderate, considering the potential for delays and interruption of traffic flow.

Overhead construction activities, such as stringing conductors and aerially installing transmission line structures, may interfere with emergency response by ambulance, fire, paramedic, and police vehicles. Roadway segments that would be most impacted are two-lane roadways that provide one lane of travel per direction. Additionally, there is a possibility that emergency services may be needed at a location where access is temporarily blocked by the construction zone. The Utilities would implement a program that requires coordination, in advance, with emergency services, such as fire, paramedics, and essential services such as mail delivery and school buses if a closure would exceed 1 hour.

The project may generate a temporary increase in daily trips on the regional and local roadways. Worker-generated traffic would occur primarily in the early morning and late afternoon, while general deliveries likely would occur throughout the day. At any single location, this increase in traffic would be short-term, as crews move over any individual construction spread along the transmission line. Workers may be commuting to the project site from as far as two hours away, from outside the analysis area. However, the effects from the comparatively small number of workers using the high standard, high-volume highways surrounding and within the analysis area is expected to be minor.

Areas in the vicinity of the project alternatives generally have light existing traffic volumes, as shown previously in Table 3.8-1, considerably below the theoretical traffic capacity of the primary highways and local roads. It is estimated the daily project workforce would consist of 100 to 240 workers of the project construction time frame. Transmission line workers would be dispersed in groups throughout the project area and would not typically be working at the same place at any one time. Haul truck traffic would include trucks carrying equipment and materials, spoils for disposal, and new and old tower support pieces. Trips would be made to and from various points along the transmission line route. The exact routes and scheduling of truck trips are not known at this time.

Because of the dispersed nature of the construction, there would be a minor impact on traffic congestion on any one road segment and, if there were, it would be a temporary situation. On an individual or cumulative basis, the proposed project would not cause long-term traffic delays.

The project Traffic and Transportation Plan and the requirements of state and county encroachment permits would provide adequate measures to ensure that traffic disruption and delay are minimized. This ensures that project trips are planned in accordance with existing road conditions. The project team would obtain permits that describe circulation and detour routes, limit lane closures, etc.

Increased traffic on roads due to the construction of the project could have adverse impacts to public safety and worker safety. With higher traffic volumes on the roadway, there is an increased risk for vehicular collisions as well as collisions with multi-modal forms of transportation, such as pedestrians and cyclists. All workers would be expected to obey local speed limits and traffic restrictions and it is assumed that local and state law enforcement would enforce traffic regulations throughout the project area as they normally would.

Prior to construction of the project, the Utilities would be required to obtain use permits or similar legal agreements from the public agencies responsible for affected transportation facilities and applicable ROWs. In addition, they would be responsible for all oversize and overweight permits required for delivery of construction materials and subcontractor components.

Standard permit application procedures for utility crossings and installations within railroad ROW would be required. Project alternatives paralleling railroads would require coordination with the railroad companies to determine if installation of the new line would create objectionable induction. Project alternatives crossing railroads would require compliance with National Electrical Safety Code Sections 231 and 232, PSC 114, or the railroad company’s reasonable clearance requirements, whichever is more stringent.

Construction timing would be coordinated for river crossings with the U.S. Coast Guard to avoid potential impacts to Private Aids to Navigation in this portion of the Mississippi River. Closures of the Mississippi River channel may be required during Project construction activities. These closures would need to be coordinated by the Utilities, the USFWS, the USACE, and the U.S. Coast Guard in terms of the planned duration and extent of the navigation constraints on the river.

Air traffic patterns at public airports would not likely be affected by the placement of new structures or conductors, because the C-HC Project would be designed and constructed to accommodate the existing public airport operations. However, private airports, airstrips, or heliports would potentially be impacted by the C-HC Project, depending on the final C-HC Project design near these facilities and the requirements of the FAA. Airport coordination for permitting with the appropriate local officials, Wisconsin Bureau of Aeronautics, FAA, Iowa Department of Aviation, and local airport operators would be required for each alternative. Specifically related to coordination of agencies, the FAA objective is to ensure safe and efficient use of the navigable airspace for public use, military airports, and heliports (facilities). Once the final route is selected, notice would be provided to the FAA for review of the FAA's criteria for structure heights, markings, and/or lighting one or more transmission structures or wire spans.

Retirement of the N-9 Transmission Line and Construction of a New 69-kV Tap Line

The decommissioning of the N-9 line would intersect 360th Street and the new tap line would intersect 360th Street and CY9 in Iowa. Major roads that would likely be used to get the equipment to the project site would be Wisconsin State Highways 81 and 133 near Cassville Substation in Wisconsin, and CY9 and U.S. Route 52 in Iowa. The decommissioning and tap line construction activities may generate a temporary increase in daily trips on the regional and local roadways. Worker-generated traffic would occur primarily in the early morning and late afternoon, while general deliveries likely would occur throughout the day. At any single location, this increase in traffic would be short term, as crews move over any individual construction spread along the transmission line.

Transportation impacts are not expected to be significant and would be temporary in nature. It is not anticipated that construction equipment or labor transportation would have a significant impact on traffic volumes or flow on local roadways or state highways. Existing roads would be used for construction access to the site. Any increases in traffic would be short-term in nature and would be limited to the decommissioning period of 2 months. Decommissioning would occur during winter months, which is traditionally a time of lower road usage in the Refuge. In winter, the level of traffic on Oak Road in the Refuge significantly drops in conjunction with the end of waterfowl hunting season and the icing of the river.

Operations

Impacts on public roadways and rail lines that may occur during operations, maintenance, and emergency repairs would be similar to those occurring during construction but would be more localized, involve fewer vehicles, and would be periodic over the life of the C-HC Project (60 years). The C-HC Project would be inspected regularly or as necessary using fixed-wing aircraft, helicopters, ground vehicles, all- terrain vehicles, and/or personnel on foot. Maintenance of project facilities would be performed as needed, and applicable Federal and state permits would be obtained prior to conducting maintenance.

The Utilities or their contractors would develop and implement a Traffic and Transportation Management Plan applicable to operations, maintenance, and emergency repairs. The plan would describe measures designed and taken to avoid and/or minimize adverse effects associated with the existing transportation system, including roadway damage or safety hazards that may occur due to project vehicle weight or size.

Project operations would involve periodic inspection and maintenance of the transmission line and associated facilities. During project operations, maintenance crews and vehicles would conduct inspection and maintenance activities. Aerial inspection would likely be conducted by helicopter or drone annually. Detailed ground inspections of the entire transmission line system would take place on a semi-annual basis using four-wheel-drive trucks or all-terrain vehicles.

Typical maintenance is conducted using live-line maintenance with equipment, such as an aerial lift crane. These activities would increase wear and tear on roadways and bridges. Personnel and equipment traveling to and from the site for operations purposes would also be negligible due to the low volumes of generated traffic.

Helicopter flights associated with project operations may affect the airports and heliports. These flights may occur within the controlled zones throughout the analysis area. All flight operations are FAA controlled. Impacts would include increased traffic load at these airports, though this is expected to be a temporary and minor impact due to the few flights that project operations would require (typically only a few per year).

Existing roads would be improved within the project area to accommodate the proposed project. Road improvements would decrease the potential for nuisance dust; however, dust would be monitored, and suppression measures incorporated into the proposed project construction and operation plans. Because of the environmental commitments, no significant adverse transportation impacts would occur.

3.8.2.4 ROADWAYS

The impact analysis for roadways generated by construction, operation, and maintenance of the proposed project focuses on the change in traffic volumes to determine potential impacts. The existing and projected traffic volumes for the project are shown in Table 3.8-5. and Table 3.8-6, along with the potential impacts from each action alternative.

- The average daily traffic volumes on segments of roadways within 5 miles of the analysis area are shown in Table 3.8-5. (Iowa DOT 2016; WisDOT 2014). These roadways may be used by construction workers and material delivery trucks to reach assembly points, yards, and work sites along the project alternatives.
- The estimated number of heavy truck loads for the duration of the project (December 2021 to June 2023—30 months) is 22,740 trips, which averages 38 trips per day for the project construction time of 30 months. Heavy truck load is defined as a vehicle over a 1-ton pickup.
- For non-heavy truck loads, projected traffic is estimated at 11,370 trips for the duration of the project, which averages 19 trips per day for the duration of the project.
- The estimated construction phase would generate 57 average daily trips of vehicles used for pole segments, drilling equipment, concrete trucks, gravel trucks, moving the transmission line equipment along the ROW, etc.
- The traffic estimates used the assumptions of 670 structures included for the project, with the assumption of 30–40 heavy truck trips per unit, and 15–20 light truck trips per unit.

Table 3.8-5. Average Daily Traffic Impact Analysis, Alternatives 1–3

Roadway	Alternative 1 Existing ADT	Alt 1 – Project Estimated ADT (% Increase)	Alternative 2 Existing ADT	Alt 2 – Project Estimated ADT (% Increase)	Alternative 3 Existing ADT	Alt 3 – Project Estimated ADT (% Increase)
IA SH3	1,020	1,077 (6%)	Delaware Co – 1,169 Dubuque Co – 1,020	1,226 (5%) 1,077 (6%)	1,020	1,077 (6%)
IA SH136	2,828	2,855 (2%)	2,828	2,855 (2%)	2,828	2,855 (2%)
IA US 52	Clayton Co – 2,833 Dubuque Co – 3,571	2,890 (2%) 3,628 (2%)	Clayton Co – 2,833 Dubuque Co – 3,571	2,890 (2%) 3,628 (2%)	Clayton Co – 2,833 Dubuque Co – 3,571	2,890 (2%) 3,628 (2%)
WI SH23	2,127	2,184 (3%)	2,127	2,184 (3%)	2,127	2,184 (3%)
WI SH35	2,953	3,010 (2%)	2,953	3,010 (2%)	2,953	3,010 (2%)
WI SH39	2,127	2,184 (3%)	2,127	2,184 (3%)	2,127	2,184 (3%)

Roadway	Alternative 1 Existing ADT	Alt 1 – Project Estimated ADT (% Increase)	Alternative 2 Existing ADT	Alt 2 – Project Estimated ADT (% Increase)	Alternative 3 Existing ADT	Alt 3 – Project Estimated ADT (% Increase)
WI SH78	8,531	8,588 (1%)	8,531	8,588 (1%)	8,531	8,588 (1%)
WI SH80	Grant Co – 2,953 Iowa Co – 2,127	3,010 (2%) 2,184 (3%)	Grant Co – 2,953 Iowa Co – 2,127	3,010 (2%) 2,184 (3%)	Grant Co – 2,953 Iowa Co – 2,127	3,010 (2%) 2,184 (3%)
WI SH81	2,953	3,010 (2%)	2,953	3,010 (2%)	2,953	3,010 (2%)
WI SH126	N/A	N/A	N/A	N/A	3,239	3,296 (2%)
WI SH129	2,953	3,010 (2%)	2,953	3,010 (2%)	N/A	N/A
WI SH130	2,127	2,184 (3%)	2,127	2,184 (3%)	2,127	2,184 (3%)
WI SH133	2,953	3,010 (2%)	2,953	3,010 (2%)	2,953	3,010 (2%)
WI SH133 B	N/A	N/A	N/A	N/A	2,953	3,010 (2%)
WI SH191	N/A	N/A	N/A	N/A	2,127	2,184 (3%)
WI TRD129	2,953	3,010 (2%)	2,953	3,010 (2%)	N/A	N/A
WI US12	10,133	10,190 (1%)	10,133	10,190 (1%)	10,133	10,190 (1%)
WI US14	Iowa Co – 10,262 Dane Co – 10,133	10,319 (1%) 10,190 (1%)	Iowa Co – 10,262 Dane Co – 10,133	10,319 (1%) 10,190 (1%)	Iowa Co – 10,262 Dane Co – 10,133	10,319 (1%) 10,190 (1%)
WI US18	Grant Co – 2,620 Iowa Co – 2,127	2,677 (2%) 2,184 (3%)	Grant Co – 2,620 Iowa Co – 10,262	2,677 (2%) 10,319 (1%)	Grant Co – 2,620 Iowa Co – 10,262	2,677 (2%) 10,319 (1%)
WI US18W	2,620	2,677 (2%)	2,620	2,677 (2%)	2,620	2,677 (2%)
WI US61	2,620	2,677 (2%)	2,620	2,677 (2%)	2,620	2,677 (2%)
WI US151	N/A	N/A	N/A	N/A	2,620	2,677 (2%)
WI US151B	N/A	N/A	N/A	N/A	2,620	2,677 (2%)
WI US151B	N/A	N/A	N/A	N/A	2,620	2,677 (2%)
WI US151B	N/A	N/A	N/A	N/A	2,620	2,677 (2%)
Impact Measure	Minor Impact – due to negligible increases in daily traffic volumes, average 2% for Alternative 1 roadways.		Minor Impact – due to negligible increases in daily traffic volumes, average 2% for Alternative 2 roadways.		Minor Impact – due to negligible increases in daily traffic volumes, average 2% for Alternative 3 roadways.	

Table 3.8-6. Average Daily Traffic Impact Analysis, Alternatives 4–6

Roadway	Alternative 4 Existing ADT	Alt 4 – Project Estimated ADT (% Increase)	Alternative 5 Existing ADT	Alt 5 – Project Estimated ADT (% Increase)	Alternative 6	Alt 6 – Project Estimated ADT (% Increase)
IA SH3	1,020	1,077 (6%)	Delaware Co – 1,169 Dubuque Co – 1,020	1,226 (5%) 1,077 (6%)	1,020	1,077 (6%)
IA SH136	2,828	2,855 (2%)	2,828	2,855 (2%)	2,828	2,855 (2%)
IA US 52	Clayton Co – 2,833 Dubuque Co – 3,571	2,890 (2%) 3,628 (2%)	Clayton Co – 2,833 Dubuque Co – 3,571	2,890 (2%) 3,628 (2%)	Clayton Co – 2,833 Dubuque Co – 3,571	2,890 (2%) 3,628 (2%)
WI SH23	2,127	2,184 (3%)	2,127	2,184 (3%)	2,127	2,184 (3%)
WI SH35	2,953	3,010 (2%)	2,953	3,010 (2%)	2,953	3,010 (2%)
WI SH39	2,127	2,184 (3%)	2,127	2,184 (3%)	2,127	2,184 (3%)
WI SH78	8,531	8,588 (1%)	8,531	8,588 (1%)	8,531	8,588 (1%)
WI SH80	Grant Co – 2,953 Iowa Co – 2,127	3,010 (2%) 2,184 (3%)	Grant Co – 2,953 Iowa Co – 2,127	3,010 (2%) 2,184 (3%)	Grant Co – 2,953 Iowa Co – 2,127	3,010 (2%) 2,184 (3%)
WI SH81	2,953	3,010 (2%)	2,953	3,010 (2%)	2,953	3,010 (2%)

Roadway	Alternative 4 Existing ADT	Alt 4 – Project Estimated ADT (% Increase)	Alternative 5 Existing ADT	Alt 5 – Project Estimated ADT (% Increase)	Alternative 6	Alt 6 – Project Estimated ADT (% Increase)
WI SH126	3,239	3,296 (2%)	3,239	3,296 (%)	N/A	N/A
WI SH129	N/A	N/A	N/A	N/A	2,953	3,010 (2%)
WI SH130	N/A	N/A	N/A	N/A	N/A	N/A
WI SH133	2,953	3,010 (2%)	2,953	3,010 (2%)	2,953	3,010 (2%)
WI SH133 B	2,953	3,010 (2%)	2,953	3,010 (2%)	N/A	N/A
WI SH191	2,127	2,184 (3%)	2,127	2,184 (3%)	2,127	2,184 (3%)
WI STRD129	N/A	N/A	2,953	3,010 (2%)	2,953	3,010 (2%)
WI US12	10,133	10,190 (1%)	10,133	10,190 (1%)	10,133	10,190 (1%)
WI US14	10,133	10,190 (1%)	10,133	10,190 (1%)	10,133	10,190 (1%)
WI US18	Grant Co – 2,620 Iowa Co – 10,262 Dane Co – 10,133	2,677 (2%) 10,319 (1%) 10,190 (1%)	Grant Co – 2,620 Iowa Co – 10,262	2,677 (2%) 10,319 (1%)	Grant Co – 2,620 Iowa Co – 10,262 Dane Co – 10,133	2,677 (2%) 10,319 (1%) 10,190 (1%)
WI US18W	2,620	2,677 (2%)	2,620	2,677 (2%)	2,620	2,677 (2%)
WI US61	2,620	2,677 (2%)	2,620	2,677 (2%)	2,620	2,677 (2%)
WI US151	2,620	2,677 (2%)	Grant Co – 2,620 Iowa Co – 10,262 Dane Co – 10,133	2,677 (2%) 10,319 (1%) 10,190 (1%)	Iowa Co – 10,262 Dane Co – 10,133	10,319 (1%) 10,190 (1%)
WI US151B	2,953	3,010 (2%)	Grant Co – 2,620 Iowa Co – 10,262	2,677 (2%) 10,319 (1%)	N/A	N/A
WI EUS151B	2,620	2,677 (2%)	2,620	2,677 (2%)	N/A	N/A
WI US151B	2,620	2,677 (2%)	2,620	2,677 (2%)	N/A	N/A
Impact Measure	Minor Impact – due to negligible increases in daily traffic volumes, average 2% for Alternative 4 roadways.		Minor Impact – due to negligible increases in daily traffic volumes, average 2% for Alternative 5 roadways.		Minor Impact – due to negligible increases in daily traffic volumes, average 2% for Alternative 6 roadways.	

The majority of roads within the analysis area would not be adversely affected by the temporary increase in road traffic for construction of 57 average daily trips; therefore, the contribution of the project's impact on traffic and transportation would be minor. The Utilities would acquire the required encroachment permits along the project and implement a Traffic Management and Control Plan to reduce impacts. The Traffic Management Plan would provide strategies to ensure safe and effective passage of through-traffic.

As a part of the WisDOT Improvement Program for 2017–2022, WisDOT has identified the following projects that may require coordination within the analysis area:

- U.S. 18/151—resurfacing project scheduled for 2022 from Dodgeville to Mount Horeb; pavement replacement/bridge deck overlay in from State Highway 23 to U.S. 18; New County Salt Facility located south of U.S. 151 Wisconsin County Trunk Highway O interchange or along the east side of U.S. 151 just north of the State Highway 23 interchange; install new cable guard on U.S. 18 between Lunde Land and Wisconsin County Trunk Highway PB.

- U.S. 14—mill and overlay from Cross Plains to Middleton

- U.S. 61—mill and overlay from Dickeyville to Lancaster

Depending on the C-HC Project alternative, the proposed project could be constructed within WisDOT highway ROW and could be in conflict with planned or unplanned highway reconstruction or expansion projects. Coordination by the Utilities with WisDOT associated with these alternatives is ongoing. WisDOT commented that if the proposed project occurs within the highway ROW, it may need to be moved if it were to coincide with future WisDOT actions. WisDOT maintains that the cost of relocating the facilities and planned power outages associated with the relocations would be the responsibility of the Utilities (WisDOT 2019b). The Utilities would continue to coordinate with WisDOT during final design to address any of these highway routing concerns.

During the DEIS public review period, WisDOT expressed concerns about the impacts to Rustic Roads 70 and 75 from the C-HC Project. The C-HC Project could result in a localized change in the rustic nature of these roadways. These adverse impacts would be minor and localized as both rustic roads are currently intersected by existing transmission lines. Therefore, if C-HC Project transmission structures were to be placed close to where the existing structures are located, the adverse impacts would be similar to current conditions. During final design, the Utilities would attempt to locate structures so that they would not be directly adjacent to the crossings with either Rustic Road 70 or Rustic Road 75.

Other impacts considered include those potential impacts to bridges along the roadways that have weight, width, and height restrictions. Once the final design is approved, the Utilities, as part of the Traffic Management and Control Plan, would use the existing bridge data to identify facilities with limitations. The Utilities will consider clearance between cranes and overhead transmission lines when selecting the final alignment and placement of the C-HC Project and structures. WisDOT suggests a 75-foot minimum offset between transmission line and bridges as a reasonable guideline. Crane staging and OSHA offsets would be taken into consideration and may increase the minimum separation needed. The options for highway crossings include 90-degree support structures (not considered preferable by WisDOT) and long and gradual crossings (which adds to overall transmission line overhead). While the Utilities will try to limit the number of highway crossings, WisDOT recommends a combination of options. In accordance with WisDOT's Utility Accommodation Policy (UAP)-09-15-25 3.1, overhead utilities can be located as near as practical to the ROW line. While WisDOT believes efforts to limit the number of highway crossings is important, WisDOT is willing to consider routing through interchanges. As a result, during construction and operation phases, the C-HC Project would avoid complications with identified transportation routes. The project impact for bridges is anticipated to be minor due to the small volume of traffic generated by the overall project during the construction phase. During operation, impact is also anticipated to be minor due to low traffic volumes and because most of the project is within coordinated ROW.

Clear-zone distances also need to be considered for the work zones that are required for the construction of the transmission line. While a structure may be outside the defined clear zone, the equipment at the construction site required to build the structure may encroach into the clear zone. While this equipment poses a temporary traffic hazard, it needs to be shielded, as long as it encroaches into the clear zone. This typically occurs at the structures that are placed just outside the clear-zone line. The work zones can be shielded by the installation of a temporary concrete barrier with crash cushions along the paved highway shoulder. Every effort shall be made to minimize the number of locations where this is required by adjusting the size of the work zone.

According to WisDOT's Facilities Development Manual, rigid structures like those associated with the C- C Project should either be placed outside the clear zone along highways or be shielded from traffic. Clear-zone distances vary due to multiple factors including highway design speed, highway traffic volumes, and highway side slopes. The Utilities will adhere to WisDOT guidance on defining these values in its Facilities Development Manual Section 11-15, Attachment 1.9 (WisDOT 2019a).

There is an area along U.S. 18/151 west of Barneveld where the C-HC Project may be routed within WisDOT ROW and transmission line structures would need to be installed within the clear zone. If this route is selected, it would require extending existing guardrail and installation of new guardrail to shield the structures. Increasing and introducing new obstructions within the clear zone is a safety hazard to the traveling public and creates additional maintenance responsibilities for WisDOT. During final design, the Utilities will coordinate with WisDOT if routing poses potential clear zone issues.

3.8.2.5 RAILWAYS

The impact analysis for railways considers any segments of the project that may encroach upon ROW owned by private rail carriers or local entities. In addition, if encroachment is determined, then the analysis considers how the project would potentially impact load and/or speed restrictions or horizontal/vertical clearance on existing or planned facilities. As mentioned previously, once the final design is identified, the Federal Railroad Administration and railroad companies would be notified for coordination of required permitting. The six action alternatives cross and/or share railroad ROW along parts of the analysis area, as shown in Table 3.8-7.

Table 3.8-7. Railroad Impacts Analysis

Alternative	Total Railroad Segments Affected	Railroad Owners	WI Segments	IA Segments	Total Miles Impacted	Impact Measure
Alternative 1	24	CPRS, WSOR, BNSF	22	2	BNSF – 12 miles CPRS – 11 miles WSOR – 24 miles	Moderate Impact due to number of miles, segments, within ROW areas of multiple carriers. Vertical and horizontal clearances and speed/weight restrictions will be determined w/ final alignment.
Alternative 2	24	CPRS, WSOR, BNSF	22	2	BNSF – 18 miles CPRS – 14 miles WSOR – 33 miles	Moderate Impact due to number of miles, segments, within ROW areas of multiple carriers. Vertical and horizontal clearances and speed/weight restrictions will be determined w/ final alignment.
Alternative 3	30	CPRS, WSOR, BNSF	27	3	BNSF – 37 miles CPRS – 22 miles WSOR – 33 miles	Moderate Impact due to number of miles, segments, within ROW areas of multiple carriers. Vertical and horizontal clearances and speed/weight restrictions will be determined w/ final alignment.
Alternative 4	26	CPRS, WSOR, BNSF	23	3	BNSF – 37 miles CPRS – 22 miles WSOR – 19 miles	Moderate Impact due to number of miles, segments, within ROW areas of multiple carriers. Vertical and horizontal clearances and speed/weight restrictions will be determined w/ final alignment.
Alternative 5	26	CPRS, WSOR, BNSF	23	3	BNSF – 37 miles CPRS – 22 miles WSOR – 19 miles	Moderate Impact due to number of miles, segments, within ROW areas of multiple carriers. Vertical and horizontal clearances and speed/weight restrictions will be determined w/ final alignment.
Alternative 6	20	WSOR, CPRS, BNSF	18	2	BNSF – 18 miles CPRS – 14 miles WSOR – 19 miles	Moderate Impact due to number of miles, segments, within ROW areas of multiple carriers. Vertical and horizontal clearances and speed/weight restrictions will be determined w/ final alignment.

The project would have a moderate impact on the railway segments along the corridor due to the number of miles and segments crossed by the C-HC Project, in addition to multiple carrier involvement.

The primary impacts of the project for railway segments would occur during the construction phases of the project, which would be a moderate impact if railcars are required to slow down in a construction zone. Ongoing operational impacts would occur if the final alignment is within a shared ROW corridor, either paralleling the route or crossing the rail line. There would be minor long-term permanent impacts only in instances of maintenance of the transmission if the maintenance activities were to occur in the shared corridor. The utilities would coordinate with the Federal Railroad Administration and with the above three rail companies for permitting that is required for areas where the project would encroach on mainline railroad ROW. Standard permit application procedures for utility crossings and installations within railroad ROW would also be required.

Each of the alternatives has segments impacting existing right-of-way for the mainline railroads. The Utilities would coordinate with the railroad companies to determine if installation of the new line would create objectionable induction. Each of the six alternatives that cross railroads would require compliance with National Electrical Safety Code Sections 231 and 232, PSC 114, or the railroad company's reasonable clearance requirements, whichever is more stringent.

3.8.2.6 RIVER CROSSINGS

The impact analysis for river crossings considers the operations of commercial or recreational activities, whether adequate clearance is available for the project or if the project would place restrictions on crossing activities. Each of the six alternatives cross the Mississippi River, including the USFWS-managed Upper Mississippi River National Wildlife and Fish Refuge. In addition, the Cassville car ferry connects the village of Cassville, Wisconsin, on the east side of the Mississippi River, with Iowa, the Refuge, and Oak Road on the west side of the Mississippi River. The Cassville car ferry landing is also used as a river access point, named the Turkey River landing. Other nearby river access points include Cassville Public Access launch and the Wisconsin Power and Light launch on the Wisconsin side of the Mississippi River. The public park in Cassville also serves as a Refuge overlook. Commercial navigation passes through the Refuge.

Each of the alternatives has moderate impacts for the river crossings and river access points due to potential obstruction of the waterway during construction phases. The obstructions would be negligent but may include obstructed views from equipment during installation or there may be small delays at the river access points or launch areas while spanning wire or delays with the crossing of the car ferry. Adequate clearance would be available for the project during construction and during operation.

Each of the six alternatives and the decommissioning of the N-9 transmission line across the Mississippi River would require coordination with the U.S. Coast Guard to avoid potential impacts to Private Aids to Navigation in this portion of the Mississippi River. Closures of the Mississippi River channel may be required during project construction activities. These closures would need to be coordinated by the Utilities, the USFWS, the USACE, and the U.S. Coast Guard in terms of the planned duration and extent of the navigation constraints on the river.

3.8.2.7 AIRPORTS

The impact analysis for airports considers the location of the airports in proximity to the project, future airport expansion projects, vertical clearance, and flight path limitations. There are 12 airports and two heliports within 5 miles of the project alternatives (USDOT 2017).

Previous analysis within the *April 2018 Application for PSCW Certificate of Public Convenience and Necessity and WDNR Utility Permit for the Cardinal-Hickory Creek Transmission Line Project* identified several airports with potential impacts related to the project. This report used the FAA criteria and surface requirements for aeronautical studies of proposed and existing structures within 0.5-mile of public and military facilities. Table 3.8-8 presents the potential project impacts for the airport and heliport facilities.

Table 3.8-8. Airport Impact Analysis

Airport Name	Type	County	Community	Impact
Cassville Municipal – C74	Airport/Public	Grant	Cassville	Runway is approximately 2,000 feet from the Stoneman crossing location. Due to the airport and the height of the bluff immediately east of Cassville, transmission line structures within the airport's conical surface would likely require additional evaluation and design and may need to be limited in height.
Lancaster Municipal – 73C	Airport/Public	Grant	Lancaster	Notice to the FAA may be required for some of the closer structures that are 2 to 4 miles away, but it is unlikely structure heights would be limited by one of the obstruction surfaces that apply to this facility.
Platteville Municipal – PVB	Airport/Public	Grant	Platteville	One runway is approximately 1 mile from the project. Based on this distance, notice to the FAA would likely be required for multiple structures near Platteville Municipal. A preliminary review of this airport indicates that structure heights could be limited to less than 150 feet above ground level by one or more instrument approach obstruction surfaces that apply to this runway.
Iowa County – MRJ	Airport/Public	Iowa	Mineral Point	This airport is approximately 3.5 miles from the project. Preliminary structure locations and heights were filed with the FAA, which issued a no hazard for all preliminary structure locations.
Southwind – 22WN	Airport/Private	Iowa	Dodgeville	This airport is approximately 1 mile from the project. The proposed alignment does not impact the FAA regulations.
Forseth Field – WI61	Airport/Private	Iowa	Arena	This airport is approximately 0.5-mile from the project. The proposed alignment does show a possible issue with FAA requirements that must be addressed.
Hallick Farm – WI66	Airport-Heliport/Private	Dane	Black Earth	This airport is approximately 0.5-mile from the project. The proposed alignment does show a possible issue with FAA regulations in relation to the runway.
Memorial Hospital – WI44 / Upland Hills Health	Heliport/Private	Iowa	Dodgeville	The helipad is approximately 0.5-mile from the project. The proposed alignment does not impact the FAA regulations.
Atkins Ridge – WI43	Airport/Private	Dane	Daleyville	This airport is approximately 4 miles from the project. The proposed alignment does not impact the FAA regulations.
Docken Field – 37WI	Airport/Private	Dane	Mount Horeb	This airport is approximately 0.5-mile from the project. The proposed alignment may have a possible issue with FAA regulations. However, based on aerial imagery, this runway appears to have fallen out of use but is still on file with the FAA.
Hecklers' Strip – 2WI7	Airport/Private	Dane	Mount Vernon	This airport is approximately 2.5 miles from the project. The proposed alignment does not impact the FAA regulations.
Middleton Municipal – Morey Field – C29	Airport/Public	Dane	Middleton	This airport is approximately 2.4 miles from the project. Airport height limitation zoning restrictions for Morey Field are in place. Preliminary structure locations and heights were filed with the FAA, who issued determinations of no hazard for all preliminary structure locations.

Table 3.8-9 shows the airports and heliports within a 5-mile buffer for each of the proposed alternatives and the summary impact measure.

Table 3.8-9. Airports and Heliports

Alternative	Number of Facilities	Number of Airports	Number of Heliports	Impact Measure
Alternative 1	5	4	1	Moderate – due to the number of facilities within the project area, in addition to the impact factors listed in the previous tables.
Alternative 2	5	4	1	Moderate – due to the number of facilities within the project area, in addition to the impact factors listed in the previous tables.
Alternative 3	6	5	1	Moderate – due to the number of facilities within the project area, in addition to the impact factors listed in the previous tables.
Alternative 4	9	8	1	Moderate – due to the number of facilities within the project area, in addition to the impact factors listed in the previous tables.
Alternative 5	10	9	1	Moderate – due to the number of facilities within the project area, in addition to the impact factors listed in the previous tables.
Alternative 6	8	7	1	Moderate – due to the number of facilities within the project area, in addition to the impact factors listed in the previous tables.

Once the final project route is selected, notice would be provided to the FAA for all structures within the analysis area. The Utilities would coordinate with the appropriate local officials, Wisconsin Bureau of Aeronautics, FAA, and the airport operator to mitigate any facility challenges. Additional airport impacts for each of the six alternatives are listed within the Impacts Common to All Alternatives.

3.8.3 *Summary of Impacts*

The following summary identifies the potential transportation impacts for the project. Table 3.8-10 provides a tabular comparison of the indicators for transportation for the six alternatives under detailed consideration. The primary transportation impacts associated with the proposed C-HC Project would be associated with construction time frame. Because of the dispersed nature of the construction phase, impacts to roadways are determined to be minor due to the low traffic volume projections for the project. Road improvements conducted as part of the project would decrease the potential for nuisance dust; however, dust would be monitored, and suppression measures incorporated into the proposed C-HC Project construction and operation plans.

Potential impacts to railways was determined to be moderate based on the number of project transmission line miles and segments within existing railroad carrier ROWs. Vertical and horizontal clearances and speed/weight restrictions would also be determined with final alignment of the C-HC Project.

The analysis of river crossings resulted in a determination of moderate impact due to the potential obstruction of the waterway during the construction phase. Delays at the river access points or launch areas while spanning wire, or delays with the crossing of the car ferry, would be infrequent and short-term. Once under operation, potential impacts to river crossings would be minor.

The analysis of airport facilities provided a determination of a potential moderate impact due to location of the alternatives near airport and heliport facilities.

The N-9 transmission line decommissioning that would occur within the Refuge would result in temporary, minor impacts during decommissioning. The N-9 transmission line decommissioning and tap line construction on private land would also result in temporary, minor impacts during decommissioning. There would be short-term minor impacts to roadways from construction of substation improvements.

Table 3.8-10. Transportation Impact Summary Table

Alternative	Roadway Segments	Major River Crossings	Railroad Segments	Airport/Heliport Facilities
Alternative 1	2,381	1	24	5
Impact	Minor – Negligible increases in daily traffic volumes resulting in perceived inconveniences to drivers, but no actual disruptions to traffic. Perceived inconveniences to drivers due to routine inspections by small vehicles or pickup trucks.	Moderate – Obstruction constructed within the navigable waterway; however, adequate clearance is available so as not to significantly impede navigation activities.	Moderate – No impact to existing and planned railroad operations; however, additional safety protections are required due to a lack of horizontal clearance	Moderate – No impact to flight paths, runway protection zones, or future airport expansion planes. The proposed path is within 5 miles of an airport.
Alternative 2	2,408	1	24	5
Impact	Minor – Negligible increases in daily traffic volumes resulting in perceived inconveniences to drivers, but no actual disruptions to traffic. Perceived inconveniences to drivers due to routine inspections by small vehicles or pickup trucks.	Moderate – Obstruction constructed within the navigable waterway; however, adequate clearance is available so as not to significantly impede navigation activities.	Moderate – No impact to existing and planned railroad operations; however, additional safety protections are required due to a lack of horizontal clearance	Moderate – No impact to flight paths, runway protection zones, or future airport expansion planes. The proposed path is within 5 miles of an airport.
Alternative 3	2,658	1	30	6
Impact	Minor – Negligible increases in daily traffic volumes resulting in perceived inconveniences to drivers, but no actual disruptions to traffic. Perceived inconveniences to drivers due to routine inspections by small vehicles or pickup trucks.	Moderate – Obstruction constructed within the navigable waterway; however, adequate clearance is available so as not to significantly impede navigation activities.	Moderate– No impact to existing and planned railroad operations; however, additional safety protections are required due to a lack of horizontal clearance	Moderate – No impact to flight paths, runway protection zones, or future airport expansion planes. The proposed path is within 5 miles of an airport.
Alternative 4	3,024	1	26	9
Impact	Minor – Negligible increases in daily traffic volumes resulting in perceived inconveniences to drivers, but no actual disruptions to traffic. Perceived inconveniences to drivers due to routine inspections by small vehicles or pickup trucks.	Moderate – Obstruction constructed within the navigable waterway; however, adequate clearance is available so as not to significantly impede navigation activities.	Minor – No impact to existing and planned railroad operations, with adequate horizontal and vertical clearances provided.	Moderate – No impact to flight paths, runway protection zones, or future airport expansion planes. The proposed path is within 5 miles of an airport.
Alternative 5	3,070	1	26	10
Impact	Minor – Negligible increases in daily traffic volumes resulting in perceived inconveniences to drivers, but no actual disruptions to traffic. Perceived inconveniences to drivers due to routine inspections by small vehicles or pickup trucks.	Moderate – Obstruction constructed within the navigable waterway; however, adequate clearance is available so as not to significantly impede navigation activities.	Moderate – No impact to existing and planned railroad operations; however, additional safety protections are required due to a lack of horizontal clearance	Moderate – No impact to flight paths, runway protection zones, or future airport expansion planes. The proposed path is within 5 miles of an airport.
Alternative 6	2,765	1	20	8
Impact	Minor – Negligible increases in daily traffic volumes resulting in perceived inconveniences to drivers, but no actual disruptions to traffic. Perceived inconveniences to drivers due to routine inspections by small vehicles or pickup trucks.	Moderate– Obstruction constructed within the navigable waterway; however, adequate clearance is available so as not to significantly impede navigation activities.	Moderate – No impact to existing and planned railroad operations; however, additional safety protections are required due to a lack of horizontal clearance	Moderate – No impact to flight paths, runway protection zones, or future airport expansion planes. The proposed path is within 5 miles of an airport.

3.9 Cultural and Historic Resources

NEPA recognizes that a unique character of an environment is its relation to "historic or cultural resources" and requires agency officials to consider the degree that an action might "adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places [NRHP]" (40 CFR 1508.27[b][3] and 40 CFR 1508.27[b][8]). However, under NEPA, no definition is provided for "cultural resources."

The NRHP, which was established under the National Historic Preservation Act of 1966, as amended (NHPA) (54 U.S.C. 3001 et seq.), identifies historic properties (i.e., locations eligible for listing or listed in the NRHP) based on their relationship to significant historic events, individuals, architectural or engineering trends, or in their potential to provide important information about the local, regional, or national past (36 CFR 60[a–d]). In addition to being significant under one of the four National Register criteria (A, B, C, or D), properties must maintain sufficient integrity to convey their significance; the NPS has defined seven aspects of integrity, all or most of which must be present to convey the significance of the historic property (NPS 1997:44). These aspects include integrity of location, design, setting, materials, workmanship, feeling, and association. Different properties may display these aspects in unique ways.

Under Section 106 of the NHPA, agencies are required to make a reasonable and good faith effort to identify, in coordination with other interested parties including State Historic Preservation Offices (SHPOs) and Native American tribal groups, whether historic properties are present within the area of potential effects (APE) of an undertaking and whether they would be significantly impacted by that undertaking. Projects which are directed, overseen, funded, partially funded or permitted by a Federal agency are considered undertakings. The NEPA Environmental Assessment/EIS process may be coordinated with a Section 106 review, as long as the processes are substantially similar and involve the same parties (36 CFR 800.8).

In addition to NEPA and NHPA, other laws which may be considered in the protection of cultural and historic resources for this undertaking include:

- Wisconsin Historical Societies and Historical Preservation Statutes (Wisconsin Statutes Chapter 44) founded the Wisconsin Historical Society, provide policies for the review of all state agency actions that have the potential to impact historic properties, and prohibit archaeological excavation on state lands by unlicensed individuals.
- Miscellaneous Wisconsin County, Town, and City Historic Preservation Ordinances (Wisconsin Statutes Chapter 59.69, 60.64, and 62.23[7][em]). Cities, Towns, and Counties in Wisconsin may create local landmarks commissions to designate landmarks and establish historic districts, and may regulate the landmarks within their property.
- Wisconsin Burial Sites Preservation Statute (Wisconsin Statutes Chapter 157, Subchapter III). Prohibits the disturbance of any burial site or land adjacent to a burial site unless authorized by the director of the historical society.
- Wisconsin historic properties protections (Wisconsin Statute Chapter 943.01 and 943.14) prohibit damage to any rock art site. In addition, they prohibit the destruction of any historic buildings listed in the NRHP or on the state register of historic places without a permit issued by the city, village, county, or town.
- Iowa burial protection law (Iowa Code 263B and 716.5) establishes the office of state archaeologist of Iowa, and gives the state archaeologist the primary responsibility for preserving and investigating ancient human remains, and allows the state archaeologist to

deny permission to exhume significant historically or scientifically significant human remains. The intentional disturbance of a burial site is an aggravated misdemeanor.

- Abandoned Shipwreck Act of 1987 (43 U.S.C. 2101–2106) establishes Federal ownership (and state custodianship) for shipwrecks located within navigable waters of each state.
- American Indian Religious Freedom Act (42 U.S.C. 1996) requires that Federal actions do not impede the free use or access to Native American religious sites and protects Native American religious practice.
- Antiquities Act of 1906 (54 U.S.C. 320301–320303 and 18 U.S.C. 1866[b]) provides for presidential designation of national monuments and provides protection from excavation of those sites unless authorized by a permit.
- Archaeological and Historic Preservation Act of 1974 as amended (54 U.S.C. 3125) requires the preservation of historic and archaeological data that might be destroyed by Federal construction projects or other federally licensed activities or programs and establishes treatment programs for the care of archaeological collections.
- Archaeological Resources Protection Act (16 U.S.C. 470aa-mm) prevents the excavation, damage, or defacement of archaeological sites on Federal or Native American land without permission from the land controlling agency and makes illegal the sale of artifacts recovered from Federal property.
- Historic Sites Act of 1935 (54 U.S.C. 320101) allows the establishment and protection of National Historic Landmarks (which are also protected under the NHPA).
- Native American Graves Protection and Repatriation Act (25 U.S.C. 3001–3013) protects cultural objects (Native American remains, funerary goods, sacred objects, or objects of cultural patrimony) to which modern Native groups can show lineal descent or cultural affiliation, when they are in control of a Federal land agency or museum controlling agency.
- EO 13007 stipulates that all Federal land agencies must attempt to accommodate access to Native American sacred sites and to avoid adversely affecting the physical integrity of such sites.

3.9.1 *Affected Environment*

This section provides a generalized statement of cultural and historic resources occurring within the vicinity of the C-HC Project. It begins with a discussion of the prehistory and history of the Upper Mississippi region around northeast Iowa and southwest Wisconsin. It then describes cultural and historic resources that occur within the APE for the C-HC Project. The area analyzed for potential physical impacts consists of a 300-foot-wide construction corridor. The area analyzed for potential non-physical impacts was set as a 2,000-foot-wide buffer. Direct and indirect effects to historic properties could occur within the APE. Direct effects could include physical, visual, auditory, or olfactory effects to historic properties. Indirect effects may be of the same range of effects; however, indirect effects are those caused by the C-HC Project that occur later in time or are farther removed in distance.

3.9.1.1 GENERAL SETTING

Humans have occupied southwestern Wisconsin and northeastern Iowa for millennia, with the earliest occupations dating to approximately 9500 B.C., around the end of the Wisconsinan Glaciation. This period, dating until approximately 7500 B.C., is called the Paleoindian period. These earliest settlers were hunter-gathers who used a distinctive toolkit, including large, fluted, lanceolate projectile points called Clovis, and who may have exploited various now-extinct Pleistocene mega-fauna.

In the following Archaic period, dating to approximately 7500–500 B.C., hunter-gather lifestyles predominated, with most populations remaining relatively small. Population generally increased over time; increasing population pressure led to increased levels of sedentism, with Late Archaic populations living in somewhat permanent (or at least seasonally occupied), larger settlements. This may have been facilitated by the appearance of semi-domesticated plants, which appear in the archaeological record around 3,000 years ago.

The Woodland period, dating to approximately 500 B.C. to A.D. 1000, features some of the first evidence in the region of large scale social coordination and increasing social complexity, likely built upon technological adaptations such as the introduction of pottery, the development of the bow and arrow, and the increasing development of horticulture during this period. The Woodland period features the first mound construction in the area, with large numbers of elaborate burial mounds erected, often along the high bluffs adjacent to the Mississippi River. During the Middle Woodland period (100 B.C.–A.D. 300) sites up and down the Mississippi show evidence of interaction with distant cultures of the Hopewell Interaction Sphere out of the Ohio River Valley. Maize agriculture and the bow and arrow were introduced late in the Woodland period, and likely had a significant impact on social structures. Another Late Woodland introduction was the construction of elaborate geometric and zoomorphic mounds, such as those found at Effigy Mounds National Monument, north of the project area.

The period from A.D. 1000–1650 is identified as the Mississippian period. Along the Mississippi valley in the project vicinity, sites dating to this period are identified as Oneota. The Oneota culture built large villages and used similar pottery to cultures farther down the Mississippi River, and may have been related to the large mound center near St. Louis, Cahokia. The Azatlan site in southeastern Wisconsin was another important Oneota mound center, with multiple large, pyramidal mounds. However, mound construction was less common in the Mississippian period than in the preceding Woodland, and seemed to decline around A.D. 1200, concurrent with a general decline at sites like Azatlan and Cahokia.

The Native American cultures of the upper Mississippi River Valley first encountered Europeans in 1673, when the French explorers Marquette and Joilet led the first well-documented European exploration of the Mississippi River. They encountered numerous Native American groups, including the Illiniwek, Ioway, and Oto tribes, possible descendants of the Oneota. The European incursion began a long period of decline for Native American cultures; although contact with Europeans was sporadic, their influence would eventually drive the Native inhabitants from their land. European goods and guns flowed sporadically up the Mississippi with French and then Spanish traders who bartered them for pelts and hides, but European settlement in the region was sporadic, both through time and space. Still, European settlement farther east pushed other tribal groups, such as the Sauk, Pawnee, and Meskwaki, into the region, increasing competition. In 1803, the nascent United States bought the territory from France in the Louisiana Purchase. The territory would remain largely unsettled by Euro-Americans until a military defeat of the organized Meskwaki and Sauk led the defeated Native American groups to sell the land in eastern Iowa in 1832. The Wisconsin Territory, incorporating all of Iowa and Wisconsin (as well as Minnesota and portions of the Dakotas) was formed from portions of the former Northwest Territory in 1836. The Iowa territory was split off again in 1838. The states rapidly gained population as eastern farmers moved in to take advantage of cheap, productive cropland. Iowa gained statehood in 1846, and Wisconsin followed in 1848. Today, much of the region remains rural and largely dedicated to agriculture, much as it was in the early periods of statehood.

3.9.1.1.1 Previously Recorded Resources in the Project Vicinity

In order to begin to identify cultural resources within the APE of the C-HC Project, the Utilities have commissioned a number of separate identification studies. Investigations focused on the APE.

At present, studies have been composed of both background desktop reviews and limited field surveys of selected resources and locations. These studies include:

- a cultural resources background review of sites within portions of the action alternatives within Iowa, conducted by Burns and McDonnell (Javers 2018; Kullen and House 2018);
- two archaeological surveys of the portion of the action alternatives within the Refuge, also conducted by Burns and McDonnell (Kullen 2017, 2018);
- an archaeological survey of previously recorded archaeological sites and cemeteries along the portions of the action alternatives' APE adjacent to existing public ROW, conducted by Burns and McDonnell and Commonwealth Heritage Group (Watson and Kullen 2018);
- a review of cemeteries and prehistoric mound sites within the APE in Wisconsin, conducted by Commonwealth Heritage Group (Watson 2018a);
- a review and reassessment of all previously recorded historic structures within the APE in Wisconsin, conducted by Commonwealth Heritage Group (Rainka et al. 2018). The last assessment also identified a small number of new historic structures but did not attempt to conduct a full survey of all potential historic structures within the APE; and
- a review of proposed access roads and laydown yard locations in Wisconsin, to determine if previously recorded archaeological sites and cemeteries are present (Watson 2018b).

Background reviews of the action alternatives within Wisconsin and Iowa were designed to identify all previously recorded archaeological sites and all previously recorded potential aboveground resources (historic structures, cemeteries, archaeological sites with mounds) within the APE of the action alternatives. Archaeologists consulted the I-Sites website, maintained by the Iowa Office of the State Archaeologist, as well as Wisconsin Historic Preservation Database. Both are limited-access databases of archaeological sites, historic structures, and previous archaeological surveys. In addition, historical topographic, river chart, and survey maps were consulted to identify potential impacts to historic resources.

Although these earlier surveys have identified previously recorded sites and historic structures within the APE of the action alternatives, only small portions of the APE have been previously surveyed for cultural resources (Kullen 2017, 2018; Kullen and House 2018; Rainka et al. 2018). As such, a comprehensive effort has not yet been made to identify all cultural resources within the APE of the action alternatives. Additional cultural resources surveys may be required.

As a result of background reviews and completed cultural resources surveys of the analysis area, as defined above, at least 37 previously recorded archaeological sites or cemeteries have been identified within the area analyzed for potential physical impacts for all action alternatives. None of the previously recorded archaeological sites or cemeteries within the area analyzed for potential physical impacts has been previously listed or determined eligible for the NRHP. However, at least 10 prehistoric mound sites and four cemeteries lie within the area analyzed for potential physical impacts for all action alternatives. In addition, 65 previously recorded historic structures or properties, 17 historic cemeteries, and 14 Native American mound sites have been documented within the area analyzed for potential non-physical impacts of the action alternatives. That includes two structures (Jones House – NPS No. 94000447; Thomas Stone Barn – NPS No. 01000299), one property (Nelson Dewey Plantation – NPS No. 70000034), and one archaeological site (Fort Blue Mounds NPS No. 01001044) that are listed in the NRHP, two structures that have been determined eligible for the NRHP, and 13 that have been recommended eligible for the NRHP. Native American mound sites in the vicinity of the C-HC Project may be eligible for the NRHP under the Multiple Property Submission (MPS), *Prehistoric Mounds of the Quad-State Region of the Upper Mississippi Valley* (Stanley and Stanley 1988).

3.9.1.2 TRIBAL RIGHTS AND INTERESTS

The tribal consultation process for the project is ongoing. RUS identified 57 federally recognized tribes who may have interest in activities occurring within the vicinity of the project due to presence of Traditional Cultural Properties (TCPs) or for some other reason. TCPs are locations which are eligible for inclusion in the NRHP due to their association with a practices or beliefs of a modern community that are tied to a community's sense of history, place, or identity (Parker and King 1998). Since 2016, RUS has invited the tribes to public scoping meetings, and has asked tribal authorities to identify properties (or general areas where properties may exist) that are sensitive to the tribes. As of June 1, 2019, RUS has followed up with tribes that expressed interest in the C-HC Project during the early phases of the NEPA and NHPA processes. Three tribes are currently involved in the development of a Programmatic Agreement (PA) that will ensure compliance with NHPA Section 106. These tribes include the Ho-Chunk Nation, the Upper Sioux Community, Minnesota, and the Rosebud Sioux Tribe. More information about the development of the PA can be found in Chapter 5 and Appendix H of this FEIS.

3.9.1.3 OTHER CONSIDERATIONS

During the public scoping period, RUS received 39 comments detailing public concerns about project impacts on cultural resources. These included general comments about potential adverse impacts on Native American and historical sites, mounds, cemeteries, and rock art in the vicinity of the C-HC Project. Others noted specific locations of concern:

- First Norwegian Lutheran Church and Cemetery. The church is no longer present, and no grave markers remain at the cemetery (Mount Horeb Area Historical Society 2018). A monument to the approximately 50 burials in the vicinity was placed at the location in 1901 and lists the dead, whose graves date to between 1847 and 1863, when the nearby Springdale Lutheran Church founded a separate cemetery.

- Taliesin, the former home and studio of famed architect Frank Lloyd Wright, which is south of the Wisconsin River near Spring Green, Wisconsin. The home forms part of a historic district surrounding a number of buildings which has been listed in the NRHP (NPS No. 73000081 [Dean 1972]).

- the Platteville "M", a large, whitewashed letter M that stands as a monument to University of Wisconsin-Platteville College of Engineering (previously the School of Mines). First constructed by students in 1937, public comments noted the important role the "M" plays in the community of Platteville.

These specific locations of concern are addressed in relation to specific, nearby action alternatives.

3.9.2 *Environmental Consequences*

The following section details anticipated impacts to cultural resources associated with the construction, operation, and maintenance of the C-HC Project. Impacts are discussed in terms of potential disturbance to previously recorded sites and historic built environment resources that are listed in, eligible for listing in, or that are assumed to be eligible for listing in the NRHP (historic properties) and predicated on a number of historic properties not previously surveyed.

Terminology associated with the APE has been revised in the FEIS to be consistent with the latest guidance from the Advisory Council on Historic Preservation (ACHP) for the meaning of the term "direct" as it relates to effects to historic properties (ACHP 2019). This ACHP guidance was issued in June 2019, after the release of the DEIS. Specifically, the term "Direct APE" was used in the DEIS and is now referred to in the FEIS as *the area analyzed for potential physical impacts*, which is the 300-foot-wide area surrounding the proposed ROW for each alternative. The term "Indirect APE" was used in the DEIS and is now referred to in the FEIS as *the area analyzed for potential non-physical impacts*, which is the 2,000-foot-wide area surrounding the proposed ROW for each alternative. RUS acknowledges that direct and indirect effects to historic properties could occur within any portion of the APE. Direct effects could include physical, visual, auditory, or olfactory effects to historic properties. Indirect effects may be of the same range of effects; however, indirect effects are those caused by the C-HC Project that occur later in time or are farther removed in distance.

The cultural and historic resources environmental consequences discussion for each action alternative presents:

1. A list of potential historic properties within the area analyzed for potential physical impacts,
2. A list of potential historic properties within the area analyzed for potential non-physical impacts, and
3. A list of potential historic properties that occur outside the APE that were brought to RUS's attention through public comments.

3.9.2.1 DATA SOURCES, METHODS, AND ANALYSIS ASSUMPTIONS

The following impact indicators were considered when analyzing potential impacts to cultural resources:

- Number of NRHP-listed, determined eligible, or assumed eligible cultural resources/historic properties (historic and prehistoric) to be directly or indirectly affected and acres to be disturbed at each historic property.
- Qualitative descriptions of changes in skylines or other visual settings in relation to cultural sites.

To help inform the impact analysis for cultural resources, RUS used the following sources to identify potential cultural resources and determine impacts:

National Park Service. 1997. *How to Apply the National Register Criteria for Evaluation*. National Register Bulletin 15. National Park Service, U.S. Department of the Interior, Washington, D.C.

Javers, A.C. 2018. *Cultural Resources within 1,000 Feet of Hickory Creek to Iowa State Line 345 KV Transmission Line Project Centerline.* Burns and McDonnel Engineering Company, Inc., Kansas City, Missouri.

Kullen, D. 2017. *Archaeological Investigation of the Cardinal to Hickory Creek 345 kV Transmission Line Project within the Upper Mississippi River National Wildlife and Fish Refuge, Clayton County, Iowa, and Grant County, Wisconsin. Draft.* Archaeological Resources Protection Act Permit Nos. 2017-IA/3-1 and DACW25-9-17-4062. Project 100247. Burns and McDonnell Engineering Company, Inc., Kansas City, Missouri.

Kullen, D. 2018. *Archaeological Investigation of the Cardinal to Hickory Creek 345 kV Transmission Line Project within the Upper Mississippi River National Wildlife and Fish Refuge, Clayton County, Iowa: Addendum 1. Draft.* Archaeological Resources Protection Act Permit Nos. 2017-IA/3-1 and DACW25-9-17-4062. Project 100247. Burns and McDonnell Engineering Company, Inc., Kansas City, Missouri.

Kullen, D., and K. House. 2018. Desktop Review of the Hickory Creek to Iowa State Line 345kV Transmission Line Project, Clayton and Dubuque Counties, Iowa. Project 100247. Burns and McDonnel Engineering Company, Inc., Kansas City, Missouri.

Rainka, G., S. Slagor, and B. Harris. 2018. *Architecture/History Survey of the Cardinal-Hickory Creek Transmission Line Project, Dane, Iowa, Grant, and Lafayette Counties, Wisconsin.* Commonwealth Heritage Group and. Milwaukee, Wisconsin and Burns and McDonnell, Downers Grove, Illinois.

Watson, R.J. 2018a. *Cemetery/Burial Site Review of Proposed Route Segments American Transmission Company Cardinal Hickory Creek Project Dane, Iowa, Lafayette, and Grant Counties*. Commonwealth Heritage Group, Milwaukee, Wisconsin.

Watson, R.J. 2018b. *Cultural Resources Review of Proposed Access Routes and Laydown Yards, American Transmission Company (ATC) Cardinal Hickory Creek Project, Dane, Iowa, Lafayette, and Grant Counties*. Commonwealth Heritage Group, Milwaukee, Wisconsin.

The above sources were used to identify all previously recorded archaeological sites, historic structures, and cemeteries within the APE. Some sites situated within public ROW within Wisconsin were revisited and reassessed, when accessible. These reports also identified all previously recorded historic standing structurers, cemeteries, and archaeological sites with aboveground architecture (mounds, earthworks) within the APE. In Wisconsin, some of the previously recorded historic structures were revisited in order to assess their integrity and provide recommendations for further work or NRHP eligibility. In the course of these surveys, an additional 10 historic structures were identified.

Under the NHPA, buildings, structures, objects, sites, and districts, may be eligible for listing in the NRHP if they are significant under one or all of the four following criteria found within Federal regulations at 36 CFR 60.4 (a–d):

- Criterion A. Properties may be eligible for the NRHP if they are associated with events that have made a significant contribution to broad patterns of our history. These may be single events (battles, signing of a treaty, location of a significant speech) or trends (commercial development of a town, Native American removal, the oil boom).
- Criterion B. Properties may be eligible for the NRHP if they are associated with the lives of persons significant in our past.
- Criterion C. Properties may be eligible for the NRHP if they embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.
- Criterion D. Properties may be eligible for the NRHP if they have yielded, or may be likely to yield, information important to prehistory or history.

Ordinarily, certain types of sites, such as religious properties, reconstructed or relocated buildings, birthplaces or gravesites of significant individuals, cemeteries, commemorative properties, or properties younger than 50 years old are not considered as eligible for the NRHP (36 CFR 60.4). However, in special cases, these may be eligible. For instance, if a religious property drives its primary significance from its architectural or artistic elements or historical importance, it may be eligible. A cemetery may be eligible if it houses numerous extremely important individuals, if it is extraordinarily old, if its design or style is distinctive of a specific period, or if is associated with specific historic events. In addition, in order to be eligible for the NRHP, properties must be able to convey their significance. To do so, they must maintain several or most of seven aspects of integrity (36 CFR 60.4). Certain aspects of integrity may be more important than others, depending on the site (NPS 1990:44). The seven aspects of integrity are:

- Location – the property is in the place where it was constructed or the event occurred.
- Design – the property maintains integrity of organization, proportion, and layout.
- Setting – the environment around the property maintains the character of the time in which the property played a historic role.
- Materials – the property maintains the integrity of the historic materials with which it was created.
- Workmanship – the property displays evidence of a particular group of craftspeople or technologies of a specific time.
- Feeling – the property expresses or evokes a sense of its particular place in time.
- Association – the property maintains a direct and definable link with a historic person or event.

Under Section 106 of the NHPA, agencies, in coordination with other interested parties, are required to identify the areas of potential effects to historic properties, make a reasonable and good faith attempt to identify properties that may be eligible for the NRHP, and determine if those properties are eligible. Consulting archaeologists and architectural historians often provide recommendations for eligibility, but formal determinations of eligibility are made by the Keeper of the NRHP, or in consultation between SHPOs and Federal agencies (36 CFR 800.4[c][1]).

For the purposes of this impact analysis, formal determinations of eligibility have not yet occurred for the majority of resources within the analysis area. Previously identified properties that have been formally determined not eligible (n=3) or are no longer extant within the APE (n=15), have been excluded from this impact's analysis. Locations that have not received formal determinations of eligibility are treated as eligible for the NRHP and are included within this impact analysis. When available, recommendations for eligibility provided by earlier researchers are included.

Under Section 106 of the NHPA, adverse effects on historic properties occur when "an undertaking may directly or indirectly alter characteristics of a historic property that qualify it for inclusion in the Register" (36 CFR 800.5[a][1]). In the terms of NEPA, impact thresholds may be summarized as shown in Table 3.9-1.

Table 3.9-1. Impact Threshold Definitions for Cultural and Historical Resources

	Minor Impact	Moderate Impact	Major Impact
Cultural and Historical Resources	Impacts would occur, but cultural resources would retain existing characteristics that make them eligible for the NRHP.	Impacts and alterations would occur, but overall, cultural resources would partially retain characteristics that make them eligible for the NRHP, or impacts would alter the characteristics that make them eligible for the NRHP.	Impacts would occur, that overall would substantially alter or destroy characteristics of cultural resources that make them eligible for the NRHP.

If moderate or major impacts to a historic property are identified, steps must be taken, in consultation with the Federal agencies, SHPO, other consulting parties, and potentially, the Advisory Council on Historic Preservation, to avoid, minimize, or mitigate the adverse effects. Avoidance and minimization may include changing construction parameters, instituting more restrictive BMPs, or other administrative or engineering controls. Mitigation of effects may include intensive investigations to glean all significant data from affected portions of the resource, or other more far-ranging programs such as purchase and preservation of other historic resources, creation of preservation easements, documentation of resources outside the area of effect, or even development of research or education programs related to historic preservation.

3.9.2.2 NO ACTION

Under the No Action Alternative, the C-HC Project would not be constructed. The existing environment in the analysis area would remain the same. Existing transmission lines would remain in place, but no new development would occur. No impacts to cultural resources would be expected.

3.9.2.3 IMPACTS COMMON TO ALL ACTION ALTERNATIVES

Ground disturbance during construction is expected with all action alternatives and may result in damage to or loss of integrity of cultural resources within the area analyzed for potential physical impacts, which would be a moderate impact to a cultural resource if the property partially retains the characteristic(s) that make it eligible for the NRHP, or a major impact if the ground disturbance results in a substantial alteration of the characteristic(s) which make the cultural resource eligible for the NRHP. Ground disturbance would be limited to the project corridor, access roads, laydown yards, and substation locations. Mechanized ROW clearing and grubbing would be considered a potential impact within wooded portions of the project corridor. Rutting and compaction of soils could occur wherever heavy equipment was mobilized. Construction impacts at structure locations would be much deeper, extending to the depth of footing installation. Grading, excavation, and filling would occur within access road and laydown yard locations. At the Hill Valley Substation, impacts would include grading, excavation, filling, rutting, and compaction. The number and types of cultural and historic resources affected would vary by alternative, and these impacts are presented below under each action alternative.

Minor to moderate and long-term adverse impacts may occur from the presences of transmission line structures/towers in sight of NRHP-listed historic properties or properties eligible under Criterion A, B, or C, by potentially altering the setting and/or feeling of the properties. The number and type of properties affected would vary by alternative.

All six of the action alternatives follow the same corridor for approximately 0.9 miles near the community of Turkey River, Iowa. Archaeological sites 13CT4, 13CT3, and 13CT2 lie within the area analyzed for potential physical impacts for the C-HC Project (Kullen and House 2018). All three sites are reported as prehistoric mound groups, but none has been formally determined eligible for the NRHP. However, all three may be eligible for the NRHP under the MPS, *Prehistoric Mounds of the Quad State Region of the Upper Mississippi Valley* (Stanley and Stanley 1988).

In addition, within this same transmission line segment, one prehistoric mound site (13CT10) lies within the area analyzed for potential non-physical impacts for the C-HC Project. The site has not been formally determined eligible for the NRHP. The C-HC Project could result in minor to moderate impacts to this property, depending on the steps taken, in consultation with the Federal agencies, SHPO, other consulting parties, to avoid, minimize, or mitigate the adverse effects.

All six of the action alternatives again share the same corridor approximately 1 mile north of the Hickory Creek Substation in Iowa. Within this segment, one historic structure, 31-00306, lies within the area analyzed for potential non-physical impacts for the C-HC Project. This structure, identified as a smokehouse of unknown age, has not been formally determined eligible for the NRHP, and is therefore assumed to be eligible for the purposes of this assessment.

Impacts to resources at laydown yards, which would be common to all action alternatives, within Wisconsin have been evaluated (Watson 2018b). Impacts to resources in proposed laydown yards in Iowa have not been assessed. Archaeological/burial sites 47GT002/BGTO326, 47GT0037/BGT0241, and 47GT0034 may be affected by construction and/or use of laydown yards LY-01, LY-03, and LY-04, respectively. Site 47GT0022/Burial site BGT0326, also known as the Dewey Mound Group 2, is a prehistoric mound site located within a Wisconsin Power and Light facility just west of the village of Cassville. Site 47GT0037/ Burial BGT0241, also known as the Geiger Group, is recorded as a conical and linear mound site located within a Dairyland facility just east of the village of Cassville. Site 47GT0034 is a prehistoric campsite or village located approximately 1.6 miles east of the village of Cassville. None of the resources within the area analyzed for potential physical impacts for laydown yards LY-01, LY-03, and LY-04 has been formally determined eligible for the NRHP; therefore, all are assumed to be eligible for the purposes of this assessment. Additional cultural resources may be present in the remaining laydown yards in Iowa and Wisconsin. A cultural resources survey of all proposed laydown yards in consultation with the Iowa and/or Wisconsin SHPOs would be required prior to any construction activity. In addition, no previously recorded sites are recorded within the proposed Hill Valley Substation locations; an attempt to identify potential cultural resources within the proposed substation locations would be required in consultation with the Wisconsin SHPO.

3.9.2.4 ALTERNATIVE 1

3.9.2.4.1 Area Analyzed for Potential Physical Impacts

In addition to the sites impacted by all action alternatives, at least six assumed eligible cultural resources are present within the area analyzed for potential physical impacts of Alternative 1 (Table 3.9-2). This includes five archaeological sites and one historic cemetery. Within the archaeological sites, four contain prehistoric cultural materials and one contains historic materials. None of the potential cultural resources have been formally determined eligible for the NRHP.

Preliminary information and eligibility recommendations are available for some of these sites. Three sites were revisited in the course of preliminary studies for the C-HC Project, and no cultural materials were identified within the accessible portion of the project corridor. Resources may be present outside the accessible portion of project corridor.

Of note is the site of Wolenec (47IA0067/ BIA0115), a prehistoric campsite and mound site that may be eligible for the NRHP under the MPS, *Prehistoric Mounds of the Quad State Region of the Upper Mississippi Valley* (Stanley and Stanley 1988), and the Millville Pioneer Cemetery, which may hold as many as 80 graves, but which has not been formally defined or evaluated. Cemeteries may be eligible for the NRHP if they are extraordinarily old or associated with a specific time period. Interments are also protected from disturbance under Wisconsin and Iowa statutes. As formal determinations of eligibility are not provided, all properties are assumed eligible for listing in the NRHP. RUS, in coordination with the Iowa/Wisconsin SHPO and other interested parties, would formally determine NRHP eligibility of these potential historic properties prior to construction.

Under Alternative 1, the C-HC Project could result in minor to moderate impacts to the cultural resources within the APE, if they are determined eligible for listing in the NRHP. The Federal agencies, in coordination with SHPOs and other consulting parties, would identify steps to avoid, minimize, or mitigate the adverse effects to these sites, thereby diminishing the severity of impacts.

Table 3.9-2. Impacted Cultural Resources within the Area Analyzed for Potential Physical Impacts of Alternative 1

Resource Identification	Resource Common Name	State	County	Resource Type	Resource Details	Visited for Current Effort?	Intersects/ Adjacent	NRHP Status/ Recommendations
Millville Pioneer Cemetery	N/A	IA	Clayton	Cemetery	At least 80 graves, dating to early founding	No	Intersects	Undetermined
13DB1043	N/A	IA	Dubuque	Historic farmstead	Late nineteenth to twentieth century	No	Adjacent	Undetermined, recommended not eligible
47GT0158	Withington Fluted Point Site	WI	Grant	Prehistoric lithic scatter	Lithic scatter	Yes	Intersects	Undetermined, possibly misplotted
47IA0067/ BIA0115	Wolenec	WI	Iowa	Prehistoric Campsite/ mound site	Multiple mounds, possible earthworks	Yes	Intersects	Undetermined, no resources identified in corridor
47DA1083	Charlie's House	WI	Dane	Prehistoric lithic scatter	Non-diagnostic lithic material	Yes	Adjacent	Undetermined, no resources identified in corridor
47DA0668	Twin Valley	WI	Dane	Prehistoric lithic scatter	Unknown	No	Adjacent	Undetermined

3.9.2.4.2 Area Analyzed for Potential Non-Physical Impacts

In addition to the sites impacted by all action alternatives, a total of one aboveground, NRHP-listed resource and 17 aboveground, assumed eligible resources lie within the area analyzed for potential non- physical impacts of Alternative 1 (Table 3.9-3). This includes one historic property, seven historic structures, five historic cemeteries, and five prehistoric burial sites. Two of the prehistoric burial sites are recorded as mound sites. Of these resources, one historic property (Nelson Dewey Plantation/ NPS No. 70000034) has been listed in the NRHP.

Preliminary information and eligibility recommendations are available for some sites. Six of the historic structures were visited in the course of preliminary studies for the C-HC Project. Based on this preliminary review, six were recommended not eligible for the NRHP. The seventh structure, Meadowvale School (236277) was recommended eligible for the NRHP. The two prehistoric mound sites and one multicomponent mound may be eligible for the NRHP under the MPS, *Prehistoric Mounds of the Quad State Region of the Upper Mississippi Valley* (Stanley and Stanley 1988). The five historic cemeteries and three non-mound prehistoric burial sites lie within the area analyzed for potential non-physical impacts. These sites have not been evaluated for the NRHP but may be eligible if they are extraordinarily old or associated with a specific time period. RUS, in coordination with the Iowa SHPO, Wisconsin SHPO, and other interested parties, would formally evaluate these potential historic properties prior to construction. Long-term impacts to the properties within the area analyzed for potential non-physical impacts are currently unknown but may be assumed to be adverse and moderate if the properties maintain integrity of feeling or setting and these aspects contribute to their significance.

Table 3.9-3. Impacted Cultural Resources within the Area Analyzed for Potential Non-Physical Impacts of Alternative 1

Resource Identification	Resource Common Name	State	County	Resource Type	Resource Details	Visited for Current Effort?	NRHP Status/ Recommendations
NPS 70000034	Nelson Dewey Plantation	WI	Grant	Historic homesite	ca. 1850–1874 residence of first Wisconsin Governor Nelson Dewey	No	Listed in NRHP 1970
47GT0754	Boundary Mounds	WI	Grant	Prehistoric mound group	Unknown	No	Undetermined
47GT0792/ BGT0420	Rattlesnake Valley	WI	Grant	Prehistoric burials	Unknown	No	Undetermined
47GT0113/ BGT0350	Glassmaker Mounds	WI	Grant	Multicomponent site with mounds	Unknown	No	Undetermined
47GT0778/ GBT0407	Angles	WI	Grant	Prehistoric burials	Unknown	No	Undetermined
47GT0779/ BGT0408	Voltage View	WI	Grant	Prehistoric burials	Unknown	No	Undetermined
BGT0077	Pigeon Cemetery	WI	Grant	Historic cemetery	Unknown	No	Undetermined
BIA0033	Cutts Cemetery	WI	Grant	Historic cemetery	Unknown	No	Undetermined
47DA1270/ BDA0020	Old Peculiar Burying Ground	WI	Dane	Historic cemetery	Unknown	No	Undetermined
BDA0228	Original Vermont Lutheran Church Cemetery	WI	Dane	Historic cemetery	Unknown	No	Undetermined
BDA0044	Vermont Lutheran Church Cemetery	WI	Dane	Historic cemetery	Unknown	No	Undetermined
47291	House	WI	Iowa	Historic house	1½ story gabled ell building on a stone foundation	Yes	Undetermined, recommended not eligible
47284	House	WI	Iowa	Historic house	Updates to siding, windows, roof sheathing	Yes	Undetermined, recommended not eligible
47297	House	WI	Iowa	Historic house	ca. 1950 1-story Contemporary	Yes	Undetermined, recommended not eligible
4758	Vermont Lutheran Church	WI	Dane	Historic church	Modern additions to front, replacement windows	Yes	Undetermined, recommended not eligible
4789	Berry Haney Tavern	WI	Dane	Historic tavern	Modern additions, porch alterations, replacement sidings and windows	Yes	Undetermined, recommended not eligible
236277	Meadowvale School	WI	Iowa	Historic School	1864 schoolhouse, privy, and shed	Yes	Undetermined, recommended eligible

Resource Identification	Resource Common Name	State	County	Resource Type	Resource Details	Visited for Current Effort?	NRHP Status/ Recommendations
47GT0753	BM-ND-2	WI	Grant	Historic farmstead	Structure pads, walls, and vegetation	No	Undetermined, recommended not eligible

3.9.2.4.3 Other Considerations

Identified as a potential concern during public scoping, Taliesin, home and studio of famed architect Frank Lloyd Wright, is approximately 3.8 miles north of Alternative 1. As the site lies outside the APE, visual impacts on the property are not expected.

Retirement of the N-9 Transmission Line and Construction of a New 69-kV Tap Line

Ground disturbance during decommissioning of a portion of the N-9 transmission line and construction of the tap line may result in damage to or loss of integrity of cultural resources within the APE, which would be a moderate impact to a cultural resource if the property partially retains the characteristic(s) that make it eligible for the NRHP, or a major impact if the ground disturbance results in a substantial alteration of the characteristic(s) which make the cultural resource eligible for the NRHP. Furthermore, minor to moderate and long-term adverse impacts may occur from the presence of transmission line structures/towers in sight of NRHP-listed historic properties or properties eligible under Criterion A, B, or C, by potentially altering the setting and/or feeling of the properties.

No cultural resources that have been determined eligible have been previously identified within the N-9 transmission line decommissioning area or new tap line. However, the area has not been surveyed for cultural resources. Approximately 85 shovel test pits have been investigated for archaeological resources within the Refuge for the C-HC Project, which would be in close proximity to the N-9 transmission line ROW. All of the pits for the C-HC Project were found to be negative for archaeological resources, meaning no sites have been found.

Approximately 3.3 acres of the N-9 transmission line proposed for decommissioning and portions of one access road cross privately owned lands, just west of the Refuge, and this land may contain prehistoric mound groups. The sites have not been formally determined eligible for the NRHP. However, they may be eligible for the NRHP under the MPS, *Prehistoric Mounds of the Quad State Region of the Upper Mississippi Valley* (Stanley and Stanley 1988).

As formal determinations of eligibility are not provided, all properties are assumed eligible for listing in the NRHP. RUS, in coordination with the Iowa SHPO and other interested parties, would formally determine NRHP eligibility of these potential historic properties prior to construction.

The N-9 decommissioning and tap line construction project could result in minor to moderate impacts to the cultural resources within the APE, if they are determined eligible for listing in the NRHP. The Federal agencies, in coordination with SHPO and other consulting parties, would identify steps to avoid, minimize, or mitigate the adverse effects to these sites, thereby diminishing the severity of impacts.

3.9.2.5 ALTERNATIVE 2

3.9.2.5.1 Area Analyzed for Potential Physical Impacts

In addition to the sites impacted by all action alternatives, at least eight assumed eligible cultural resources are present within the area analyzed for potential physical impacts of Alternative 2

(Table 3.9-4). This includes four archaeological sites, one historic cemetery, and three archaeological sites with limited or inconclusive data on their true location. Within the archaeological sites, six contain prehistoric cultural materials and one contains historic materials. None of the potential cultural resources have been formally determined eligible for the NRHP.

Preliminary information and eligibility recommendations are available for some of these sites. Three sites were revisited in the course of preliminary studies for the C-HC Project, and no cultural materials were identified within the accessible portion of the project corridor. Resources may be present outside the accessible portion of project corridor.

Of note is the site of Wolenec (47IA0067 / BIA0115), a prehistoric campsite and mound site that may be eligible for the NRHP under the MPS, *Prehistoric Mounds of the Quad State Region of the Upper Mississippi Valley* (Stanley and Stanley 1988). Cemeteries may be eligible for the NRHP if they are extraordinarily old or associated with a specific time period. Interments are also protected from disturbance under Wisconsin and Iowa statutes. As formal determinations of eligibility are not provided, all properties are assumed eligible for listing in the NRHP. RUS, in coordination with the Iowa/Wisconsin SHPO and other interested parties, would formally determine NRHP eligibility of these potential historic properties prior to construction.

Under Alternative 2, the C-HC Project could result in minor to moderate impacts to the cultural resources within the APE, if determined eligible for listing in the NRHP. The Federal agencies, in coordination with SHPOs and other consulting parties, would identify steps to avoid, minimize, or mitigate the adverse effects to these sites, thereby diminishing the severity of impacts.

Table 3.9-4. Impacted Cultural Resources within the Area Analyzed for Potential Physical Impacts of Alternative 2

Resource Identification	Resource Common Name	State	County	Resource Type	Resource Details	Visited for Current Effort?	Intersects/ Adjacent	NRHP Status/ Recommendations
Goshen Cemetery	N/A	IA	Clayton	Historic cemetery	200+ interments, dating to 1860s to present	No	Adjacent	Undetermined
13DB1040	N/A	IA	Dubuque	Historic farmstead	Late nineteenth to twentieth century	No	Adjacent	Undetermined, recommended not eligible
13CT460	N/A	IA	Clayton	Prehistoric artifact scatter	Middle Woodland artifact scatter, exact location unknown	No	Unknown	Undetermined
13CT461	N/A	IA	Clayton	Prehistoric isolated find	Late Woodland Scallorn point, exact location unknown	No	Unknown	Undetermined
13CT464	N/A	IA	Clayton	Prehistoric isolated find	Paleoindian Eden point, exact location unknown	No	Unknown	Undetermined
47GT0158	Withington Fluted Point Site	WI	Grant	Prehistoric lithic scatter	Lithic scatter	Yes	Intersects	Undetermined, possibly misplotted
47IA0067/ BIA0115	Wolenec	WI	Iowa	Prehistoric campsite/ mound site	Multiple mounds, possible earthworks	Yes	Intersects	Undetermined, no resources identified in corridor

Resource Identification	Resource Common Name	State	County	Resource Type	Resource Details	Visited for Current Effort?	Intersects/ Adjacent	NRHP Status/ Recommendations
47DA1083	Charlie's House	WI	Dane	Prehistoric lithic scatter	Non-diagnostic lithic material	Yes	Adjacent	Undetermined, no resources identified in corridor

3.9.2.5.2 Area Analyzed for Potential Non-Physical Impacts

In addition to the sites impacted by all action alternatives, a total of 28 aboveground, assumed eligible resources lie within the area analyzed for potential non-physical impacts of Alternative 2 (Table 3.9-5). This includes 17 historic structures, five historic cemeteries, five prehistoric burial sites, and one multicomponent site (featuring historic materials and prehistoric burials). Three of the prehistoric burial sites are recorded as mound sites. Of these resources, none has been formally determined eligible for the NRHP.

Preliminary information exists for 15 of the 17 historic sites/structures that were visited in the course of preliminary studies for the C-HC Project. Based on this preliminary review, 10 were recommended eligible for the NRHP and five were recommended not eligible for the NRHP. In addition, one of the previously recorded sites has been previously recommended eligible for the NRHP.

Sites and structures that were recommended as eligible include site 13DB1037, a historic blacksmith shop, Meadowvale School (236277), St. Charles Borromeo Catholic Church (2362778), the Klindt-Geiger Canning Company (2362779), and a set of seven historic homes in downtown Cassville, Wisconsin (44243 and 236270–236275). Additionally, all three mound sites may be eligible for the NRHP under the MPS, *Prehistoric Mounds of the Quad State Region of the Upper Mississippi Valley* (Stanley and Stanley 1988). The five historic cemeteries and two non-mound prehistoric burial sites may be eligible for the NRHP if they are extraordinarily old or associated with a specific time period. RUS, in coordination with the Iowa/Wisconsin SHPO and other interested parties, would formally evaluate these potential historic properties prior to construction. Long-term impacts to the properties within the area analyzed for potential non-physical impacts are currently unknown but may be assumed to be adverse and moderate if the properties currently maintain integrity of feeling or setting and these aspects contribute to their significance.

Table 3.9-5. Impacted Cultural Resources within the Area Analyzed for Potential Non-Physical Impacts of Alternative 2

Resource Identification	Resource Common Name	State	County	Resource Type	Resource Details	Visited for Current Effort?	NRHP Status/ Recommendations
13CT70	Smith Mound Group II	IA	Clayton	Prehistoric mound group	Woodland period	No	Undetermined
13DB1037	N/A	IA	Dubuque	Historic blacksmith	Nineteenth century	No	Undetermined, recommended eligible
13DB1093	N/A	IA	Dubuque	Historic farmstead	Late nineteenth century to present	No	Undetermined
47GT0032/ BGT0238	Riverside Park Mounds	WI	Grant	Prehistoric mound group	Unknown	No	Undetermined
47GT0792/ BGT0420	Rattlesnake Valley	WI	Grant	Prehistoric burials	Unknown	No	Undetermined

Resource Identification	Resource Common Name	State	County	Resource Type	Resource Details	Visited for Current Effort?	NRHP Status/ Recommendations
47GT0113/ BGT0350	Glassmaker mounds	WI	Grant	Multicomponent site with mounds	Unknown	No	Undetermined
47GT0778/ GBT0407	Angles	WI	Grant	Prehistoric burials	Unknown	No	Undetermined
47GT0779/ BGT0408	Voltage View	WI	Grant	Prehistoric burials	Unknown	No	Undetermined
BGT0077	Pigeon Cemetery	WI	Grant	Historic cemetery	Unknown	No	Undetermined
BIA0033	Cutts Cemetery	WI	Grant	Historic cemetery	Unknown	No	Undetermined
47DA1270/ BDA0020	Old Peculiar Burying Ground	WI	Dane	Historic cemetery	Unknown	No	Undetermined
BDA0228	Original Vermont Lutheran Church Cemetery	WI	Dane	Historic cemetery	Unknown	No	Undetermined
BDA0044	Vermont Lutheran Church Cemetery	WI	Dane	Historic cemetery	Unknown	No	Undetermined
44243	House	WI	Grant	Historic house	Italianate style	Yes	Undetermined, recommended eligible (with 236270-236275)
236270	House	WI	Grant	Historic house	Italianate style	Yes	Undetermined, recommended eligible (with 236270-236275)
236271	House	WI	Grant	Historic house	Second Empire style	Yes	Undetermined, recommended eligible (with 236270-236275)
236272	House	WI	Grant	Historic house	Folk Victorian style	Yes	Undetermined, recommended eligible (with 236270-236275)
236273	House	WI	Grant	Historic house	American Foursquare style	Yes	Undetermined, recommended eligible (with 236270-236275)
236274	House	WI	Grant	Historic house	Queen Anne Victorian Style	Yes	Undetermined, recommended eligible (with 236270-236275)
236275	House	WI	Grant	Historic house	American Foursquare style	Yes	Undetermined, recommended eligible (with 236270-236275)
236277	Meadowvale School	WI	Iowa	Historic school	1864 schoolhouse, privy, and shed	Yes	Undetermined, recommended eligible
2362778	St. Charles Borromeo Catholic Church	WI	Grant	Historic church	1889 Victorian Gothic church	Yes	Undetermined, recommended eligible
236279	Klindt-Geiger Canning Co.	WI	Grant	Historic industrial	ca. 1890 2-story industrial facility	Yes	Undetermined, recommended eligible
47291	House	WI	Iowa	Historic house	1½ story gabled ell building on a stone foundation	Yes	Undetermined, recommended not eligible
47284	House	WI	Iowa	Historic house	Updates to siding, windows, roof sheathing	Yes	Undetermined, recommended not eligible

Resource Identification	Resource Common Name	State	County	Resource Type	Resource Details	Visited for Current Effort?	NRHP Status/ Recommendations
47297	House	WI	Iowa	Historic house	ca. 1950 1-story Contemporary	Yes	Undetermined, recommended not eligible
4758	Vermont Lutheran Church	WI	Dane	Historic church	Modern additions to front, replacement windows	Yes	Undetermined, recommended not eligible
4789	Berry Haney Tavern	WI	Dane	Historic tavern	Modern additions, porch alterations, replacement sidings and windows	Yes	Undetermined, recommended not eligible

3.9.2.5.3 Other Considerations

Identified as a potential concern during public scoping, Taliesin, home and studio of famed architect Frank Lloyd Wright, is approximately 3.8 miles north of Alternative 2. As the site lies outside the APE, visual impacts on the property are not expected.

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.9.2.6 ALTERNATIVE 3

3.9.2.6.1 Area Analyzed for Potential Physical Impacts

In addition to the sites impacted by all action alternatives, at least 12 assumed eligible cultural resources are present within the area analyzed for potential physical impacts of Alternative 3 (Table 3.9-6). This includes 11 archaeological sites and one historic cemetery. Within the archaeological sites, eight contain prehistoric cultural materials and three contain historic materials. None of the potential cultural resources have been formally determined eligible for the NRHP.

Preliminary information and eligibility recommendations are available for some of these sites. Five sites were revisited in the course of preliminary studies for the C-HC Project, and no cultural materials were identified within the accessible portion of the project corridor. Resources may be present outside the accessible portion of the project corridor. Of note are Udelhoffen Mounds (47GT0437 / BGT0187), Wolenec (47IA0067 / BIA0115), Murphy Enclosure (47GT0089), and the Triumvirate site (47GT0788 / BGT0417, all of which may have had prehistoric age burial mounds or earthworks, and that may be eligible for the NRHP under the MPS, *Prehistoric Mounds of the Quad State Region of the Upper Mississippi Valley* (Stanley and Stanley 1988). The alternative also crosses the Millville Pioneer Cemetery, which may hold as many as 80 graves, but which has not been formally defined or evaluated. Cemeteries may be eligible for the NRHP if they are extraordinarily old or associated with a specific time period. Interments are also protected from disturbance under Wisconsin and Iowa statutes. As formal determinations of eligibility are not provided, all properties are assumed eligible for listing in the NRHP. RUS, in coordination with the Iowa/Wisconsin SHPO and other interested parties, would formally determine NRHP eligibility of these potential historic properties prior to construction.

Under Alternative 3, the C-HC Project could result in minor to moderate impacts to the cultural resources within the APE, if determined eligible for listing in the NRHP. The Federal agencies, in coordination with SHPOs and other consulting parties, would identify steps to avoid, minimize, or mitigate the adverse effects to these sites, thereby diminishing the severity of impacts.

Table 3.9-6. Impacted Cultural Resources within the Area Analyzed for Potential Physical Impacts of Alternative 3

Resource Identification	Resource Common Name	State	County	Resource Type	Resource Details	Visited for Current Effort?	Intersects/ Adjacent	NRHP Status/ Recommendations
Millville Pioneer Cemetery	N/A	IA	Clayton	Cemetery	At least 80 graves, dating to early founding	No	Intersects	Undetermined
13DB1043	N/A	IA	Dubuque	Historic farmstead	Late nineteenth to twentieth century	No	Adjacent	Undetermined, recommended not eligible
47GT0437/ BGT0187	Udelhoffen Mounds	WI	Grant	Prehistoric Burial Mounds	Sixteen reported on ridge crest	No	Intersects	Undetermined, recommended eligible
47IA0067/ BIA0115	Wolenec	WI	Iowa	Prehistoric campsite/ mound site	Multiple mounds, possible earthworks	Yes	Intersects	Undetermined, no resources identified in corridor
47DA1083	Charlie's House	WI	Dane	Prehistoric lithic scatter	Non-diagnostic lithic material	Yes	Adjacent	Undetermined, no resources identified in corridor
47GT0788/ BG0417	Triumvirate Site	WI	Grant	Prehistoric burial mound group	Three or more conical mounds	No	Intersects	Undetermined, recommended eligible
47GT0665	Emery Lead Furnace	WI	Grant	Historic industrial site	Lead smelting furnace location interpreted from historic records	Yes	Intersects	Undetermined, no resources identified in corridor. Recommended not eligible
47GT0089	Murphy Enclosures	WI	Grant	Prehistoric earthworks	Earthen enclosure somewhere within 320-acre plot	Yes	Intersects	Undetermined, recommended not eligible within corridor
					Location from informant interview	Yes	Intersects	Undetermined, recommended not eligible within survey corridor
47GT0090	Gardner Camp	WI	Grant	Prehistoric campsite/ village	Location from informant interview	Yes	Intersects	Undetermined, recommended not eligible within survey corridor
47GT0685	Bellmeyer 1	WI	Grant	Prehistoric isolated find	Single galena chert secondary flake	No	Adjacent	Undetermined, recommended not eligible
47GT0687	Bellmeyer 3	WI	Grant	Historic artifact scatter	Brick fragments, whiteware, nails	No	Adjacent	Undetermined, recommended not eligible

Resource Identification	Resource Common Name	State	County	Resource Type	Resource Details	Visited for Current Effort?	Intersects/ Adjacent	NRHP Status/ Recommendations
47DA0668	Twin Valley	WI	Dane	Prehistoric lithic scatter	Unknown	No	Adjacent	Undetermined

3.9.2.6.2 Area Analyzed for Potential Non-Physical Impacts

In addition to the sites impacted by all action alternatives, a total of 36 aboveground, assumed eligible resources lie within the area analyzed for potential non-physical impacts of Alternative 3 (Table 3.9-7). This includes 22 historic structures, seven historic cemeteries, and seven prehistoric burial sites. All seven of the prehistoric burial sites are recorded as mound sites. Of these resources, none has been formally determined eligible for the NRHP.

Preliminary information and eligibility recommendations are available for some of these sites. Of the 22 historic sites/structures, all were visited in the course of preliminary studies for the C-HC Project. Based on this preliminary review, nine were recommended eligible for the NRHP, and 13 were recommended not eligible for the NRHP. Sites and structures that were recommended as eligible include St. Charles Borromeo Catholic Church (2362778), the Klindt-Geiger Canning Company (2362779), and a set of seven historic homes in downtown Cassville, Wisconsin (44243 and 236270–236275). Additionally, the seven mound sites may be eligible for the NRHP under the MPS, *Prehistoric Mounds of the Quad State Region of the Upper Mississippi Valley* (Stanley and Stanley 1988). The seven historic cemeteries may be eligible for the NRHP if they are extraordinarily old or associated with a specific time period. As formal determinations of eligibility are not provided, all properties are assumed eligible for listing in the NRHP. RUS, in coordination with the Iowa/Wisconsin SHPO and other interested parties, would formally determine NRHP eligibility of these potential historic properties prior to construction. Long-term impacts to the properties within the area analyzed for potential non-physical impacts are currently unknown but may be assumed to be adverse and moderate if the properties currently maintain integrity of feeling or setting and these aspects contribute to their significance.

Table 3.9-7. Impacted Cultural Resources within the Area Analyzed for Potential Non-Physical Impacts of Alternative 3

Resource Identification	Resource Common Name	State	County	Resource Type	Resource Details	Visited for Current Effort?	NRHP Status/ Recommendations
47GT0032/ BGT0238	Riverside Park Mounds	WI	Grant	Prehistoric mound group	Unknown	No	Undetermined
BGT0029	St. Charles Catholic Cemetery	WI	Grant	Historic cemetery	Unknown	No	Undetermined
BGT0028	Cassville Seventh Adventist Cemetery	WI	Grant	Historic cemetery	Unknown	No	Undetermined
47GT0403/ BGT0188	Schupper Mounds	WI	Grant	Prehistoric mound group	Unknown	No	Undetermined
47GT0784/ BGT0415	Horseshoe Bench	WI	Grant	Prehistoric mound	Unknown	No	Undetermined
47GT0436/ BGT0186	Eckstein Ploessl Mounds	WI	Grant	Prehistoric mound group	Unknown	No	Undetermined

Resource Identification	Resource Common Name	State	County	Resource Type	Resource Details	Visited for Current Effort?	NRHP Status/ Recommendations
47GT0782/ BGT0412	Guardians of the Gate	WI	Grant	Prehistoric mound	Unknown	No	Undetermined
47GT0434/ BGT0411	Eckstein 1 Mounds	WI	Grant	Prehistoric mound ground	Unknown	No	Undetermined
47GT0727/ BGT0001	Burton Cemetery	WI	Grant	Historic cemetery	Unknown	No	Undetermined
47GT0441/ GBT0183	Eugene Reynolds Mound	WI	Grant	Prehistoric mound	Unknown	No	Undetermined
BIA0033	Cutts Cemetery	WI	Grant	Historic cemetery	Unknown	No	Undetermined
47DA1270/ BDA0020	Old Peculiar Burying Ground	WI	Dane	Historic cemetery	Unknown	No	Undetermined
BDA0228	Original Vermont Lutheran Church Cemetery	WI	Dane	Historic cemetery	Unknown	No	Undetermined
BDA0044	Vermont Lutheran Church Cemetery	WI	Dane	Historic cemetery	Unknown	No	Undetermined
44243	House	WI	Grant	Historic house	Italianate style	Yes	Undetermined, recommended eligible (with 236270-236275)
43629	Burton General Store	WI	Grant	Historic commercial	1904 Wood-frame, front-gabled store	Yes	Undetermined, recommended not eligible
43603	House	WI	Grant	Historic house	Modern alterations to siding, windows, roof sheathing, and porch	Yes	Undetermined, recommended not eligible
220502	House	WI	Grant	Historic house	Modern alterations to roof sheathing, windows, front entry	Yes	Undetermined, recommended not eligible
55762	Sanders House	WI	Grant	Historic house	Modern alterations to siding, roof sheathing, floorplan	Yes	Undetermined, recommended not eligible
43573	House	WI	Grant	Historic house	Modern alterations to windows, historic fabric	Yes	Undetermined, recommended not eligible
43575	House	WI	Grant	Historic house	Modern alterations to windows, porch	Yes	Undetermined, recommended not eligible
64645	House	WI	Grant	Historic house	Modern alterations to windows, roof sheathing, floorplan	Yes	Undetermined, recommended not eligible
64652	House	WI	Iowa	Historic house	Modern alterations to windows, siding, façade	Yes	Undetermined, recommended not eligible

Resource Identification	Resource Common Name	State	County	Resource Type	Resource Details	Visited for Current Effort?	NRHP Status/ Recommendations
47291	House	WI	Iowa	Historic house	1 and ½ story gabled ell building on a stone foundation	Yes	Undetermined, recommended not eligible
47284	House	WI	Iowa	Historic house	Updates to siding, windows, roof sheathing	Yes	Undetermined, recommended not eligible
47297	House	WI	Iowa	Historic house	ca. 1950 1-story Contemporary	Yes	Undetermined, recommended not eligible
4758	Vermont Lutheran Church	WI	Dane	Historic church	Modern additions to front, replacement windows	Yes	Undetermined, recommended not eligible
4789	Berry Haney Tavern	WI	Dane	Historic tavern	Modern additions, porch alterations, replacement sidings and windows	Yes	Undetermined, recommended not eligible
236270	House	WI	Grant	Historic house	Italianate style	Yes	Undetermined, recommended eligible (with 236270-236275)
236271	House	WI	Grant	Historic house	Second Empire style	Yes	Undetermined, recommended eligible (with 236270-236275)
236272	House	WI	Grant	Historic house	Folk Victorian style	Yes	Undetermined, recommended eligible (with 236270-236275)
236273	House	WI	Grant	Historic house	American Foursquare style	Yes	Undetermined, recommended eligible (with 236270-236275)
236274	House	WI	Grant	Historic house	Queen Anne Victorian Style	Yes	Undetermined, recommended eligible (with 236270-236275)
236275	House	WI	Grant	Historic house	American Foursquare style	Yes	Undetermined, recommended eligible (with 236270-236275)
236278	St. Charles Borromeo Catholic Church	WI	Grant	Historic church	1889 Victorian Gothic church	Yes	Undetermined, recommended eligible
236279	Klindt-Geiger Canning Co.	WI	Grant	Historic industrial	ca. 1890 2-story industrial facility	Yes	Undetermined, recommended eligible

3.9.2.6.3 Other Considerations

Identified as a potential concern during public scoping, the Platte Mound "M" lies approximately 1.25 miles west of Alternative 3. As the "M" lies on the west side of Platte Mound from Alternative 3 and is outside the APE, visual impacts on the property are not expected.

In addition, Taliesin, home and studio of famed architect Frank Lloyd Wright, is approximately 3.8 miles north of Alternative 3. As the site lies outside the APE, visual impacts on the property are not expected.

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.9.2.7 ALTERNATIVE 4

3.9.2.7.1 Area Analyzed for Potential Physical Impacts

In addition to the sites impacted by all action alternatives, at least 18 assumed eligible cultural resources are present within the area analyzed for potential physical impacts of Alternative 4 (Table 3.9-8). This includes 17 archaeological sites and one historic cemetery. Within the archaeological sites, six contain prehistoric cultural materials, 10 contain historic materials, and one features both prehistoric and historic materials. None of the potential cultural resources have been formally determined eligible for the NRHP.

Preliminary information and eligibility recommendations are available for some of these sites. Six sites were revisited in the course of preliminary studies for the C-HC Project, and no cultural materials were identified within the accessible portion of the project corridor at four of the sites. Two sites yielded very light scatters of historic artifacts. Resources may be present outside the accessible portion of project corridor.

Of note are Udelhoffen Mounds (47GT0437/ BGT0187), Murphy Enclosure (47GT0089), and the Triumvirate site (47GT0788/ BGT0417), all of which may have had prehistoric age burial mounds or earthworks, and that may be eligible for the NRHP under the MPS, *Prehistoric Mounds of the Quad State Region of the Upper Mississippi Valley* (Stanley and Stanley 1988). The alternative intersects Gomers (47IA0061), a historic mine site which has been recommended as eligible for the NRHP. The alternative also crosses the Millville Pioneer Cemetery, which may hold as many as 80 graves, but which has not been formally defined or evaluated. Cemeteries may be eligible for the NRHP if they are extraordinarily old or associated with a specific time period. Interments are also protected from disturbance under Wisconsin and Iowa statutes. As formal determinations of eligibility are not provided, all properties are assumed eligible for listing in the NRHP. RUS, in coordination with the Iowa/Wisconsin SHPO and other interested parties, would formally evaluate these potential historic properties prior to construction.

Under Alternative 4, the C-HC Project could result in minor to moderate impacts to the cultural resources within the APE, if determined eligible for listing in the NRHP. The Federal agencies, in coordination with SHPOs and other consulting parties, would identify steps to avoid, minimize, or mitigate the adverse effects to these sites, thereby diminishing the severity of impacts.

Table 3.9-8. Impacted Cultural Resources within the Area Analyzed for Potential Physical Impacts of Alternative 4

Resource Identification	Resource Common Name	State	County	Resource Type	Resource Details	Visited for Current Effort?	Intersects/ Adjacent	NRHP Status/ Recommendations
Millville Pioneer Cemetery	N/A	IA	Clayton	Cemetery	At least 80 graves, dating to early founding	No	Intersects	Undetermined
13DB1043	N/A	IA	Dubuque	Historic farmstead	Late nineteenth to twentieth century	No	Adjacent	Undetermined, recommended not eligible

Resource Identification	Resource Common Name	State	County	Resource Type	Resource Details	Visited for Current Effort?	Intersects/ Adjacent	NRHP Status/ Recommendations
47GT0437/ BGT0187	Udelhoffen Mounds	WI	Grant	Prehistoric Burial Mounds	Sixteen reported on ridge crest	No	Intersects	Undetermined, recommended eligible
47GT0788/ BG0417	Triumvirate Site	WI	Grant	Prehistoric burial mound group	Three or more conical mounds	No	Intersects	Undetermined, recommended eligible
47GT0665	Emery Lead Furnace	WI	Grant	Historic industrial site	Lead smelting furnace location interpreted from historic records	Yes	Intersects	Undetermined, Recommended not eligible
47GT0089	Murphy Enclosure	WI	Grant	Prehistoric earthworks	Earthen enclosure somewhere within 320 acre plot	Yes	Intersects	Undetermined, recommended not eligible within corridor
47GT0090	Gardner Camp	WI	Grant	Prehistoric campsite/ village	Location from informant interview	Yes	Intersects	Undetermined, recommended not eligible within corridor
47GT0685	Bellmeyer 1	WI	Grant	Prehistoric isolated find	Single galena chert secondary flake	No	Adjacent	Undetermined, recommended not eligible
47GT0687	Bellmeyer 3	WI	Grant	Historic artifact scatter	Brick fragments, whiteware, nails	No	Adjacent	Undetermined, recommended not eligible
47IA0416	Williams Diggins	WI	Iowa	Multi-component quarry	Tailings, pits, scattered rock	No	Intersects	Undetermined
47IA0061	Gomers	WI	Iowa	Historic mine site	Historic foundations, pits, and tailings piles	No	Intersects	Undetermined, recommended eligible
47IA0488	W-0322-04	WI	Iowa	Historic farmstead	Unknown	No	Intersects	Undetermined, recommended not eligible
47IA0487	W-0322-03	WI	Iowa	Historic mining area	Spoil pile	No	Adjacent	Undetermined, recommended not eligible
47IA0438	Ridge Pits	Wi	Iowa	Historic mining area	Mining pits	No	Adjacent	Undetermined, recommended not eligible
47IA0506	W-0322-08-2011	WI	Iowa	Historic artifact scatter	Unknown	Yes	Intersects	Undetermined, no resources identified in corridor
47IA0418	Ghost House Farm	WI	Iowa	Historic farmstead	Wood-framed house, concrete foundations,	Yes	Intersects	Undetermined, recommended not eligible
47IA0503	W-0322-04-2011	WI	IA	Historic farmstead	Artifact scatter with no structural remains	Yes	Intersects	Undetermined, recommended not eligible
47DA0668	Twin Valley	WI	Dane	Prehistoric lithic scatter	Unknown	No	Adjacent	Undetermined

3.9.2.7.2 Area Analyzed for Potential Non-Physical Impacts

In addition to the sites impacted by all action alternatives, a total of three aboveground, NRHP-listed, and 45 assumed eligible resources lie within the area analyzed for potential non-physical impacts of Alternative 4 (Table 3.9-9). This includes 32 historic structures, seven historic cemeteries, eight prehistoric burial sites, and one historic archaeological site. All eight of the prehistoric burial sites are recorded as mound sites. Of these resources, two historic structures (David and Maggie Jones House [NPS No. 94000447] and the Thomas Stone Barn [NPS No. 01000299]) and the historic archaeological site (Fort Blue Mounds/ NPS No. 01001044) have been listed in the NRHP.

Preliminary information and eligibility recommendations are available for some of these sites. Of the other 30 historic structures, all were visited in the course of preliminary studies for the C-HC Project. Based on these preliminary reviews, 10 were recommended as eligible for the NRHP and 20 were recommended not eligible for the NRHP. Sites and structures that were recommended eligible include St. Charles Borromeo Catholic Church (2362778), the Klindt-Geiger Canning Company (2362779), Meadowvale School (236277), and a set of seven historic homes in downtown Cassville, Wisconsin (44243 and 236270–236275). Additionally, all nine mound sites may be eligible for the NRHP under the MPS, *Prehistoric Mounds of the Quad State Region of the Upper Mississippi Valley* (Stanley and Stanley 1988). The six historic cemeteries may be eligible for the NRHP if they are extraordinarily old or associated with a specific time period. As formal determinations of eligibility are not provided, all properties are assumed eligible for listing in the NRHP. RUS, in coordination with the Iowa/Wisconsin SHPO and other interested parties, would formally determine NRHP eligibility of these potential historic properties prior to construction. Long-term impacts to the properties within the area analyzed for potential non-physical impacts are currently unknown but may be assumed to be adverse and moderate if the properties currently maintain integrity of feeling or setting and these aspects contribute to their significance.

Table 3.9-9. Impacted Cultural Resources within the Area Analyzed for Potential Non-Physical Impacts of Alternative 4

Resource Identification	Resource Common Name	State	County	Resource Type	Resource Details	Visited for Current Effort?	NRHP Status/ Recommendations
47GT0032/ BGT0238	Riverside Park Mounds	WI	Grant	Prehistoric mound group	Unknown	No	Undetermined
BGT0029	St. Charles Catholic Cemetery	WI	Grant	Historic cemetery	Unknown	No	Undetermined
BGT0028	Cassville Seventh Adventist Cemetery	WI	Grant	Historic cemetery	Unknown	No	Undetermined
47GT0403/ BGT0188	Schupper Mounds	WI	Grant	Prehistoric mound group	Unknown	No	Undetermined
47GT0784/ BGT0415	Horseshoe Bench	WI	Grant	Prehistoric mound	Unknown	No	Undetermined
47GT0436/ BGT0186	Eckstein Ploessl Mounds	WI	Grant	Prehistoric mound group	Unknown	No	Undetermined
47GT0782/ BGT0412	Guardians of the Gate	WI	Grant	Prehistoric mound	Unknown	No	Undetermined
47GT0434/ BGT0411	Eckstein 1 Mounds	WI	Grant	Prehistoric mound ground	Unknown	No	Undetermined

Resource Identification	Resource Common Name	State	County	Resource Type	Resource Details	Visited for Current Effort?	NRHP Status/ Recommendations
47GT0727/ BGT0001	Burton Cemetery	WI	Grant	Historic cemetery	Unknown	No	Undetermined
47GT0441/ GBT0183	Eugene Reynolds Mound	WI	Grant	Prehistoric mound	Unknown	No	Undetermined
BIA0034	Unnamed Cemetery	WI	Iowa	Historic cemetery	Unknown	No	Undetermined
BIA0032	St. Bridget's Cemetery	WI	Iowa	Historic cemetery	Unknown	No	Undetermined
BIA0057	Unnamed Cemetery	Wi	Iowa	Historic cemetery	Unknown	No	Undetermined
47DA0891/ BDA0187/ NPS No. 01001044	Fort Blue Mounds	WI	Dane	Historic military	1832–1850 stockade	No	Listed in NRHP, 2001
BDA0041	St. Ignatius Cemetery	WI	Dane	Historic cemetery	Unknown	No	Undetermined
47DA0937/ BDA0432	Hollfelder Mound	WI	Dane	Prehistoric mound	Unknown	No	Undetermined
44243	House	WI	Grant	Historic house	Italianate style	Yes	Undetermined, recommended eligible (with 236270-236275)
236270	House	WI	Grant	Historic house	Italianate style	Yes	Undetermined, recommended eligible (with 236270-236275)
236271	House	WI	Grant	Historic house	Second Empire style	Yes	Undetermined, recommended eligible (with 236270-236275)
236272	House	WI	Grant	Historic house	Folk Victorian style	Yes	Undetermined, recommended eligible (with 236270-236275)
236273	House	WI	Grant	Historic house	American Foursquare style	Yes	Undetermined, recommended eligible (with 236270-236275)
236274	House	WI	Grant	Historic house	Queen Anne Victorian Style	Yes	Undetermined, recommended eligible (with 236270-236275)
236275	House	WI	Grant	Historic house	American Foursquare style	Yes	Undetermined, recommended eligible (with 236270-236275)
236277	Meadowvale School	WI	Iowa	Historic school	1864 schoolhouse, privy, and shed	Yes	Undetermined, recommended eligible
236278	St. Charles Borromeo Catholic Church	WI	Grant	Historic church	1889 Victorian Gothic church	Yes	Undetermined, recommended eligible
236279	Klindt-Geiger Canning Co.	WI	Grant	Historic industrial	ca. 1890 2-story industrial facility	Yes	Undetermined, recommended eligible
43629	Burton General Store	WI	Grant	Historic commercial	1904 wood-frame, front-gabled store	Yes	Undetermined, recommended not eligible
43603	House	WI	Grant	Historic house	Modern alterations to siding, windows, roof sheathing, and porch	Yes	Undetermined, recommended not eligible

Resource Identification	Resource Common Name	State	County	Resource Type	Resource Details	Visited for Current Effort?	NRHP Status/ Recommendations
220502	House	WI	Grant	Historic house	Modern alterations to roof sheathing, windows, front entry	Yes	Undetermined, recommended not eligible
55762	Sanders House	WI	Grant	Historic house	Modern alterations to siding, roof sheathing, floorplan	Yes	Undetermined, recommended not eligible
43573	House	WI	Grant	Historic house	Modern alterations to windows, historic fabric	Yes	Undetermined, recommended not eligible
43575	House	WI	Grant	Historic house	Modern alterations to windows, porch	Yes	Undetermined, recommended not eligible
64645	House	WI	Grant	Historic house	Modern alterations to windows, roof sheathing, floorplan	Yes	Undetermined, recommended not eligible
64652	House	WI	Iowa	Historic house	Modern alterations to windows, siding, façade	Yes	Undetermined, recommended not eligible
64652	House	WI	Iowa	Historic house	Modern alterations to windows, siding, façade	Yes	Undetermined, recommended not eligible
47075	Grain Elevator	WI	Iowa	Historic farming	Modern alterations to historic fabric	Yes	Undetermined, recommended not eligible
134159	Farmstead complex	WI	Iowa	Historic House	ca. 1890 house, ban barn, silo, shed, and gothic roofed barn	Yes	Undetermined, recommended not eligible
47092	Commercial Building	WI	Iowa	Historic commercial	ca.1880 commercial building	Yes	Undetermined, recommended not eligible
47091	Commercial Building	WI	Iowa	Historic commercial	Modern alterations to windows, storefront, floorplan	Yes	Undetermined, recommended not eligible
134158	House	WI	Iowa	Historic house	Modern alterations to windows, siding, floorplan	Yes	Undetermined, recommended not eligible
28412/ NPS No. 94000447	David and Maggie Jones House	WI	Iowa	Historic house	1878–1908 Italianate dwelling	No	Listed in NRHP, 1994
47765	House	WI	Iowa	Historic house	Modern alterations to façade	Yes	Undetermined, recommended not eligible
47761	House	WI	Iowa	Historic house	Modern alterations to façade	Yes	Undetermined, recommended not eligible
47767	Iowa County Highway Garage	WI	Iowa	Historic governmental	1937 garage building	Yes	Undetermined, recommended not eligible
139838	Dodgeville United States Army Reserve Center	WI	Iowa	Historic governmental	1963 modernist brick building	Yes	Undetermined, recommended not eligible
47766	House	WI	Iowa	Historic house	Modern alterations to siding, windows, porch	Yes	Undetermined, recommended not eligible
89885/ NPS No. 01000299	Thomas Stone Barn	WI	Iowa	Historic farming	1881 quarry-stone barn	No	Listed in NRHP, 2001
4522	Cheese Factory	WI	Dane	Historic industrial	Modern additions	Yes	Undetermined, recommended not eligible

Resource Identification	Resource Common Name	State	County	Resource Type	Resource Details	Visited for Current Effort?	NRHP Status/ Recommendations
4789	Berry Haney Tavern	WI	Dane	Historic tavern	Modern additions, porch alterations, replacement sidings and windows	Yes	Undetermined, recommended not eligible

3.9.2.7.3 Other Considerations

Identified as a potential concern during public scoping, the Platte Mound “M” lies approximately 1.25 miles west of Alternative 3. As the “M” lies on the west side of Platte Mound from Alternative 3 and is outside the APE, visual impacts on the property are not expected.

Additionally, the First Norwegian Lutheran Church Cemetery monument lies 1,900 feet northeast of the alternative. As the monument is outside the APE, visual impacts on the property are not expected.

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.9.2.8 ALTERNATIVE 5

3.9.2.8.1 Area Analyzed for Potential Physical Impacts

In addition to the sites impacted by all action alternatives, a total of at least 25 assumed eligible cultural resources are present within the area analyzed for potential physical impacts of Alternative 5 (Table 3.9-10). This includes 19 archaeological sites, three historic cemeteries, and three archaeological sites with limited or inconclusive data on their true location. Within the archaeological sites, 10 contain prehistoric cultural materials, 11 contain historic materials, and one features both prehistoric and historic materials. None of the potential cultural resources have been formally determined eligible for the NRHP.

Preliminary information and eligibility recommendations are available for some of these sites. Seven sites were revisited in the course of preliminary studies for the C-HC Project. Of note are the N.D. Power Mounds (47GT0750 / BTG0395), Udelhoffen Mounds (47GT0437 / BGT0187), Murphy Enclosure (47GT0089), and the Triumvirate site (47GT0788 / BGT0417), all of which may have had prehistoric age burial mounds or earthworks., and that may be eligible for the NRHP under the MPS, *Prehistoric Mounds of the Quad State Region of the Upper Mississippi Valley* (Stanley and Stanley 1988). The alternative intersects Gomers (47IA0061), a historic mine site which has been recommended as eligible for the NRHP. Cemeteries may be eligible for the NRHP if they are extraordinarily old or associated with a specific time period. Interments are also protected from disturbance under Wisconsin and Iowa statutes. As formal determinations of eligibility are not provided, all properties are assumed eligible for listing in the NRHP. RUS, in coordination with the Iowa/Wisconsin SHPO and other interested parties, would formally determine NRHP eligibility of these potential historic properties prior to construction.

Under Alternative 5, the C-HC Project could result in minor to moderate impacts to the cultural resources within the APE, if determined eligible for listing in the NRHP. The Federal agencies, in coordination with SHPOs and other consulting parties, would identify steps to avoid, minimize, or mitigate the adverse effects to these sites, thereby diminishing the severity of impacts.

Table 3.9-10. Impacted Cultural Resources within the Area Analyzed for Potential Physical Impacts of Alternative 5

Resource Identification	Resource Common Name	State	County	Resource Type	Resource Details	Visited for Current Effort?	Intersects/ adjacent	NRHP Status/ Recommendations
Goshen Cemetery	N/A	IA	Clayton	Historic cemetery	200+ interments, dating to 1860s to present	No	Adjacent	Undetermined
13DB1040	N/A	IA	Dubuque	Historic farmstead	Late nineteenth to twentieth century	No	Adjacent	Undetermined, recommended not eligible
13CT460	N/A	IA	Clayton	Prehistoric artifact scatter	Middle Woodland artifact scatter, exact location unknown	No	Unknown	Undetermined
13CT461	N/A	IA	Clayton	Prehistoric isolated find	Late Woodland Scallorn point, exact location unknown	No	Unknown	Undetermined
13CT464	N/A	IA	Clayton	Prehistoric isolated find	Paleoindian Eden point, exact location unknown	No	Unknown	Undetermined
47GT0753	BM-ND-2	WI	Grant	Historic farmstead	Structure pads, walls, and vegetation	No	Intersects	Undetermined, recommended not eligible
47GT0750/ BTG0395	N.D. Power Mounds	WI	Grant	Prehistoric mound group	Three intact mounds	Yes	Adjacent	Undetermined, recommended eligible
47GT0437/ BGT0187	Udelhoffen Mounds	WI	Grant	Prehistoric burial mounds	Sixteen reported on ridge crest	No	Intersects	Undetermined, recommended eligible
47GT0788/ BG0417	Triumvirate Site	WI	Grant	Prehistoric burial mound group	Three or more conical mounds	No	Intersects	Undetermined, recommended eligible
47GT0665	Emery Lead Furnace	WI	Grant	Historic industrial site	Lead smelting furnace location interpreted from historic records	Yes	Intersects	Undetermined, Recommended not eligible
47GT0089	Murphy Enclosure	WI	Grant	Prehistoric earthworks	Earthen enclosure somewhere within 320-acre plot	Yes	Intersects	Undetermined, recommended not eligible within corridor
47GT0090	Gardner Camp	WI	Grant	Prehistoric campsite/ village	Location from informant interview	Yes	Intersects	Undetermined, recommended not eligible within corridor
47GT0685	Bellmeyer 1	WI	Grant	Prehistoric isolated find	Single galena chert secondary flake	No	Adjacent	Undetermined, recommended not eligible
47GT0687	Bellmeyer 3	WI	Grant	Historic artifact scatter	Brick fragments, whiteware, nails	No	Adjacent	Undetermined, recommended not eligible

Resource Identification	Resource Common Name	State	County	Resource Type	Resource Details	Visited for Current Effort?	Intersects/ adjacent	NRHP Status/ Recommendations
BIA0037	Thomas Cemetery	Wi	Iowa	Historic cemetery	Two marked graves dating to 1856–1871	Yes	Adjacent	Undetermined, identified outside the area analyzed for potential physical impacts
BIA0019	Laxey Cemetery	WI	Iowa	Historic cemetery	1855–1930 cemetery	Yes	Adjacent	Undetermined, identified outside project area
47IA0416	Williams Diggins	WI	Iowa	Multi-component quarry	Tailings, pits, scattered rock	No	Intersects	Undetermined
47IA0061	Gomers	WI	Iowa	Historic mine site	Historic foundations, pits, and tailings piles	No	Intersects	Undetermined, recommended eligible
47IA0488	W-0322-04	WI	Iowa	Historic farmstead	Unknown	No	Intersects	Undetermined, recommended not eligible
47IA0487	W-0322-03	WI	Iowa	Historic mining area	Spoil pile	No	Adjacent	Undetermined, recommended not eligible
47IA0438	Ridge Pits	Wi	Iowa	Historic mining area	Mining pits	No	Adjacent	Undetermined, recommended not eligible
47IA0506	W-0322-08-2011	WI	Iowa	Historic artifact scatter	Unknown	Yes	Intersects	Undetermined, no resources identified in corridor
47IA0418	Ghost House Farm	WI	Iowa	Historic farmstead	Wood-framed house, concrete foundations,	Yes	Intersects	Undetermined, recommended not eligible
47IA0503	W-0322-04-2011	WI	Iowa	Historic farmstead	Artifact scatter with no structural remains	Yes	Intersects	Undetermined, recommended not eligible
447DA0668	Twin Valley	WI	Dane	Prehistoric lithic scatter	Unknown	No	Adjacent	Undetermined

3.9.2.8.2 Area Analyzed for Potential Non-Physical Impacts

In addition to the sites impacted by all action alternatives, a total of three aboveground, NRHP-listed resources, and 32 assumed eligible resources lie within the area analyzed for potential non-physical impacts of Alternative 5 (Table 3.9-11). This includes one historic property, 15 historic structures, seven historic cemeteries, nine prehistoric burial sites, and three historic archaeological sites. All nine of the prehistoric burial sites are recorded as mound sites. Of these resources, one historic structure (Thomas Stone Barn/ NPS No. 01000299), one historic property (Nelson Dewey Plantation/ NPS No. 70000034), and a historic archaeological site (Fort Blue Mounds/ NPS No. 01001044) have been listed in the NRHP.

Preliminary information and eligibility recommendations are available for some of these sites. Of the other 15 historic sites, all but one were visited in the course of preliminary studies for the C-HC Project. Based on these preliminary reviews, one, Springdale Lutheran Church (4562), a Gothic revival church dating to 1895, was recommended eligible for the NRHP. In addition, historic archaeological site 13DB1037, a blacksmith shop, has been recommended eligible for the NRHP. The nine mound sites may be eligible for the NRHP under the MPS, *Prehistoric Mounds of the Quad State Region of the Upper*

Mississippi Valley (Stanley and Stanley 1988). The seven historic cemeteries may be eligible for the NRHP if they are extraordinarily old or associated with a specific time period. As formal determinations of eligibility are not provided, all properties are assumed eligible for listing in the NRHP. RUS, in coordination with the Iowa/Wisconsin SHPO and other interested parties, would formally determine NRHP eligibility of these potential historic properties prior to construction. Long-term impacts to the properties within the area analyzed for potential non-physical impacts are currently unknown but may be assumed to be adverse and moderate if the properties currently maintain integrity of feeling or setting and these aspects contribute to their significance.

Table 3.9-11. Impacted Cultural Resources within the Area Analyzed for Potential Non-Physical Impacts of Alternative 5

Resource Identification	Resource Common Name	State	County	Resource Type	Resource Details	Visited for Current Effort?	NRHP Status/ Recommendations
13CT70	Smith Mound Group II	IA	Clayton	Prehistoric mound group	Woodland period	No	Undetermined
13DB1037	N/A	IA	Dubuque	Historic blacksmith	Nineteenth century	No	Undetermined, recommended eligible
13DB1093	N/A	IA	Dubuque	Historic farmstead	Late nineteenth century to present	No	Undetermined
NPS 70000034	Nelson Dewey Plantation	WI	Grant	Historic home site	ca. 1850–1874 residence of first Wisconsin Governor Nelson Dewey	No	Listed in NRHP 1970
47GT0754	Boundary Mounds	WI	Grant	Prehistoric mound group	Unknown	No	Undetermined
BGT0028	Cassville Seventh Adventist Cemetery	WI	Grant	Historic cemetery	Unknown	No	Undetermined
47GT0403/ BGT0188	Schupper Mounds	WI	Grant	Prehistoric mound group	Unknown	No	Undetermined
47GT0784/ BGT0415	Horseshoe Bench	WI	Grant	Prehistoric mound	Unknown	No	Undetermined
47GT0436/ BGT0186	Eckstein Ploessl Mounds	WI	Grant	Prehistoric mound group	Unknown	No	Undetermined
47GT0782/ BGT0412	Guardians of the Gate	WI	Grant	Prehistoric mound	Unknown	No	Undetermined
47GT0434/ BGT0411	Eckstein 1 Mounds	WI	Grant	Prehistoric mound ground	Unknown	No	Undetermined
47GT0727/ BGT0001	Burton Cemetery	WI	Grant	Historic cemetery	Unknown	No	Undetermined
47GT0441/ GBT0183	Eugene Reynolds Mound	WI	Grant	Prehistoric mound	Unknown	No	Undetermined
BIA0018	Bloomfield Cemetery	WI	Iowa	Historic cemetery	Unknown	No	Undetermined
BIA0021	St. Joseph Cemetery	WI	Iowa	Historic cemetery	Unknown	No	Undetermined
BIA0032	St. Bridget’s Cemetery	WI	Iowa	Historic cemetery	Unknown	No	Undetermined
BIA0057	Unnamed Cemetery	Wi	Iowa	Historic cemetery	Unknown	No	Undetermined

Resource Identification	Resource Common Name	State	County	Resource Type	Resource Details	Visited for Current Effort?	NRHP Status/ Recommendations
47DA0891/ BDA0187/ NPS No. 01001044	Fort Blue Mounds	WI	Dane	Historic military	1832–1850 stockade	No	Listed in NRHP, 2001
47DA0937/ BDA0432	Hollfelder Mound	WI	Dane	Prehistoric mound	Unknown	No	Undetermined
43629	Burton General Store	WI	Grant	Historic commercial	1904 wood-frame, front-gabled store	Yes	Undetermined, recommended not eligible
43603	House	WI	Grant	Historic house	Modern alterations to siding, windows, roof sheathing, and porch	Yes	Undetermined, recommended not eligible
220502	House	WI	Grant	Historic house	Modern alterations to roof sheathing, windows, front entry	Yes	Undetermined, recommended not eligible
55762	Sanders House	WI	Grant	Historic house	Modern alterations to siding, roof sheathing, floorplan	Yes	Undetermined, recommended not eligible
43573	House	WI	Grant	Historic house	Modern alterations to windows, historic fabric	Yes	Undetermined, recommended not eligible
43575	House	WI	Grant	Historic house	Modern alterations to windows, porch	Yes	Undetermined, recommended not eligible
64645	House	WI	Grant	Historic house	Modern alterations to windows, roof sheathing, floorplan	Yes	Undetermined, recommended not eligible
64652	House	WI	Iowa	Historic house	Modern alterations to windows, siding, façade	Yes	Undetermined, recommended not eligible
46951	Sunny Slope School	WI	Iowa	Historic school	Modern alterations to historic fabric, cladding	Yes	Undetermined, recommended not eligible
46941	William J. Bennett House	WI	Iowa	Historic house	Modern alterations to windows, porch design	Yes	Undetermined, recommended not eligible
89885/ NPS No. 01000299	Thomas Stone Barn	WI	Iowa	Historic farming	1881 quarry-stone barn	No	Listed in NRHP, 2001
4522	Cheese Factory	WI	Dane	Historic industrial	Modern additions	Yes	Undetermined, recommended not eligible
4562	Springdale Lutheran Church	WI	Dane	Historic church	1895 Gothic revival church	Yes	Undetermined, recommended eligible
BDA0039	Springdale Lutheran Church Cemetery	WI	Dane	Historic cemetery	Unknown	No	Undetermined

Resource Identification	Resource Common Name	State	County	Resource Type	Resource Details	Visited for Current Effort?	NRHP Status/ Recommendations
5635	Ridgeview School	WI	Dane	Historic school	1958 schoolhouse	Yes	Undetermined, recommended not eligible
4789	Berry Haney Tavern	WI	Dane	Historic tavern	Modern additions, porch alterations, replacement sidings and windows	Yes	Undetermined, recommended not eligible

3.9.2.8.3 Other Considerations

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.9.2.9 ALTERNATIVE 6

3.9.2.9.1 Area Analyzed for Potential Physical Impacts

In addition to the sites impacted by all action alternatives, at least eight assumed eligible cultural resources are present within the area analyzed for potential physical impacts for Alternative 6 (Table 3.9-12). This includes seven archaeological sites and one historic cemetery. Within the archaeological sites, two contain prehistoric cultural materials and five contain historic materials. None of the potential cultural resources have been formally determined eligible for the NRHP.

Preliminary information and eligibility recommendations are available for some of these sites. Three sites were revisited in the course of preliminary studies for the C-HC Project, and cultural materials were identified within the accessible portion of the project corridor at only one site. Resources may be present outside the accessible portion of the project corridor. Of note is the Millville Pioneer Cemetery, which may hold as many as 80 graves, but which has not been formally defined or evaluated. Cemeteries may be eligible for the NRHP if they are extraordinarily old or associated with a specific time period. Interments are also protected from disturbance under Wisconsin and Iowa statutes. As formal determinations of eligibility are not provided, all properties are assumed eligible for listing in the NRHP. RUS, in coordination with the Iowa/Wisconsin SHPO and other interested parties, would formally determine NRHP eligibility of these potential historic properties prior to construction.

Under Alternative 6, the C-HC Project could result in minor to moderate impacts to the cultural resources within the APE, if determined eligible for listing in the NRHP. The Federal agencies, in coordination with SHPOs and other consulting parties, would identify steps to avoid, minimize, or mitigate the adverse effects to these sites, thereby diminishing the severity of impacts.

Table 3.9-12. Impacted Cultural Resources within the Area Analyzed for Potential Physical Impacts of Alternative 6

Resource Identification	Resource Common Name	State	County	Resource Type	Resource Details	Visited for Current Effort?	Intersects/ Adjacent	NRHP Status/ Recommendations
Millville Pioneer Cemetery	N/A	IA	Clayton	Cemetery	At least 80 graves, dating to early founding	No	Intersects	Undetermined
13DB1043	N/A	IA	Dubuque	Historic farmstead	Late nineteenth to twentieth century	No	Adjacent	Undetermined, recommended not eligible

Resource Identification	Resource Common Name	State	County	Resource Type	Resource Details	Visited for Current Effort?	Intersects/ Adjacent	NRHP Status/ Recommendations
47GT0158	Withington Fluted Point Site	WI	Grant	Prehistoric lithic scatter	Lithic scatter	Yes	Intersects	Undetermined, possibly misplotted
47IA0504	W-0322-06-2011	WI	Iowa	Prehistoric lithic scatter	High-density scatter	No	Adjacent	Undetermined, further work recommended
47IA0438	Ridge Pits	Wi	Iowa	Historic mining area	Mining pits	No	Adjacent	Undetermined, recommended not eligible
47IA0506	W-0322-08-2011	WI	Iowa	Historic artifact scatter	Unknown	Yes	Intersects	Undetermined, no resources identified in corridor
47IA0418	Ghost House Farm	WI	Iowa	Historic farmstead	Wood-framed house, concrete foundations	Yes	Intersects	Undetermined, recommended not eligible
47IA0503	W-0322-04-2011	WI	Iowa	Historic farmstead	Artifact scatter with no structural remains	Yes	Intersects	Undetermined, recommended not eligible

3.9.2.9.2 Area Analyzed for Potential Non-Physical Impacts

In addition to the sites impacted by all action alternatives, three aboveground, NRHP-listed, and 25 assumed eligible resources lie within the area analyzed for potential non-physical impacts of Alternative 6 (Table 3.9-13). This includes one historic property, 15 historic structures, five historic cemeteries, five prehistoric burial sites, one multicomponent archaeological site with prehistoric mounds and historic artifacts, and one historic archaeological site. Two of the five prehistoric burial sites and the single multicomponent site are recorded as mound sites. Of the aboveground resources, one historic property (Nelson Dewey Plantation/ NPS No. 70000034), two historic structures (David and Maggie Jones House [NPS No. 94000447] and the Thomas Stone Barn [NPS No. 01000299), and the historic archaeological site (Fort Blue Mounds/ NPS No. 01001044) have been listed in the NRHP.

Preliminary information and eligibility recommendations are available for some of these sites. Of the other 13 historic sites/structures, all were visited in the course of preliminary studies for the C-HC Project. Based on these preliminary review, one, Meadowvale School (23627), a mid-nineteenth century schoolhouse and privy, was recommended eligible for the NRHP; the remaining 12 sites were recommended not eligible for the NRHP. The two prehistoric mound sites and one multicomponent mound may be eligible for the NRHP under the MPS, *Prehistoric Mounds of the Quad State Region of the Upper Mississippi Valley* (Stanley and Stanley 1988). The five historic cemeteries and three non-mound prehistoric burial sites may be eligible for the NRHP if they are extraordinarily old or associated with a specific time period. As formal determinations of eligibility are not provided, all properties are assumed eligible for listing in the NRHP. RUS, in coordination with the Iowa/Wisconsin SHPO and other interested parties, would formally determine NRHP eligibility of these potential historic properties prior to construction. Long-term impacts to the properties within the area analyzed for potential non-physical impacts are currently unknown but may be assumed to be adverse and moderate if the properties currently maintain integrity of feeling or setting and these aspects contribute to their significance.

Table 3.9-13. Impacted Cultural Resources within the Area Analyzed for Potential Non-Physical Impacts of Alternative 6

Resource Identification	Resource Common Name	State	County	Resource Type	Resource Details	Visited for Current Effort?	NRHP Status/ Recommendations
NPS 70000034	Nelson Dewey Plantation	WI	Grant	Historic home site	ca. 1850–1874 residence of first Wisconsin Governor Nelson Dewey	No	Listed in NRHP 1970
47GT0754	Boundary Mounds	WI	Grant	Prehistoric mound group	Unknown	No	Undetermined
47GT0792/ BGT0420	Rattlesnake Valley	WI	Grant	Prehistoric burials	Unknown	No	Undetermined
47GT0113/ BGT0350	Glassmaker mounds	WI	Grant	Multicomponent site with mounds	Unknown	No	Undetermined
47GT0778/ GBT0407	Angles	WI	Grant	Prehistoric burials	Unknown	No	Undetermined
47GT0779/ BGT0408	Voltage View	WI	Grant	Prehistoric burials	Unknown	No	Undetermined
BGT0077	Pigeon Cemetery	WI	Grant	Historic cemetery	Unknown	No	Undetermined
BIA0034	Unnamed Cemetery	WI	Iowa	Historic cemetery	Unknown	No	Undetermined
BIA0032	St. Bridget's Cemetery	WI	Iowa	Historic cemetery	Unknown	No	Undetermined
BIA0057	Unnamed Cemetery	Wi	Iowa	Historic cemetery	Unknown	No	Undetermined
47DA0891/ BDA0187/ NPS No. 01001044	Fort Blue Mounds	WI	Dane	Historic military	1832–1850 stockade	No	Listed in NRHP, 2001
BDA0041	St. Ignatius Cemetery	WI	Dane	Historic cemetery	Unknown	No	Undetermined
47DA0937/ BDA0432	Hollfelder Mound	WI	Dane	Prehistoric mound	Unknown	No	Undetermined
47075	Grain Elevator	WI	Iowa	Historic farming	Modern alterations to historic fabric	Yes	Undetermined, recommended not eligible
134159	Farmstead complex	WI	Iowa	Historic house	ca. 1890 house, ban barn, silo, shed, and gothic roofed barn	Yes	Undetermined, recommended not eligible
47092	Commercial Building	WI	Iowa	Historic commercial	ca. 1880 commercial building	Yes	Undetermined, recommended not eligible
47091	Commercial Building	WI	Iowa	Historic commercial	Modern alterations to windows, storefront, floorplan	Yes	Undetermined, recommended not eligible
134158	House	WI	Iowa	Historic house	Modern alterations to windows, siding, floorplan	Yes	Undetermined, recommended not eligible
28412/ NPS No. 94000447	David and Maggie Jones House	WI	Iowa	Historic house	1878–1908 Italianate dwelling	No	Listed in NRHP, 1994
47765	House	WI	Iowa	Historic house	Modern alterations to façade	Yes	Undetermined, recommended not eligible
47761	House	WI	Iowa	Historic house	Modern alterations to façade	Yes	Undetermined, recommended not eligible

Resource Identification	Resource Common Name	State	County	Resource Type	Resource Details	Visited for Current Effort?	NRHP Status/ Recommendations
47767	Iowa County Highway Garage	WI	Iowa	Historic governmental	1937 garage building	Yes	Undetermined, recommended not eligible
139838	Dodgeville United States Army Reserve Center	WI	Iowa	Historic governmental	1963 modernist brick building	Yes	Undetermined, recommended not eligible
47766	House	WI	Iowa	Historic house	Modern alterations to siding, windows, porch	Yes	Undetermined, recommended not eligible
89885/ NPS No. 01000299	Thomas Stone Barn	WI	Iowa	Historic farming	1881 quarry-stone barn	No	Listed in NRHP, 2001
4522	Cheese Factory	WI	Dane	Historic industrial	Modern additions	Yes	Undetermined, recommended not eligible
4789	Berry Haney Tavern	WI	Dane	Historic tavern	Modern additions, porch alterations, replacement sidings and windows	Yes	Undetermined, recommended not eligible
23627	Meadowvale School	WI	Iowa	Historic school	1864 schoolhouse, privy, and shed	Yes	Undetermined, recommended eligible

3.9.2.9.3 Other Considerations

Identified as a potential concern during public scoping, the First Norwegian Lutheran Church Cemetery monument lies 1,900 feet northeast of the alternative. As the monument is outside the APE, visual impacts on the property are not expected.

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.9.3 *Summary of Impacts*

Known cultural resources that are of undetermined NRHP eligibility or are listed in the NRHP are present within the APE of the action alternatives (Table 3.9-14). In addition, as a comprehensive cultural resources survey has not been conducted, any number of unknown resources may be present within the area analyzed for potential physical impacts. Prior to construction, RUS would attempt to identify and evaluate additional resources within the area analyzed for potential physical impacts. If, through consultation with the Iowa and/or Wisconsin SHPOs, RUS, the Utilities, and affected tribal groups, measures cannot be taken to avoid impacts to the characteristics that qualify any identified resource for inclusion in the NRHP, that may constitute a major impact. These impacts may be irreversible. However, the Federal agencies, SHPOs, and other consulting parties would identify steps to avoid, minimize, or mitigate the adverse effects to sites eligible for listing in the NRHP; therefore, impacts to those sites where adverse effects are mitigated would be minor or moderate.

Table 3.9-14. Impact Summary Table for Cultural and Historical Resources

	NRHP-Listed, Determined Eligible, or Assumed Eligible Resources within the Area Analyzed for Potential Physical Impacts	NRHP-Listed, Determined Eligible, or Assumed Eligible Resources within the Area Analyzed for Potential Non-Physical Impacts	Total NRHP-Listed, Determined Eligible, or Assumed Eligible Resources
Alternative 1	12	20	**32**
Alternative 2	14	30	**44**
Alternative 3	18	38	**56**
Alternative 4	24	50	**74**
Alternative 5	31	41	**72**
Alternative 6	14	30	**44**

For resources within the area analyzed for potential non-physical impacts, the impacts to affected resources would be evaluated on a case-by-case basis. Impacts to the setting and character of historic properties may range from minor to major, depending on the proximity of the resource to the line, the resource position on the landscape, vegetation cover in the resource vicinity, and the remaining ability of the resource to convey its historic significance. Additionally, these impacts would be reversible, as the poles could be removed and vegetation restored, returning the area to its preconstruction characteristics.

For the N-9 transmission line decommissioning that would occur within the Refuge, there were no cultural resources identified at this time, although a survey may be necessary. The N-9 transmission line decommissioning and tap line construction on private land would result in potential minor to moderate impacts to cultural resources within the APE, if they are determined eligible for listing in the NRHP. Cultural resource surveys have not been conducted. There would be no impact to cultural resources from substation improvements.

Finally, three tribal groups, the Ho-Chunk Nation of Wisconsin, the Rosebud Sioux Tribe, and the Upper Sioux Community, have elected to participate in the development of the PA for NHPA Section 106 compliance. See Chapter 5 and Appendix H for more information about the PA. Further consultation with affected tribal groups would be necessary to refine the location, character, NRHP eligibility, and impacts to these sites.

Due to the constraints of the NEPA process and the preliminary nature of this document, incomplete information has been utilized to attempt to identify impacts of the C-HC Project on cultural resources. Accordingly, all known cultural resources, regardless of significance, have been assumed to be eligible for the NRHP. As such, this impacts analysis may overestimate the severity of impacts among all action alternatives. If, in the course of resource identification and evaluation, sites are determined not eligible for the NRHP, then they would not be considered historic properties and impacts to the sites would not be considered adverse, eliminating them from the consideration of impacts. In addition, the Federal agencies, in coordination with SHPOs and other consulting parties, would take steps to avoid, minimize, or mitigate impacts to historic properties in accordance with Section 106 of the NHPA, thereby diminishing the severity of impacts.

3.10 Land Use, including Agriculture and Recreation

This section describes land use classifications, including agricultural lands, as well as recreational uses that occur across the C-HC Project.

Land use is defined as the human use of areas for economic, residential, recreational, conservational, and government purposes. Land use in the project area is primarily dominated by agricultural uses, such as croplands and farmsteads. Other uses include recreational areas such as state parks and trails, urban development, natural areas, and conservation lands.

3.10.1 *Affected Environment*

The analysis area includes portions of six counties in southwestern Wisconsin and east-central Iowa: Dane, Grant, Iowa, Lafayette, Clayton, and Dubuque. The C-HC Project is mostly within the Wisconsin Driftless Area. This area is characterized as unglaciated terrain dominated by sedimentary formations. The topography of the area has been impacted by erosion by dissecting river valleys and tributaries of the Mississippi River. The region surrounding the proposed project contains large expanses of rural lands comprising a mixture of agricultural lands and woodlands with rural residences scattered throughout the area.

Landownership in the analysis area is composed of Federal lands associated with the Refuge, State lands, county and municipal parcels, and private ownership.

3.10.1.1 LAND COVER IN THE ANALYSIS AREA

Land use and land cover data were obtained from the USGS NLCD (USGS 2011). Land cover data are derived from satellite imagery and describe general categories of land use. Land cover types within the analysis area include: urban, agriculture, grassland, forest, wetland, barren, shrubland, and open water. Approximately 51% of the analysis area is agricultural lands consisting of cultivated crops and pasture/hay fields. Approximately 18% of the area is forested, and these areas occur interspersed throughout but are generally associated with water bodies and rivers within the area. Forested lands also include woodlands managed for timber production. Whereas timber production is relatively low within the analysis area, Clayton and Dubuque Counties are two of the highest producers in the state of Iowa, producing at least 11 cubic feet of industrial roundwood per acre of forest land (Haugen and Michel 2005; Reading and Whipple 2003). Approximately 13% of the analysis area is grasslands, which also occur throughout the area. Approximately 10% of the analysis area is urban development associated with the communities of Mount Horeb, Barneveld, Ridgeway, Dodgeville, Cobb, Montfort, and Cassville, Wisconsin. The remaining land cover types are extremely limited within the analysis area and combined cover less than 8% of the total area.

3.10.1.2 AGRICULTURAL LANDS

Wisconsin and Iowa boast a diverse and dynamic agriculture industry. In 2016, Wisconsin was number one in the United States in production of cheddar and total cheese, dry whey for human consumption, milk goat inventory, mink pelts produced, corn harvested for silage, snap beans for processing, and cranberry production. Wisconsin cows produced 14% of the nation's milk supply and ranked second in the United States in the number of organic farms (USDA National Agricultural Statistics Service [NASS] 2017a). In 2017, Iowa was number one in the United States in production of corn for grain, egg production, hogs and pigs inventory and value, pig crop, sows farrowed, and commercial hog slaughter. Iowa is also ranked second in soybean production and red meat production (USDA NASS 2017b).

Lands owned and managed as farmland account for more than 65% of the counties within the analysis area (Table 3.10-1). Selected agricultural products by county are presented in Table 3.10-2.

Table 3.10-1. Percentage of Farmland, Number of Farms, and Average Size of Farm by County

County	Farmland (acres)	Percent of County	Number of Farms	Average Size of Farms (acres)
Dane, WI	504,420	66	2,749	183
Grant, WI	587,587	80	2,436	241
Iowa, WI	350,813	72	1,588	221
Lafayette, WI	368,501	91	1,252	294
Clayton, IA	398,022	78	1,577	252
Dubuque, IA	291,441	74	1,462	199

Data were obtained from USDA Census of Agriculture (2012).

Table 3.10-2. Selected Agricultural Product Totals for Each County

County	Corn (acres planted)	Soybeans (acres planted)	Alfalfa (acres harvested)	All Cattle and Calves (head)	Hogs and Pig Inventory (head)*
Dane, WI	193,500	86,900	24,300	135,000	27,872
Grant, WI	162,500	73,500	33,300	175,000	54,798
Iowa, WI	77,000	49,100	18,000	93,000	2,918
Lafayette, WI	138,000	59,700	26,000[†]	110,000	14,267
Clayton, IA	151,000	57,800	20,000	70,000	261,084
Dubuque, IA	151,500	40,600	25,000	135,000	137,271

Data were obtained from USDA NASS (2017c).

* 2012 data used, as these are the most current available.
[†] Most recent data available are 2016 data.

Soil is the foundation of agricultural production as it not only provides the physical medium for growing plants, but also supplies the nutrients and moisture required for healthy plant growth. In an effort to identify the extent and location of important farmlands, the NRCS, in cooperation with other interested Federal, State, and local government organizations, has inventoried lands that can be used for the production of the nation's food supply. Farmland is a unique resource and lands with the highest productivity potential are classified by the NRCS as Prime Farmland, Unique Farmland, or Farmland of Statewide or Local Importance (USDA NRCS 2019a). Only Prime Farmland and Farmland of Statewide Importance classifications occur within the analysis area. These classifications are defined as follows:

> *Prime Farmland: is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil quality, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. The water supply is dependable and of adequate quality. Prime farmland is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent.*

> *Farmland of Statewide Importance: is land that does not meet the criteria for prime or unique farmland, but is determined by the appropriate State agencies as lands that are used for the production of food, feed, fiber, forage, and oilseed crops. Generally, this land includes areas of soils that nearly meet the requirements for prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some areas may produce as high a yield as prime farmland if conditions are favorable. Farmland of statewide importance may include tracts of land that have been designated for agriculture by State law.*

Acres of prime farmland range from approximately 300 to 879 within the analysis area. An additional 4 to 6 acres are within the analysis area for the proposed substation. Acres of farmland of statewide importance range from approximately 426 to 654 within the analysis area, and an additional 4.7 acres are within the analysis area for the proposed substation.

The Conservation Reserve Program (CRP) provides technical and financial assistance to eligible landowners to address soil, water, and related natural resource concerns on their lands in an environmentally beneficial and cost-effective manner. The CRP reduces soil erosion, protects the Nation's ability to produce food and fiber, reduces sedimentation in streams and lakes, improves water quality, establishes wildlife habitat, and enhances forest and wetland resources. It encourages farmers to convert highly erodible cropland or other environmentally sensitive acreage to vegetative cover, such as tame or native grasses, wildlife plantings, trees, filterstrips, or riparian buffers. In addition, farmers receive an annual rental payment for the term of the multi-year contract (USDA NRCS 2019b). Locations of lands enrolled in CRP programs are confidential and NRCS would not make the data available for use in this analysis, but based on information provided during public comments on the DEIS, CRP lands are known to occur in the analysis area.

The Wisconsin Managed Forest Law (MFL) program is a financial incentive program that encourages sustainable forestry on private woodlands. In exchange for implementing sound forest management practices, the landowner pays reduced property taxes. Management practices include: harvesting timber according to sound forestry standards, thinning plantations and natural stands for merchantable products, releasing trees from competing vegetation, tree planting to maintain necessary forest density, treating before and after harvest to ensure adequate forest regeneration, and controlling soil erosion (WDNR 2017b).

3.10.1.3 RECREATION AREAS

Various developed and undeveloped outdoor recreational facilities exist within the vicinity of the project. These include state parks, trails, wildlife and natural areas, and the Refuge. Recreation areas provide various recreation opportunities including canoeing, kayaking, biking, bird-watching, fishing, camping, geocaching, and other outdoor activities (Trout Unlimited 2017). The recreational areas presented below overlap the analysis area or were raised as a concern during the public scoping period.

3.10.1.3.1 Black Earth Creek Wildlife – Sunnyside Unit

The Black Earth Creek Wildlife Area, Sunnyside Unit is a 292-acre designated county wildlife area in Dane County. This area is open to public hunting (all types), and other activities such as fishing, hiking and cross-country skiing (Dane County Parks 2018).

3.10.1.3.2 Blackhawk Lake Recreation Area

Blackhawk Lake Recreation Area consists of over 2,050 acres, including the lake, recreation areas, and designated wildlife areas. Blackhawk Lake is a 220-acre human-made lake with a maximum depth of

42 feet, which offers fishing and other recreational opportunities. The recreation areas include 150 campsites, cabins, picnic shelters, fishing piers, sand beach, sand volleyball courts, playgrounds, hiking trails, and boat launches. Hunting is permitted in the designated wildlife areas. The Blackhawk Lake Recreation Area is owned by the WDNR with an operational easement granted to Iowa County (Blackhawk Lake Recreation Area 2018).

3.10.1.3.3 Governor Dodge State Park, Pleasant Ridge – Driftless Area

Located outside 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. The park offers camping, picnicking, hiking, canoeing, biking, hunting, fishing, off-road biking, cross-country skiing, and horseback riding within Wisconsin's Driftless Area. In fiscal year 2016, the total attendance of Governor Dodge State Park was 496,847 (WDNR 2018h).

The park 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, red pine, and Jack pine, and the spring wildflowers of the forests include bloodroot, 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 2018h).

3.10.1.3.4 Ice Age National Scenic Trail And The Ice Age Complex at Cross Plains

The Ice Age NST is one of 11 National Scenic Trails occurring entirely within Wisconsin and is one of 42 designated Wisconsin state trails and the only one designated as a State Scenic Trail. Highlighting unique glacial features, the trail is a 1,200-mile footpath that traverses 31 counties with endpoints in Interstate State Park in St. Croix Falls, Polk County and Potawatomi State Park in Sturgeon Bay, Door County. The trail provides opportunities for people to immerse themselves in a large natural landscape, enjoy outdoor education and recreation, and experience expansive views that provide a visual display between unglaciated driftless areas and lands shaped by continental glaciation. Activities permitted along the trail include hiking, backpacking, snowshoeing, and cross-country skiing. Additionally, biking and motorized vehicles are permitted in a few designated sections. The Ice Age NST is meant to connect people and communities crossing private lands; city and state parks; county, state, and national forests; as well as many state wildlife, fishery, and natural areas (Ice Age Trail Alliance 2018; WDNR 2018i).

The lands and landscape of the Ice Age Complex have been deemed nationally significant under two related, but distinct, Federal designations. The first enacted in 1964 created the Ice Age National Scientific Reserve as a network of distinct areas, one of which is the Cross Plains unit, each exhibiting an example of one type of landscape or landform resulting from continental glaciation. The second enacted in 1980 amended the National Trails System Act to authorize and establish the Ice Age National Scenic Trail as a component of the National Trails System. The Complex is a 1,700-acre unit of the NPS located west of Madison, southeast of Cross Plains, and south of Highway 14. Within the Complex are lands owned and managed by the NPS, the WDNR, Dane County Parks, the USFWS, the Ice Age Trail Alliance, and private citizens. The Ice Age Complex at Cross Plains, Wisconsin also includes the interpretive site for the Ice Age NST (NPS and WDNR 2013). The intent of the Complex is to provide visitors with interpretation of its evolution from the last glacial retreat, with opportunities to enjoy low impact outdoor recreation. There is currently no visitor infrastructure at the Complex other than parking along an existing road, an old farmhouse, and a barn. Current development plans include the installation of a new sustainable visitor center, new protected Ice Age NST segments, additional interpretive and recreational sites, administrative and maintenance facilities, and expansion to complete the park out to State Highway 14. The NPS is slated to work with WDNR, Dane County Parks, and the USFWS to develop a Use Management Plan, which will identify locations for visitor infrastructure. Once completed, the NPS anticipates up to 250,000 annual visitors per year at the Ice Age Complex (NPS 2017a).

3.10.1.3.5 Military Ridge State Trail

The 40-mile Military Ridge State Trail in Iowa and Dane Counties, Wisconsin, connects Dodgeville and Madison by way of an 1855 military route. The trail runs along the southern borders of Governor Dodge and Blue Mound State Parks passing by agricultural lands, woods, wetlands, and prairies. Most of the trail follows the former Chicago and North Western Railroad corridor, which has a gentle grade of only 2% to 5%. Between Dodgeville and Mount Horeb it runs along the top of the Military Ridge, the divide between the Wisconsin River watershed to the north and the Pecatonica and Rock River watershed to the south. Between Mount Horeb and Fitchburg, the trail goes through the Sugar River valley.

Recreational opportunities include several observation platforms adjacent to the trail for viewing wildlife and other natural features, and in Ridgeway, the trail passes by a historic railroad depot. Additionally, the level grade and smooth limestone and asphalt surfaces make this 40-mile trail suitable for bicyclists, walkers, and joggers. The 2.5-mile section between Fitchburg and Verona has been paved with asphalt making it suitable for in-line skating. In winter, snowmobiles are permitted on the limestone section of the trail, but not the paved asphalt section (WDNR 2018j).

3.10.1.3.6 Upper Mississippi River National Wildlife and Fish 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. It is an important habitat for migratory birds, fish, and other wildlife, as well as many species of plants (USFWS 2013). The Refuge is also an important area for tourists. The area receives nearly 3.7 million annual visits (USFWS 2006a).

Pool 11 of the Upper Mississippi River extends 32.1 miles from Lock and Dam 11 in Dubuque, Iowa, to Lock and Dam 10 in Guttenberg, Iowa. Pool 11 contains 19,875 acres of aquatic habitat and the upper and middle portions of the pool contain many islands, side channels, and backwaters while the lower pool is a broad expanse of open water. Pool 11 encompasses the majority of the natural river floodplain and is bounded by limestone bluffs. Major tributaries that enter the Mississippi River in Pool 11 are the Turkey and Little Maquoketa Rivers in Iowa and the Grant and Platte Rivers in Wisconsin.

Pool 11 is also part of the Upper Mississippi River Restoration (UMRR) Program. The UMRR Program was the first environmental restoration and monitoring program undertaken on a large river system in the United States. The UMRR Program has come to be recognized as the single most important effort committed to ensuring the viability and vitality of the Upper Mississippi River System's diverse and significant fish and wildlife resources. This systemic program provides a well-balanced combination of habitat restoration activities, along with monitoring and research (USACE Rock Island District 2017).

Recreational uses of this area are varied and include hunting, fishing, wildlife observation and photography, boating, camping, and beach-related uses. Hunting for big-game, upland game, and migratory waterfowl are common uses. Fishing is also common in this area with several fishing tournaments hosted annually. Additionally, there is a long history of beach use on the Upper Mississippi River as the public takes advantage of beach areas created by placement of dredged sand during navigation and maintenance operations (USFWS 2006a).

3.10.1.3.7 Pecatonica State Trail

Running 10 miles through the picturesque Bonner Branch Valley, this County-operated trail links Belmont with the 47-mile Cheese Country Trail in Calamine, Wisconsin. The Pecatonica State Trail follows the old Milwaukee Road railroad corridor. Trail activities include horseback riding, walking, and bicycling. The use of all-terrain vehicles, off-highway motorcycles, and snowmobiles is permitted on the trail (WDNR 2017c).

3.10.1.4 NATURAL AREAS

3.10.1.4.1 Thompson Memorial Prairie Natural Area

Thompson Memorial Prairie State Natural Area is the only designated State Natural Area to occur within the ROW and analysis area. State Natural Areas protect outstanding examples of Wisconsin's native landscape of natural communities, significant geological formations, and archeological sites. Encompassing nearly 400,000 acres, Wisconsin's 687 natural areas are valuable for research and educational use, 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 2018k).

3.10.1.4.2 Southwest Wisconsin Grassland and Stream Conservation Area

The Southwest Wisconsin Grassland and Stream Conservation Area (SWGSCA) is a WDNR landscape-based initiative to work with a diverse group of partners to enhance functioning grassland, savanna, and stream ecosystems in southwest Wisconsin. This region of Wisconsin contains numerous prairie remnants of tallgrass prairie and oak savanna that provide habitat for various grassland species. The SWGSCA project area covers approximately 473,900 acres in Dane, Green, Iowa, and Lafayette Counties. The goals of the SWGSCA are to protect 12,000 acres through acquisition and easements to protect, restore, and manage priority natural communities and associated rare species, provide compatible recreational and educational opportunities and appreciation of the area's cultural history, help sustain the area's rural agricultural landscape, encourage ecologically friendly development, and promote appreciation of historical, cultural, and archaeological resources (WDNR 2009). Currently no known lands that are included in the SWGSCA are within the analysis area, but areas that are targeted for conservation through this program do overlap.

3.10.1.4.3 Public Access Areas

The Remnant Fishery Habitat (REM) Little Platte River and REM Otters Creek fishery areas occur within the analysis area. REM areas protect individual tracts of land of fish habitat for cold-water species. These usually occur in widely scattered areas along trout streams and include the most important spawning areas and springs. These areas are a part of the 500 existing Wisconsin state parks and trails, flowages, fishery, wildlife, state forest, and rivers projects that preserve valuable natural areas and wildlife habitat, protect water quality and fisheries, and expand opportunities for outdoor recreation. The REM Little Platte River and REM Otters Creek fishery areas are funded by the Knowles-Nelson Stewardship Program (WDNR 2018l).

3.10.1.4.4 Other Conservation Land Uses

Several conservation easements and parcels managed for land conservation occur within the analysis areas. These lands could be private conservation easements or associated with agency conservation programs such as the WDNR Landowner Incentive Program, IDNR Resource Enhancement and

Protection program, or other various USDA conservation programs. Conservation lands are managed to maintain and enhance the health and diversity of habitats by working with landowners and organizations to protect and preserve areas through land management practices. Examples of conservation lands include the Thomas Tract, easements held by Driftless Area Land Conservancy, and other conservation easements.

3.10.1.5 COMPREHENSIVE LAND USE PLANS/DESIGNATIONS

Zoning is a regulatory device used by local governments to geographically restrict or promote certain types of land uses. Local governments in Iowa have siting authority for transmission lines that cross into municipal boundaries, but siting authority in Wisconsin is held by the PSCW (IUB n.d.; Ramirez 2018).

County comprehensive plans for Dane, Grant, Iowa, Lafayette, Clayton, and Dubuque Counties, as well as municipal plans for Mount Horeb, Cassville, Barneveld, and Montfort were reviewed for policies or recommendations for power line ROWs and siting of transmission lines. The Dane County plan includes the need to develop procedures and standards to ensure that any future siting decisions for energy generation, transmission, and distribution facilities will be evaluated to ensure consistency with community and regional development objectives, and the overall protection of public health, safety and the environment (Dane County 2012). Additionally, the Mount Horeb plan includes strategies for promoting electric transmission and high-speed technology to promote local businesses and promotes corridor sharing or the use of existing linear ROWs to minimize the amount of land affected by new easements (Village of Mount Horeb 2015). The Iowa County plan included municipal land use policies for Dodgeville and Ridgeway. Both towns include provisions limiting or prohibiting the placement of power lines across productive farmlands in a manner that would disrupt farming activities (Iowa County 2005). There are no municipalities within the Iowa portion of the analysis area.

Several local communities in Wisconsin and Iowa have expressed concerns and opposition to the C-HC Project, including the signing of resolutions stating the same. Communities that have provided comment letters and resolutions during the scoping and DEIS public comment periods include:

- City of Platteville, WI
- Town of Arena, WI
- Town of Belmont, WI
- Town of Springdale, WI
- Town of Vermont, WI
- Mount Horeb Village, WI
- City of Dubuque, IA.

3.10.2 *Environmental Consequences*

This section describes impacts to land use, including agriculture and recreation, associated with the construction, operation, and maintenance of the C-HC Project. Impacts to land use are discussed in terms of changes to land cover classes, farmland categories, and areas used for recreational purposes.

3.10.2.1 DATA SOURCES, METHODS, AND ANALYSIS ASSUMPTIONS

The following impact indicators were considered when analyzing impacts to land use:

- Acres of disturbance within designated prime farmland, unique farmland, or farmland that is of state or local importance.
- Acres of disturbance within specially designated lands, including state parks, Ice Age National Scenic Trail, and Military Ridge Trail.
- Qualitative descriptions of consistency or inconsistency with local land use plans and ordinances.
- Qualitative descriptions of other potential land use conflicts.

Land use and land cover data were obtained from the USGS NLCD (USGS 2011). These datasets were overlaid with the C-HC Project alternative ROWs, analysis areas, and substation footprints to determine acres of overlap in land cover classes and farmland designations.

Permanent acres of disturbance for the transmission line structures were calculated using known number of structures per action alternative multiplied by the known maximum area of disturbance (113 square feet) for each structure. This number was then converted to acres by dividing by a conversion factor of 43,560.

Publicly available GIS information was gathered for recreation and natural areas within the C-HC Project analysis area. These datasets were overlaid with the C-HC Project alternative ROWs, analysis areas, and substation footprints to determine areas and acres of overlap for each recreation and natural area.

Table 3.10-3 defines the impact thresholds for defining impacts to land use. These thresholds are used throughout this section to characterize the intensity of impacts that are estimated for each action alternative.

Table 3.10-3. Impact Thresholds and Descriptions for Land Use, including Agriculture and Recreation

	Minor Impact	Moderate Impact	Major Impact
Land Use, Including Agriculture and Recreation	Other than at the footprint of project features (e.g., transmission structures, substations, access roads), previous land uses would continue without interruption. Existing land uses such as agriculture, grazing, and special use areas might experience temporary construction-related disturbances and intermittent, infrequent interruptions from operation and maintenance. There would be no conflicts with local zoning. For recreation, the same site capacity and visitor experience would remain unchanged after construction.	Previous land uses | (e.g., agriculture, grazing, and special use areas) would be diminished or required to change on a portion of the project area, to be compatible with the C-HC Project. Only a few parcels within the project area would require zoning changes to be consistent with local plans. Some parcels within the project area (e.g., transmission ROW, substation, access roads) might require a change in land ownership through purchases or condemnation. For recreation, the visitor experience would be slightly changed but would still be available.	More than 25% of the project area (e.g., transmission ROW, substations, access roads) would require a change in land ownership through purchases or condemnation. All land use (e.g., agriculture, grazing, and special use areas) on these parcels would be discontinued. Most parcels of land within the project area would require zoning changes to be consistent with local plans. For recreation, visitors would be displaced to facilities at other regional or local locations and the visitor experience would no longer be available at this location.

3.10.2.2 NO ACTION

Under the No Action Alternative, the proposed Project would not be built, and there would be no impacts on land use, including agriculture and recreation.

3.10.2.3 IMPACTS COMMON TO ALL ACTION ALTERNATIVES

This section discusses potential impacts on land use within the analysis area as a result of the construction and operation of any of the action alternatives. Common impacts to all alternatives are categorized into the following groups: land cover, agricultural lands, recreational areas, natural areas, and comprehensive land use plans/designations.

3.10.2.3.1 Land Cover

Temporary impacts would occur during construction to land cover types within the ROW. Impacts would result from vegetation clearing, transporting materials to and from construction sites, and construction of transmission line structures, substation, and support facilities (e.g., laydown yards, access roads, etc.). Impacts would be localized within the ROW and would include rutting, soil mixing, soil compaction, and the potential spread of invasive plant species, plant disease, and/or pest species. Land cover change would be temporarily altered at support laydown yards and access roads, but would be reclaimed to previous conditions once construction has completed.

Permanent impacts to land cover types would occur as a result of the C-HC Project within the ROW. Impacts would result from vegetation clearing and the construction of transmission line structures, substation, and support facilities. Impacts would be localized within the ROW and would include permanent land cover change. Land cover change would be permanently altered from current land use conditions to a developed land cover for utility purposes at transmission line structure locations and the Hill Valley Substation site.

The agricultural land cover type would be temporarily and permanently impacted as a result of the C-HC Project. Temporary minor impacts as described above would occur during construction, but once construction is complete most of the ROW in this land cover type would return to existing conditions. At transmission line structure locations and the Hill Valley Substation location, permanent land cover type would change from agricultural land cover to a developed land cover for utility purposes.

The forest land and shrubland cover types would be permanently impacted as a result of the C-HC Project. Temporary impacts as described above would occur during construction. Additionally, in this landscape, trees, shrubs, and brush would be cleared for the full width of the ROW to facilitate construction equipment access and ensure safe clearances between vegetation and the transmission line. Permanent major impacts would result from a permanent change in land cover type from forest and shrubland to grassland in much of the ROW and to developed land cover at transmission line structures. Additional impacts to forested areas managed for timber production would result in long-term loss of timber value and area for regeneration of timber products. Per Wisconsin (Wis. Stat. Sec. 182.017(7)(e)) and Iowa regulations (IUB 2018), the handling and valuation of timber is part of the real-estate and acquisition process and the landowner would be compensated for the timber removed for the ROW. The spread of disease such as oak wilt or spread of pest species such as emerald ash borer or gypsy moth could result from construction activities in these areas.

Grassland cover type would be temporarily and permanently impacted as a result of the C-HC Project. Temporary minor impacts as described above would occur during construction, but once construction is complete most of the ROW in this land cover type would return to existing conditions. At transmission line structure locations permanent land cover type would change from grassland cover to a developed land cover for utility purposes. See Section 3.3 Vegetation, including Wetlands and Special Status Plants, for a detailed discussion of non-native, invasive plant species and potential impacts to grassland cover types from invasive species.

Urban areas are already considered developed areas and therefore no impacts to land cover in these areas are anticipated from the construction and operation of this project.

Wetlands and open water would also be impacted during construction; although the Utilities would work to avoid construction activities in these areas where possible. See Sections 3.3 and 3.5 for a detailed discussion of wetlands and open water and the potential impacts to these areas.

The implementation of environmental commitments would reduce the temporary impacts. Environmental commitments to prevent the spread of invasive species, plant disease, and pest species would be implemented as needed. Best management practices for soils would be implemented to mitigate impacts to soil mixing, soil compaction, and rutting. See Table 3.1-4 for a complete list of environmental commitments and Appendix D for a description of best management practices.

3.10.2.3.2 Agricultural Lands

Between 66% and 91% of the land base in the analysis area is used for agricultural purpose (see Table 3.10-1). Existing agricultural activities taking place within the ROW are likely to experience temporary and localized interruptions during construction. Impacts to agricultural operations, prime farmland, and farmland of statewide importance would result from ROW clearing and maintenance, transporting materials to and from construction sites, and construction of transmission line structures, substation, and support facilities (e.g., laydown yards, access roads, etc.). Impacts to agricultural operations would include temporary loss of use of lands within the ROW, interference with movement of machinery and equipment, irrigation implements, obstacles for aerial seeding and spraying, and interference with the movement of livestock for grazing. Additionally, livestock grazing would need to be restricted within the ROW until after construction is complete to allow grass to reestablish. Potential crop loss could occur depending on the crop type and construction timing. Impacts on prime farmland and farmland of statewide importance within the ROW would include soil mixing, rutting, and soil compaction.
Once construction and reclamation are complete, agricultural activities would resume within the ROW and under the power line. Impacts would be minimized by providing compensation to landowners and restoring agricultural lands where practicable by using techniques such as topsoil replacement and deep tilling. Additionally, the Utilities would coordinate with landowners to schedule construction activities to minimize disturbances to farming operations and crop growing cycles.

Long-term impacts would occur at transmission line structure locations and the Hill Valley Substation site where agricultural lands would be permanently converted for utility use. Additionally, when transmission line structures are located within croplands, an area larger than the foundation is lost from production due to large equipment being unable to maneuver close to these structures without risking damage. The exact acres lost depends on the size of the foundation, the size and maneuverability of farm equipment, and existing cropping patters (Wisconsin Department of Agriculture 2019). However, long-term impacts would be minimized by siting along fence lines, between fields, or along existing public ROWs. This would minimize loss of tillable or grazing lands and associated interference with equipment operation. Additionally, property owners would be consulted to accommodate property owner needs to the extent practicable.

Additional impacts to organic farming could occur due to siting and construction of the project that could jeopardize the farm's organic status. The introduction of foreign plant species or chemicals could occur from construction equipment moving through the area and ROW clearing activities. These impacts would be reduced by coordinating with the landowner on siting to ensure buffers between the power line and farm are maintained, washing construction equipment prior to entering the property, and not using herbicides as vegetation control measures within the ROW. Impacts from herbicide drift could occur to organic farms if herbicide used within the ROW on neighboring properties moves onto organic crops.

This could result in crop damage and impact the farm's organic status. Herbicide drift occurs in three ways: particle drift, vapor drift, and contaminated soil drift; however, contamination or damage from contaminated soil drift is unlikely to occur as herbicide particles readily bind to soil particles and do not separate easily to be absorbed by plant foliage (Al-Khatib 2019). Impacts from particle drift or vapor drift are considered to be negligible as herbicides would be applied by a Certified Pesticide Applicator and all USEPA product label requirements would be followed. These measures have been shown to be effective in preventing herbicide drift (Al-Khatib 2019).

Impacts to CRP lands would primarily be financial. Each transmission structure located in CRP lands could require that 0.1 acre be removed from the contract. A repayment of past payments, damages, and interest on the removal area would need to be paid. If the transmission line requires the removal of trees and the CRP contract requires that trees remain, the area where the trees would be removed would also need to be removed from the contract and previous CRP payments, damages, and interest paid. If the CRP land is acquired through eminent domain, the repayment would not be required (PSCW 2019). As CRP lands are managed for environmental enhancements that reduce soil erosion, protect the Nation's ability to produce food and fiber, reduce sedimentation in streams and lakes, improve water quality, establish wildlife habitat, and enhance forest and wetland resources, additional impacts could result if the proposed project interferes with these practices or causes land parcels to be removed from the CRP.

Impacts to MFL lands would primarily be financial if the proposed project ROW removed an amount of productive forest that would result in the property being dropped from the program. Loss of MFL eligibility could have long-term impacts on land value and tax incentives; however, the Utilities would work with landowners to compensate for monetary losses including net present value of the loss of future tax savings that would have been realized had the land remained in the program (PSCW 2019).

3.10.2.3.3 Recreation Areas

Temporary impacts to recreation areas and recreational users would occur during the construction activities for the C-HC Project. Construction of the project is not expected to permanently impede the use of or access to any existing recreation opportunities or activities, but some short-term impacts to these resources would occur during construction activities. Impacts to recreation areas would include disruption of recreational activities from construction activities and movement of construction materials and workers. Impacts to recreational users at established recreation areas would include industrial noise from construction activities, increase in traffic from construction vehicles, equipment and workers, dust from construction activities, wildlife disruption, and viewshed enjoyment.

Permanent impacts to recreation areas and recreational users would occur in limited areas within the analysis area. Where the project does not follow existing ROWs, the recreation setting would change from the existing conditions of undeveloped landscape to a developed landscape. Visual impacts to recreational users from a newly constructed high-voltage power line would occur (see Section 3.11 for more details). Additionally, recreational opportunities and recreational pursuits would still be available where authorized within the ROW but would no longer be permitted in the footprints of the towers and substation.

The Ice Age National Scenic Trail corridor, which generally runs north to south in the vicinity of the C-HC Project, overlaps the analysis area for all alternatives of the C-HC Project, which generally runs east to west in the vicinity of the trail. Adverse impacts would occur from the all action alternatives to the Ice Age NST and recreational users on this trail system. Temporary impacts would occur from the presence of construction equipment and employees, noise from construction activities, and ground disturbance near segments of the Ice Age NST. These activities would impact recreational users' experiences during the construction period. Once construction is complete, the presence of the

transmission line would adversely impact the character of the Ice Age NST where there is overlap with the analysis area creating visual impacts to trail users. Because portions of the Ice Age NST have not been built within the vicinity of the C-HC Project, it is difficult to identify specific locations where the C-HC Project would cross the trail. Additional details for how the C-HC Project would potentially cross-existing and proposed segments of the Ice Age NST are provided in Section 3.11 (see Figure 3.11-11).
The primary adverse impacts to recreation users along the trail would be from viewing the C-HC Project while using the trail or viewing the landscape from scenic overlooks at the Cross Plains Complex. Refer to Section 3.11, Visual Quality and Aesthetics, for additional details.

3.10.2.3.4 Natural Areas

There are lands throughout the analysis area that are considered conservation lands. However, easements typically remain in private ownership and as such information about the specific location and scope of potential impacts to these resources is limited. The Utilities would coordinate with landowners and agencies administering conservation land programs on a site-by-site basis to minimize impacts to conservation lands and associated management of these properties.

3.10.2.3.5 Comprehensive Land Use Plans/Designations

The project would extend through multiple municipal jurisdictions and would cross lands in zoning districts where transmission line ROW development is not prohibited. Under the applicable zoning ordinances and comprehensive plans, transmission lines are either a permitted or conditional use in all jurisdictions traversed by the proposed ROW. However, the construction and operation of the C-HC Project could be inconsistent with the development goals of local communities, which include preserving the natural character of the area, small-town feel of the community, and emphasis of local resources and features such as trails and historic areas. All applicable zoning and land use approvals would need to be obtained prior to construction.

The C-HC Project would require ROW easements from private property owners, which could encumber the ROW area with land use restrictions. Each easement would specify the present and future right to clear the ROW and to keep it clear of all trees, whether natural or cultivated; all structure-supported crops; other structures; brush; vegetation; and fire and electrical hazards, with the exception of non-structure supported agricultural crops less than 10 feet in height.

3.10.2.4 ALTERNATIVE 1

3.10.2.4.1 Land Cover

Temporary minor impacts would occur to agriculture, grassland, and barren land cover classes as a result of the C-HC Project. Areas within the ROW, access roads, and laydown yards would return to existing conditions in these land cover types with only the areas in the transmission line structure and substation footprints being permanently affected (Table 3.10-4).

Permanent major impacts would occur to forest and shrubland land cover types as these areas within the ROW would be cleared prior to construction and low vegetation would be maintained throughout the life of the project, resulting in a permanent change from forest and shrubland land cover to grassland land cover type in these areas. Permanent major impacts would also occur to land cover types at transmission line structure and substation footprints where existing land cover would be converted to a developed area (see Table 3.10-4).

Table 3.10-4. Land Cover Class Acreage for Alternative 1

	Within ROW	Outside ROW and within Analysis Area	Hill Valley Substation	Access Roads	Laydown Yards
Total Analysis Area	**1,891**	**1,699**	**22**	**204**	**213**
Land Cover Class					
Agriculture	868	792	22	100	106
Forest	524	496	0	11	0
Grassland	228	153	0	40	0
Urban	73	62	0	44	0
Barren	64	106	0	0	107
Shrubland	10	6	0	0	0
Wetlands	110	73	0	4	0
Open Water	15	10	0	0	0

Retirement of the N-9 Transmission Line and Construction of a New 69-kV Tap Line

Temporary impacts would occur to land cover types within the ROW during decommissioning and construction of the tap line. Impacts would result from vegetation clearing, transporting materials to and from decommissioning/construction sites, deconstruction of transmission line structures, and building on the tap line. Impacts would be localized within the ROW and access roads. Table 3.10-5 shows land coverage acreage for the N-9 line and tap line by land ownership. The land cover designated as urban/developed along the Refuge is associated where the existing access road overlaps with Oak Road.

Table 3.10-5. Primary Land Cover Classes within the N-9 Decommissioning and Tap Line Area

	Refuge (acres)	Private Land (acres)	Transportation ROW (acres)	Total (acres)
Total Analysis Area	**21.5**	**12.3**	**1.5**	**35.3**
Agriculture	2.0	2.8	0.1	4.9
Forest	0.0	0.4	0.0	0.4
Grassland	1.6	5.2	0.6	7.4
Urban/Developed	0.6	0.3	0.4	1.3
Shrubland	0.1	3.4	0.3	3.8
Wetlands	17.2	0.0	0.0	17.2

Grassland and shrubland cover types would be temporarily and permanently impacted as a result of the decommissioning of the N-9 transmission line and construction of the 0.2-mile tap line. Temporary minor impacts as described above would occur during construction and decommissioning, but once these activities are complete most of the ROW in this land cover type would return to shrubland and forested conditions over time, unless the landowners continued to maintain vegetation within the decommissioned ROW as grassland. In the case of the Refuge, the ROW would be revegetated with the goal of returning to a forested landscape, consistent with the adjacent landcover.

Wetlands and open water would also be impacted during construction and decommissioning, although the Utilities would work to avoid construction activities in these areas where possible. Construction mats and temporary bridges would be used in wetlands to help mitigate impacts.

All current land uses along the decommissioned transmission line would return to their original land uses after the structures and conductors are removed. Once the structures are removed and the ROW easements are retired, there would be long-term beneficial impacts to vegetation because the retired ROW would be allowed to naturally revegetate outside of the Refuge and would be revegetated within the Refuge through a coordinated planning effort with the USFWS and USACE. Over the long term, the vegetation communities would be consistent with surrounding land uses.

Minor, long-term impacts to land use and land cover would occur as a result of construction of the 0.2-mile tap line, most of which is classified as grassland and/or is managed as transportation ROW. Long-term minor impacts from the tap line would include less than 1 acre that would be permanently removed from grassland cover for the new transmission line structures.

3.10.2.4.2 Agricultural Lands

Temporary minor impacts would occur to prime farmland and farmland of statewide importance during construction activities within the ROW (Table 3.10-6). These would include soil mixing, rutting, and soil compaction. However, these areas would be restored to existing conditions except within the transmission line structure footprints.

Permanent major impacts would occur to prime farmland and farmland of statewide importance at transmission line structures and within the Hill Valley Substation where existing farmland would be converted to a developed utility use (see Table 3.10-6).

Table 3.10-6. Acres of Farmland by Farmland Classification for Alternative 1

	Prime Farmland	Farmland of Statewide Importance
Total Analysis Area	**1,891**	**1,699**
Temporary Disturbance within ROW	372	510
Temporary Disturbance from Access Roads	27	43
Temporary Disturbance from Laydown Yards	0	0
Permanent Disturbance from the Transmission Line	>1	>1
Permanent Disturbance from the Hill Valley Substation Option 1	11	11
Outside ROW within 300 feet analysis area	301	426

Retirement of the N-9 Transmission Line and Construction of a New 69-kV Tap Line

While there are soils classified as prime farmland and farmland of statewide importance within the analysis area, these areas are not managed for agricultural use. These soils are within the Refuge and within the transportation ROW; therefore, the land is not expected to be used for agricultural purposes in the future. Therefore, no impacts to prime farmland or farmland of statewide importance would result from the decommissioning of the N-9 transmission line and construction of the 0.2-mile tap line.

3.10.2.4.3 Recreation Areas

Table 3.10-7 summarizes the area of overlap of recreational areas and the C-HC Project ROW and analysis area.

Table 3.10-7. Acres of Overlap with Recreational Areas for Alternative 1

	Within ROW	Outside ROW within 300 feet Analysis Area
Black Earth Creek Wildlife Area, Sunnyside Unit	9	9
Blackhawk Lake Recreation Area	9	8
Governor Dodge State Park	0	0.06
Refuge	44	6

Temporary minor impacts would occur to the Black Earth Creek Wildlife Area, Sunnyside Unit, during construction. Construction activities would detract from the recreational user experience; however, Alternative 1 would occur in an existing power line ROW. Therefore, no permanent impacts to the recreational area or users is anticipated.

Temporary minor impacts would occur to the Blackhawk Lake Recreation Area during construction. Construction activities would detract from the recreational user experience north and west of the lake power line ROW within the Blackhawk Lake Recreation Area. Therefore, no permanent impacts to the recreational area or user is anticipated.

Temporary minor impacts would occur to the Governor Dodge State Park during construction. Whereas the project ROW follows an existing rural road north of the Park, there is currently not a major utility line ROW in this area, so land-clearing activities would occur in forested areas limiting access to these areas during construction. Construction activities would likely impact recreational experience on the north side of the Governor Dodge State Park temporarily. The duration of the impact would last as long as construction occurs in this area. Permanent minor impacts would occur as a new high-voltage power line through this area would change the character of the local vicinity, just north of the park. The transmission line would not be visible from key observation points within the park.

Temporary moderate impacts would occur to the Refuge during construction. Approximately 44 acres of new ROW would be constructed through the Refuge under Alternative 1. Alternative 1 would adversely impact recreational users during construction by limiting access to a small portion of the Refuge and the Mississippi River, introducing noise from construction equipment and contractors, changing the land use of the ROW area, and altering the visual environment from an undeveloped landscape to a developed landscape. Most of these adverse impacts would last the duration of construction. Recreation activities are expected to return to preconstruction levels after construction ends. Permanent moderate impacts would occur in the Refuge from the C-HC Project as the character of the area near Oak Road would be changed and user experience would be impacted. However, beneficial impacts would also occur to the Refuge under Alternative 1. The existing transmission line ROW near the Stoneman would be removed and reclaimed. Decommissioning and removing the existing utility line would limit users access and recreational opportunities to this area during reclamation activities. However, reclamation of this area to pre-existing conditions would enhance user experiences in this area by providing an undeveloped landscape over the long term.

Retirement of the N-9 Transmission Line and Construction of a New 69-kV Tap Line

Decommissioning and removing the existing utility line would limit user access and recreational opportunities within this portion of the Refuge during the 2-month decommissioning period. Recreational uses typically decline in the winter months to a few trappers and upland game and deer hunters in this area. However, reclamation of this area to pre-existing conditions would enhance user experiences in this area by providing an undeveloped landscape over the long term.

3.10.2.4.4 Natural Areas

Table 3.10-8 summarizes the area of overlap of natural areas and the C-HC Project ROW and analysis area.

Table 3.10-8. Acres of Overlap with Natural Areas for Alternative 1

	Within ROW	Outside ROW within 300 feet of Analysis Area
REM – Otters Creek Fishery Area	0.5	0.4
SWGSCA	11.7	13.0

Temporary major impacts would occur to the Otters Creek Fishery Area during construction. Alternative 1 would create a new utility ROW through this area, which would impact recreational users during construction by limiting access to the ROW, changing the land use of the ROW area, and altering the visual environment from an undeveloped landscape to a developed landscape. Permanent major impacts would occur in the new utility ROW as the character of this area would be changed, wooded areas would be cleared, and user experience would be impacted. The retirement of the N-9 transmission line and construction of the new tap line would not impact any natural areas, as defined in Section 3.10.1.4 above.

Negligible impacts would occur to the SWGSCA from construction of the C-HC Project. Alternative 1 would cross approximately 11.7 acres southeast of Montfort, Wisconsin, just inside the SWGSCA project area. The maintenance of the ROW would not hinder the stated goals of the SWGSCA as lands would be reclaimed to previous conditions including grassland and agricultural use. This area is not known to be currently enrolled in the SWGSCA, but as this area is included in the overall project boundary of lands targeted for this program, minor long-term impacts would occur if the operation of the C-HC Project were to hinder or preclude this area for enrollment.

3.10.2.5 ALTERNATIVE 2

3.10.2.5.1 Land Cover

Temporary minor impacts would occur to agriculture, grassland, and barren land cover classes as a result of the C-HC Project. Areas within the ROW, access roads, and laydown yards would return to existing conditions in these land cover types with only the areas in the transmission line structure and substation footprints being permanently affected (Table 3.10-9).

Permanent major impacts would occur to forest and shrubland land cover types as these areas within the ROW would be cleared prior to construction and low vegetation would be maintained throughout the life of the project, resulting in a permanent change from forest and shrubland land cover to grassland land cover type in these areas. Permanent major impacts would also occur to land cover types at transmission line structure and substation footprints where existing land cover would be converted to a developed area (see Table 3.10-9).

Table 3.10-9. Land Cover Class Acreage for Alternative 2

	Within ROW	Outside ROW and within Analysis Area	Hill Valley Substation	Access Roads	Laydown Yards
Total Analysis Area	**2,008**	**1,766**	**22**	**210**	**213**
Land Cover Class					
Agriculture	916	810	22	102	106
Forest	530	500	0	11	0
Grassland	249	171	0	42	0
Urban	102	89	0	46	0
Barren	69	105	0	0	107
Shrubland	9	5	0	0	0
Wetlands	121	77	0	3	0
Open Water	13	8	0	0	0

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.10.2.5.2 Agricultural Lands

Temporary minor impacts would occur to prime farmland and farmland of statewide importance during construction activities within the ROW (Table 3.10-10). These would include soil mixing, rutting, and soil compaction. However, these areas would be restored to existing conditions except within the transmission line structure footprints.

Permanent major impacts would occur to prime farmland and farmland of statewide importance at transmission line structure and substation footprints where existing farmland would be converted to a developed area (see Table 3.10-10).

Table 3.10-10. Acres of Farmland by Farmland Classification for Alternative 2

	Prime Farmland	Farmland of Statewide Importance
Total Analysis Area	**2,008**	**1,766**
Temporary Disturbance within ROW	349	587
Temporary Disturbance from Access Roads	26	43
Temporary Disturbance from Laydown Yards	0	0
Permanent Disturbance from Transmission Line	>1	>1
Permanent Disturbance from the Hill Valley Substation Option 2	22	0
Outside ROW within 300 feet analysis area	307	467

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.10.2.5.3 Recreation Areas

Table 3.10-11 summarizes the area of overlap of recreational areas and the C-HC Project ROW and analysis area.

Table 3.10-11. Acres of Overlap with Recreational Areas for Alternative 2

	Within ROW	Outside ROW within 300 feet Analysis Area
Black Earth Creek Wildlife Area, Sunnyside Unit	9	6
Blackhawk Lake Recreation Area	9	8
Governor Dodge State Park	0	0.06
Refuge	46	53

Temporary moderate impacts would occur to the Black Earth Creek Wildlife Area, Sunnyside Unit during construction. Alternative 2 would follow an existing railroad ROW, but would create a new high-voltage utility line ROW that would pass over the parking lot to this area. User access and experience would be limited during construction. Permanent minor impacts would occur as areas within the ROW are already developed and recreational use of this area would continue unimpeded after construction completion.

Impacts to Blackhawk Lake Recreation Area and Governor Dodge State Park would be the same as presented under Alternative 1.

Temporary minor impacts would occur within the Refuge during construction. Approximately 46 acres of ROW would be constructed through the Refuge under Alternative 2, following the existing transmission line ROW. Construction activities would temporarily impact both land cover and recreational users by limiting access to a small portion of the Refuge and the Mississippi River, generating noise associated with construction equipment, changing the land use of the ROW area, and altering the visual environment. Most of these adverse impacts would last the duration of construction. Recreation activities are expected to return to preconstruction levels after construction ends and land use with the transmission line ROW would not change since Alternative 2 follows an existing transmission line ROW.
No permanent impacts would occur as the new power line would occur in an existing power line ROW.

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.10.2.5.4 Natural Areas

Table 3.10-12 summarizes the area of overlap of natural areas and the C-HC Project ROW and analysis area.

Table 3.10-12. Acres of Overlap with Natural Areas for Alternative 2

	Within ROW	Outside ROW within 300 feet Analysis Area
REM – Otters Creek Fishery Area	0.5	0.4
SWGSCA	30.9	37.4

Impacts to REM – Otters Creek Fishery Area would be the same as presented under Alternative 1.

Impacts to the SWGSCA would be the same as presented under Alternative 1.

3.10.2.6 ALTERNATIVE 3

3.10.2.6.1 Land Cover

Temporary minor impacts would occur to agriculture, grassland, and barren land cover classes as a result of the C-HC Project. Areas within the ROW, access roads, and laydown yards would return to existing conditions in these land cover types with only the areas in the transmission line structure and substation footprints being permanently affected (Table 3.10-13).

Permanent major impacts would occur to forest and shrubland land cover types as these areas within the ROW would be cleared prior to construction and low vegetation would be maintained throughout the life of the project, resulting in a permanent change from forest and shrubland land cover to grassland land cover type in these areas. Permanent major impacts would also occur to land cover types at transmission line structure and substation footprints where existing land cover would be converted to a developed area (see Table 3.10-13).

Table 3.10-13. Land Cover Class Acreage for Alternative 3

	Within ROW	Outside ROW and within Analysis Area	Hill Valley Substation	Access Roads	Laydown Yards
Total Analysis Area	**2,210**	**2,016**	**22**	**157**	**213**
Land Cover Class					
Agriculture	1,098	1,081	22	73	106
Forest	504	504	0	12	0
Grassland	302	198	0	27	0
Urban	129	88	0	37	0
Barren	50	65	0	0	107
Shrubland	10	8	0	0	0
Wetlands	107	66	0	3	0
Open Water	11	6	0	0	0

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.10.2.6.2 Agricultural Lands

Temporary minor impacts would occur to prime farmland and farmland of statewide importance during construction activities within the ROW (Table 3.10-14). These would include soil mixing, rutting, and soil compaction. However, these areas would be restored to existing conditions except within the transmission line structure footprints.

Permanent major impacts would occur to prime farmland and farmland of statewide importance at transmission line structure and substation footprints where existing farmland would be converted to a developed area (see Table 3.10-14).

Table 3.10-14. Acres of Farmland-by-Farmland Classification for Alternative 3

	Prime Farmland	Farmland of Statewide Importance
Total Analysis Area	**2,210**	**2,016**
Temporary Disturbance within ROW	614	616
Temporary Disturbance from Access Roads	22	45
Temporary Disturbance from Laydown Yards	0	0
Outside ROW within 300 feet analysis area	573	514
Permanent Disturbance from Transmission Line	>1	>1
Permanent Disturbance from the Hill Valley Substation Option 2	22	0

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.10.2.6.3 Recreation Areas

Table 3.10-15 summarizes the area of overlap of recreational areas and the C-HC Project ROW and analysis area.

Table 3.10-15. Acres of Overlap with Recreational Areas for Alternative 3

	Within ROW	Outside ROW within 300 feet Analysis Area
Black Earth Creek Wildlife Area, Sunnyside Unit	9	9
Blackhawk Lake Recreation Area	9	8
Governor Dodge State Park	0	0.06
Refuge	46	53
Pecatonica State Trail	0.3	0.3

Impacts to the Black Earth Creek Wildlife Area, Sunnyside Unit would be the same as presented under Alternative 1.

Impacts to Blackhawk Lake Recreation Area and Governor Dodge State Park would be the same as presented under Alternative 1.

Impacts to the Refuge would be the same as presented under Alternative 2.

Temporary moderate impacts would occur to the Pecatonica State Trail during construction. There is currently not a major utility line ROW in this area, but much of the area is agricultural fields, so vegetation clearing activities would be minimal. Construction activities would impact the Trail and user experience in limited areas. Permanent moderate impacts would occur as a new high-voltage power line through this area would change the character of the Trail and impact the recreational experience in this area.

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.10.2.6.4 Natural Areas

Table 3.10-16 summarizes the area of overlap of natural areas and the C-HC Project ROW and analysis area.

Table 3.10-16. Acres of Overlap with Natural Areas for Alternative 3

	Within ROW	Outside ROW within 300 feet of Analysis Area
REM – Little Platte River Fishery Area	9	0.3
REM – Otters Creek Fishery Area	0.5	0.4
SWGSCA	387.4	391.7

Temporary minor impacts would occur to the Little Platte River fishery area during construction. Construction activities would detract from the recreational user experience; however, Alternative 3 would occur in an existing power line ROW. Therefore, no permanent impacts to the fishery area or users is anticipated.

Impacts to REM – Otters Creek Fishery Area would be the same as presented under Alternative 1.

Temporary, moderate impacts would occur to the SWGSCA from construction of the C-HC Project. Alternative 3 would create new ROW along the western edge of the SWGSCA project area.
The maintenance of the ROW would not hinder the stated goals of the SWGSCA as lands would be reclaimed to previous conditions including grassland and agricultural use. This area is not known to be currently enrolled in the SWGSCA, but as this area is included in the overall project boundary of lands targeted for this program, minor long-term impacts would occur if the operation of the C-HC Project were to hinder or preclude this area for enrollment.

3.10.2.7 ALTERNATIVE 4

3.10.2.7.1 Land Cover

Temporary minor impacts would occur to agriculture, grassland, and barren land cover classes as a result of the C-HC Project. Areas within the ROW, access roads, and laydown yards would return to existing conditions in these land cover types with only the areas in the transmission line structure and substation footprints being permanently affected (Table 3.10-17).

Permanent major impacts would occur to forest and shrubland land cover types as these areas within the ROW would be cleared prior to construction and low vegetation would be maintained throughout the life of the project, resulting in a permanent change from forest and shrubland land cover to grassland land cover type in these areas. Permanent major impacts would also occur to land cover types at transmission line structure and substation footprints where existing land cover would be converted to a developed area (see Table 3.10-17).

Table 3.10-17. Land Cover Class Acreage for Alternative 4

	Within ROW	Outside ROW and within Analysis Area	Hill Valley Substation	Access Roads	Laydown Yards
Total Area	**2,246**	**2,083**	**22**	**116**	**213**
Land Cover Class					

	Within ROW	Outside ROW and within Analysis Area	Hill Valley Substation	Access Roads	Laydown Yards
Agriculture	1,175	1,103	22	58	106
Forest	236	216	0	7	0
Grassland	433	317	0	19	0
Urban	263	343	0	27	0
Barren	45	59	0	0	107
Shrubland	16	10	0	0	0
Wetlands	69	28	0	2	0
Open Water	11	6	0	0	0

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.10.2.7.2 Agricultural Lands

Temporary minor impacts would occur to prime farmland and farmland of statewide importance during construction activities within the ROW (Table 3.10-18). These would include soil mixing, rutting, and soil compaction. However, these areas would be restored to existing conditions except within the transmission line structure footprints.

Permanent major impacts would occur to prime farmland and farmland of statewide importance at transmission line structure and substation footprints where existing farmland would be converted to a developed area (see Table 3.10-18).

Table 3.10-18. Acres of Farmland-by-Farmland Classification for Alternative 4

	Prime Farmland	Farmland of Statewide Importance
Total Analysis Area	**2,246**	**2,083**
Temporary Disturbance within ROW	855	685
Temporary Disturbance from Access Roads	17	40
Temporary Disturbance from Laydown Yards	0	0
Outside ROW within 300 feet of Analysis Area	839	589
Permanent Disturbance from the Transmission Line	>1	>1
Permeant Disturbance from the Hill Valley Substation Option 2	22	0

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.10.2.7.3 Recreation Areas

Table 3.10-19 summarizes the area of overlap of recreational areas and the C-HC Project ROW and analysis area.

Table 3.10-19. Acres of Overlap with Recreational Areas for Alternative 4

	Within ROW	Outside ROW within 300 feet Analysis Area
Black Earth Creek Wildlife Area, Sunnyside Unit	9	9
Military Ridge State Trail	0.5	0.5
Refuge	46	53
Pecatonica State Trail	0.3	0.3

Impacts to Black Earth Creek Wildlife Area, Sunnyside Unit would be the same as presented under Alternative 1.

Temporary minor impacts would occur to the Military Ridge State Trail during construction. Construction of the ROW would occur on the opposite side of a four-lane state highway from the Trail system. Impacts from construction activities would detract somewhat from user experience, but highway traffic and other development in the area would minimize these impacts. Permanent moderate impacts would occur as a new high-voltage power line ROW would alter the character of the Trail system, but existing developed conditions in this area would minimize this impact.

Impacts to the Refuge would be the same as presented under Alternative 2.

Impacts to Pecatonica State Trail would be the same as presented under Alternative 3.

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.10.2.7.4 Natural Areas

Table 3.10-20 summarizes the area of overlap of natural areas and the C-HC Project ROW and analysis area.

Table 3.10-20. Acres of Overlap with Natural Areas for Alternative 4

	Within ROW	Outside ROW within 300 feet Analysis Area
REM – Little Platte River Fishery Area	9	0.3
Thompson Memorial Prairie State Natural Area	4	3
SWGSCA	1,023.3	1,036.0

Impacts to REM – Little Platte River Fishery Area would be the same as presented under Alternative 3.

Temporary moderate impacts would occur to the Thompson Memorial State Natural Area during construction. Alternative 4 would follow an existing four-lane highway ROW, but would create a new high-voltage utility line ROW that would pass through agricultural fields in this area. User access and experience would be limited during construction. Permanent moderate impacts would occur as a new power line would change the character of this area; however, the close proximity to the highway would help minimize impacts to use of this area.

Impacts to the SWGSCA would be the same as presented under Alternative 3.

3.10.2.8 ALTERNATIVE 5

3.10.2.8.1 Land Cover

Temporary minor impacts would occur to agriculture, grassland, and barren land cover classes as a result of the C-HC Project. Areas within the ROW, access roads, and laydown yards would return to existing conditions in these land cover types with only the areas in the transmission line structure and substation footprints being permanently affected (Table 3.10-21).

Permanent major impacts would occur to forest and shrubland land cover types as these areas within the ROW would be cleared prior to construction and low vegetation would be maintained throughout the life of the project, resulting in a permanent change from forest and shrubland land cover to grassland land cover type in these areas. Permanent major impacts would also occur to land cover types at transmission line structure and substation footprints where existing land cover would be converted to a developed area (see Table 3.10-21).

Table 3.10-21. Land Cover Class Acreage for Alternative 5

	Within ROW	Outside ROW and within Analysis Area	Hill Valley Substation	Access Roads	Laydown Yards
Total Analysis Area	**2,431**	**2,230**	**22**	**129**	**213**
Land Cover Class					
Agriculture	1,342	1,263	22	64	106
Forest	245	216	0	7	0
Grassland	454	338	0	22	0
Urban	266	295	0	30	0
Barren	41	68	0	0	107
Shrubland	8	7	0	0	0
Wetlands	66	35	0	2	0
Open Water	10	8	0	0	0

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.10.2.8.2 Agricultural Lands

Temporary minor impacts would occur to prime farmland and farmland of statewide importance during construction activities within the ROW (Table 3.10-22). These would include soil mixing, rutting, and soil compaction. However, these areas would be restored to existing conditions except within the transmission line structure footprints.

Permanent major impacts would occur to prime farmland and farmland of statewide importance at transmission line structure and substation footprints where existing farmland would be converted to a developed area (see Table 3.10-22).

Table 3.10-22. Acres of Farmland-by-Farmland Classification for Alternative 5

	Prime Farmland	Farmland of Statewide Importance
Total Analysis Area	**2,431**	**2,230**
Temporary Disturbance within ROW	916	773
Temporary Disturbance from Access Roads	19	42
Temporary Disturbance from Laydown Yards	0	0
Outside ROW within 300 feet of Analysis Area	880	654
Permanent Disturbance from the Transmission Line	>1	>1
Permanent Disturbance from the Hill Valley Substation Option 1	11	11

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.10.2.8.3 Recreation Areas

Table 3.10-23 summarizes the area of overlap of recreational areas and the C-HC Project ROW and analysis area.

Table 3.10-23. Acres of Overlap with Recreational Areas for Alternative 5

	Within ROW	Outside ROW within 300 feet Analysis Area
Black Earth Creek Wildlife Area, Sunnyside Unit	9	9
Military Ridge State Trail	3	0.9
Refuge	44	6
Pecatonica State Trail	0.3	0.3

Impacts to the Black Earth Creek Wildlife Area, Sunnyside Unit would be the same as presented under Alternative 1.

Impacts to the Military Ridge State Trail would be the same as presented under Alternative 4.

Impacts to the Refuge would be the same as presented under Alternative 1.

Impacts to Pecatonica State Trail would be the same as presented under Alternative 3.

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.10.2.8.4 Natural Areas

Table 3.10-24 summarizes the area of overlap of natural areas and the C-HC Project ROW and analysis area.

Table 3.10-24. Acres of Overlap with Natural Areas for Alternative 5

	Within ROW	Outside ROW within 300 feet Analysis Area
REM – Little Platte River Fishery Area	9	0.3
Thompson Memorial Prairie State Natural Area	4	3
SWGSCA	1,090.6	1,118.7

Impacts to REM – Little Platte River Fishery Area would be the same as presented under Alternative 3.

Impacts to the Thompson Memorial Prairie State Natural Area would be the same as presented under Alternative 4.

Temporary, major impacts would occur to the SWGSCA from construction of the C-HC Project. Alternative 4 would create new ROW along the northern and western edges of the SWGSCA project area. The maintenance of the ROW would not hinder the stated goals of the SWGSCA as lands would be reclaimed to previous conditions including grassland and agricultural use. This area is not known to be currently enrolled in the SWGSCA, but as this area is included in the overall project boundary of lands targeted for this program, moderate long-term impacts would occur if the operation of the C-HC Project were to hinder or preclude this area for enrollment.

3.10.2.9 ALTERNATIVE 6

3.10.2.9.1 Land Cover

Temporary minor impacts would occur to agriculture, grassland, and barren land cover classes as a result of the C-HC Project. Areas within the ROW, access roads, and laydown yards would return to existing conditions in these land cover types with only the areas in the transmission line structure and substation footprints being permanently affected (Table 3.10-25).

Permanent major impacts would occur to forest and shrubland land cover types as these areas within the ROW would be cleared prior to construction and low vegetation would be maintained throughout the life of the project, resulting in a permanent change from forest and shrubland land cover to grassland land cover type in these areas. Permanent major impacts would also occur to land cover types at transmission line structure and substation footprints where existing land cover would be converted to a developed area (see Table 3.10-25).

Table 3.10-25. Land Cover Class Acreage for Alternative 6

	Within ROW	Outside ROW and within Analysis Area	Hill Valley Substation	Access Roads	Laydown Yards
Total Analysis Area	**1,936**	**1,773**	**22**	**163**	**213**
Land Cover Class					
Agriculture	958	812	22	84	106
Forest	250	201	0	6	0
Grassland	352	273	0	32	0
Urban	212	327	0	34	0
Barren	56	101	0	0	107
Shrubland	17	9	0	0	0

	Within ROW	Outside ROW and within Analysis Area	Hill Valley Substation	Access Roads	Laydown Yards
Wetlands	76	38	0	2	0
Open Water	14	10	0	0	0

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.10.2.9.2 Agricultural Lands

Temporary minor impacts would occur to prime farmland and farmland of statewide importance during construction activities within the ROW (Table 3.10-26). These would include soil mixing, rutting, and soil compaction. However, these areas would be restored to existing conditions except within the transmission line structure footprints.

Permanent major impacts would occur to prime farmland and farmland of statewide importance at transmission line structure and substation footprints where existing farmland would be converted to a developed area (see Table 3.10-26).

Table 3.10-26. Acres of Farmland by Farmland Classification for Alternative 6

	Prime Farmland	Farmland of Statewide Importance
Total Analysis Area	**1,936**	**1,773**
Within ROW	621	573
Temporary Disturbance from Access Roads	23	37
Temporary Disturbance from Laydown Yards	0	0
Outside ROW within 300 feet analysis area	578	499
Permanent Disturbance from the Transmission Line	>1	>1
Permanent Disturbance from the Hill Valley Substation Option 1	11	11

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.10.2.9.3 Recreation Areas

Table 3.10-27 summarizes the area of overlap of recreational areas and the C-HC Project ROW and analysis area.

Table 3.10-27. Acres of Overlap with Recreational Areas for Alternative 6

	Within ROW	Outside ROW within 300 feet Analysis Area
Black Earth Creek Wildlife Area, Sunnyside Unit	8	6
Military Ridge State Trail	1	1
Refuge	44	6

Impacts to Black Earth Creek Wildlife Area, Sunnyside Unit, would be the same as presented under Alternative 2.

Impacts to Military Ridge State Trail would be the same as presented under Alternative 4.

Impacts to the Refuge would be the same as presented under Alternative 1.

Impacts from the retirement of the N-9 transmission line and construction of the 0.2-mile tap line would be the same as described under Alternative 1.

3.10.2.9.4 Natural Areas

Table 3.10-28 summarizes the area of overlap of natural areas and the C-HC Project ROW and analysis area.

Table 3.10-28. Acres of Overlap with Natural Areas for Alternative 6

	Within ROW	Outside ROW within 300 feet Analysis Area
Thompson Memorial Prairie State Natural Area	4	3
SWGSCA	652.1	660.7

Impacts to the Thompson Memorial Prairie State Natural Area would be the same as presented under Alternative 4.

Impacts to the SWGSCA would be the same as presented under Alternative 1.

3.10.3 *Summary of Impacts*

3.10.3.1 LAND COVER

All land cover types would be temporarily impacted as a result of the C-HC Project construction activities (Table 3.10-29). Agricultural land cover would have the highest temporary impact with between 1,096 acres impacted under Alternative 1, and 1,534 acres impacted under Alternative 5; however, much of this cover type would be restored to existing conditions once construction has completed. Grasslands would also be restored to existing conditions after construction. Whereas temporary impacts to wetlands and open water bodies would occur during construction, environmental commitments would be implemented to minimize temporary impacts to these land cover types.

Table 3.10-29. Land Cover Temporary Impact Summary

	Total Analysis Area (acres)	Agriculture (acres)	Forest (acres)	Grassland (acres)	Urban (acres)	Barren (acres)	Shrubland (acres)	Wetlands (acres)	Open Water (acres)
Alternative 1	3,591	1,096	535	268	117	64	10	114	15
Alternative 2	3,774	1,146	541	291	148	176	9	124	13
Alternative 3	4,226	1,299	516	329	166	157	10	110	11
Alternative 4	4,329	1,361	243	452	290	152	16	71	11
Alternative 5	4,661	1,534	252	476	266	148	8	68	10

	Total Analysis Area (acres)	Agriculture (acres)	Forest (acres)	Grassland (acres)	Urban (acres)	Barren (acres)	Shrubland (acres)	Wetlands (acres)	Open Water (acres)
Alternative 6	3,709	1,164	256	384	246	163	17	78	14

All land cover types, except open water, would be permanently impacted as a result of the C-HC Project (Table 3.10-30). Land cover type would change from existing land cover to a developed land cover at transmission line structure sites and the substation location. Additionally, land clearing activities and ROW maintenance would permanently change forest and shrubland land cover types to grassland areas. Alternative 4 would result in the fewest acres (236 acres) converted from forested to grassland land cover in the ROW. Alternative 2 would result in the greatest number of acres (530 acres) converted from forest to grassland land cover in the ROW.

Temporary minor impacts would occur to agriculture, grassland, and barren land cover classes as a result of the C-HC Project. Permanent major impacts would occur to forest and shrubland land cover types as a permanent change from forest and shrubland land cover to grassland land cover type. Permanent major impacts would also occur to land cover types at transmission line structure and substation footprints where existing land cover would be converted to a developed area.

Table 3.10-30. Land Cover Permanent Impact Summary

	Total Analysis Area (acres)	Agriculture (acres)	Forest (acres)	Grassland (acres)	Urban (acres)	Barren (acres)	Shrubland (acres)	Wetlands (acres)	Open Water (acres)
Alternative 1	3,591	22	524	>1	>1	>1	10	>1	0
Alternative 2	3,774	22	530	>1	>1	>1	9	>1	0
Alternative 3	4,226	22	504	>1	>1	>1	10	>1	0
Alternative 4	4,329	22	236	>1	>1	>1	16	>1	0
Alternative 5	4,661	22	245	>1	>1	>1	8	>1	0
Alternative 6	3,709	22	250	>1	>1	>1	17	>1	0

The N-9 transmission line decommissioning that would occur within the Refuge would result in short-term minor impacts to land use during decommissioning on 21.5 acres of Refuge land. There would be long-term beneficial impacts after decommissioning to the Refuge. The N-9 transmission line decommissioning and tap line construction on private land would also result in short-term minor impacts during decommissioning. There would also be long-term beneficial impacts after decommissioning.

3.10.3.2 AGRICULTURAL LANDS

Temporary impacts from the C-HC Project construction activities would occur in prime farmland and farmland of statewide importance (Table 3.10-31). Impacts on prime farmland and farmland of statewide importance within the ROW would include soil mixing, rutting, and soil compaction. However, the implementation of environmental commitments for soils and reclamation activities within the ROW after construction has completed, will minimize any long-term effects to these areas and their productivity.

Permanent impacts from the transmission line structures would occur in the loss of prime farmland and farmland of statewide importance (see Table 3.10-31).

Table 3.10-31. Farmland Classification Impact Summary

	Total Analysis Area (acres)	Prime Farmland Temporary Impact (acres)	Prime Farmland Permanent Impact (acres)	Farmland of Statewide Importance Temporary Impact (acres)	Farmland of Statewide Importance Permanent Impact (acres)
Alternative 1	3,591	399	11	553	11
Alternative 2	3,774	375	22	630	0
Alternative 3	4,226	636	22	661	0
Alternative 4	4,329	872	22	725	0
Alternative 5	4,661	935	11	815	11
Alternative 6	3,709	644	11	610	11

As a whole, the types of agricultural use taking place within the analysis area are generally compatible with the presence of transmission line ROWs and agricultural activities would largely be allowed to continue in the long term. The Utilities would coordinate with landowners regarding routing the ROW and would incorporate appropriate environmental commitments. The relatively small amount of acreage needed for the transmission line structures and substation would have a long-term, minor impact on agricultural productivity.

Lands enrolled in incentive programs such as NRCS CRP and Wisconsin MFL would have a long-term, moderate impact as the C-HC project could require the removal of lands from the programs. This would result in a loss of revenue or tax incentives for landowners; however, the Utilities would work with landowners to compensate for monetary losses. Additionally, these programs are landscape based programs focusing on sustainable land management across regions to improve water quality, wildlife habitat, and forest resources and removal of lands from these programs could have additional impacts to these resources.

3.10.3.3 RECREATION AREAS

Alternatives 1, 3, 4, and 5 would cause minor temporary impacts and no permanent impacts to the Black Earth Creek Wildlife Area, Sunnyside Unit (Table 3.10-32 and Table 3.10-33). These alternatives would follow an existing transmission ROW, so impacts are limited to only construction activities. Alternatives 2 and 6 would cause moderate temporary and minor permanent impacts to the Black Earth Creek Wildlife Area, Sunnyside Unit (see Table 3.10-32 and Table 3.10-33). These alternatives would create a new transmission ROW in this area and would cross the parking lot to this recreation area.

Alternatives 1, 2, and 3 would cause minor temporary impacts and no permanent impacts to the Blackhawk Lake Recreational area (see Table 3.10-32 and Table 3.10-33). These alternatives would follow an existing transmission line ROW, so impacts are limited to only construction activities.

Alternatives 1, 2, and 3 would cause minor temporary and minor permanent impacts to the Governor Dodge State Park (see Table 3.10-32 and Table 3.10-33). These alternatives would create a new transmission line ROW through small wooded tracts just north of the park. This would change the character of the local vicinity of the park which would impact recreational users' experiences travelling through these areas. The transmission line would not be visible from key observation points within the park.

All alternatives would cause minor temporary and moderate permanent impacts to the Ice Age National Scenic Trail and Cross Plains Complex (see Table 3.10-32 and Table 3.10-33). Whereas the ROW does not impact the trail system, it will parallel it in some areas. The close proximity of a new high-voltage transmission line in these areas would alter the character of the trail system and impact recreational users' experiences in these areas.

Alternatives 4, 5, and 6 would have minor temporary and moderate permanent impacts to the Military Ridge State Trail (see Table 3.10-32 and Table 3.10-33). A four-lane highway lies between the transmission line ROW and the trail system, which would provide a buffer for trail users from construction activities. However, a new high-power transmission line within the vicinity of the trail system would alter the character of the trail and would impact recreational users' experiences in these areas.

Alternatives 2, 3, and 4 would have minor temporary and no permanent impacts to the Refuge (see Table 3.10-32 and Table 3.10-33). These alternatives would follow the existing transmission line ROW through the Refuge, so impacts would be limited to construction activities. Alternatives 1, 5, and 6 would cause both moderate temporary and moderate permanent impacts to the Refuge (see Table 3.10-32 and Table 3.10-33). These alternatives would create a new ROW through the Refuge altering the character of the Refuge from an undeveloped area to a developed area, which would impact recreational users in these areas. Additional beneficial impacts from Alternatives 1, 5, and 6 would occur as the existing ROW for the 161-kV transmission line crossing the Refuge would be reclaimed to pre-existing conditions.

Alternatives 3, 4, and 5 would cause moderate temporary and moderate permanent impacts to the Pecatonica State Trail (see Table 3.10-32 and Table 3.10-33). These alternatives would create a new ROW through agricultural fields, so construction would be limited to transmission line structure locations. However, a new high-power transmission line in this area would change the character of the trail system which would impact recreational users in these areas.

Table 3.10-32. Recreation Areas Temporary Impact Summary

	Black Earth Creek Wildlife Area, Sunnyside Unit	Blackhawk Lake Recreational Area	Governor Dodge State Park	Ice Age National Scenic Trail	Military Ridge State Trail	The Refuge	Pecatonica State Trail
Alternative 1	Minor	Minor	Minor	Minor	N/A	Moderate	N/A
Alternative 2	Moderate	Minor	Minor	Minor	N/A	Minor	N/A
Alternative 3	Minor	Minor	Minor	Minor	N/A	Minor	Moderate
Alternative 4	Minor	N/A	N/A	Minor	Minor	Minor	Moderate
Alternative 5	Minor	N/A	N/A	Minor	Minor	Moderate	Moderate
Alternative 6	Moderate	N/A	N/A	Minor	Minor	Moderate	N/A

N/A = not applicable because the alternative does not cross, and the analysis area does not overlap the recreational area.

Table 3.10-33. Recreation Areas Permanent Impact Summary

	Black Earth Creek Wildlife Area, Sunnyside Unit	Blackhawk Lake Recreational Area	Governor Dodge State Park	Ice Age National Scenic Trail	Military Ridge State Trail	The Refuge	Pecatonica State Trail
Alternative 1	None	None	Minor	Moderate	N/A	Moderate	N/A
Alternative 2	Minor	None	Minor	Moderate	N/A	None	N/A
Alternative 3	None	None	Minor	Moderate	N/A	None	Moderate
Alternative 4	None	N/A	N/A	Moderate	Moderate	None	Moderate
Alternative 5	None	N/A	N/A	Moderate	Moderate	Moderate	Moderate
Alternative 6	Minor	N/A	N/A	Moderate	Moderate	Moderate	N/A

N/A = not applicable because the alternative does not cross, and the analysis area does not overlap the recreational area.

3.10.3.4 NATURAL AREAS

Alternatives 1, 2, and 3 would cause major temporary and permanent impacts to the REM – Otters Creek fishery area (Table 3.10-34 and Table 3.10-35). These alternatives would create a new transmission line ROW across this area which would include the clearing of wooded areas. This will change the character of this area which will impact recreational users' experiences.

Alternatives 3, 4, and 5 would cause minor temporary and no permanent impacts to the REM – Little Platte River fishery area (see Table 3.10-34 and Table 3.10-35). These alternatives would use an existing transmission line ROW through this area, so impacts would be limited to construction activities.

Alternatives 4, 5, and 6 would cause moderate temporary and permanent impacts to the Thompson Memorial Prairie State Natural Area (see Table 3.10-34 and Table 3.10-35). These alternatives would create a new transmission line ROW through agricultural fields and would change the character of the area which would impact recreational users experience.

Alternatives 1, 2, and 6 would cause negligible temporary and minor permanent impacts to the SWGSCA (see Table 3.10-34 and Table 3.10-35). These alternatives would create a small segment of new transmission ROW through an agricultural field in the very northeastern corner of the SWGSCA project area. Alternatives 3 and 4 would cause moderate temporary and minor permanent impacts to the SWGSCA (see Table 3.10-34 and Table 3.10-35). These alternatives would create new transmission ROW through mostly agricultural fields along the western edge of the SWGSCA project area. Alternative 5 would cause major temporary and moderate permanent impacts to the SWGSCA (see Table 3.10-34 and Table 3.10-35). This alternative would create new transmission ROW through agricultural fields and grassland areas.

Table 3.10-34. Natural Areas Temporary Impact Summary

	REM – Otters Creek Fishery Area	REM – Little Platte River Fishery Area	Thompson Memorial Prairie State Natural Area	SWGSCA
Alternative 1	Major	N/A	N/A	Negligible
Alternative 2	Major	N/A	N/A	Negligible
Alternative 3	Major	Minor	N/A	Moderate
Alternative 4	N/A	Minor	Moderate	Moderate
Alternative 5	N/A	Minor	Moderate	Major
Alternative 6	N/A	N/A	Moderate	Negligible

N/A = not applicable because the alternative does not cross, and the analysis area does not overlap the natural area.

Table 3.10-35. Natural Areas Permanent Impact Summary

	REM – Otters Creek Fishery Area	REM – Little Platte River Fishery Area	Thompson Memorial Prairie State Natural Area	SWGSCA
Alternative 1	Major	N/A	N/A	Minor
Alternative 2	Major	N/A	N/A	Minor
Alternative 3	Major	None	N/A	Minor
Alternative 4	N/A	None	Moderate	Minor
Alternative 5	N/A	None	Moderate	Moderate
Alternative 6	N/A	N/A	Moderate	Minor

N/A = not applicable because the alternative does not cross, and the analysis area does not overlap the natural area.

3.10.3.5 COMPREHENSIVE LAND USE PLANS/DESIGNATIONS

There would be no impact from the C-HC Project to comprehensive land use plans within the analysis area as transmission line ROW development is not prohibited. Under the applicable zoning ordinances and comprehensive plans, transmission lines are either a permitted or a conditional use in all jurisdictions traversed by the proposed ROW. However, the C-HC Project may be inconsistent with stated goals in local land use plans.

Long-term minor impacts would occur to private properties as the project would require ROW easements. These would include land use restrictions on private properties.

3.11 Visual Quality and Aesthetics

This section presents the visual characterization of the existing aesthetic conditions in the landscape. The description of the affected environment and the environmental consequences focuses on scenic resources and key observation points (KOPs) within potentially affected visual environment. Key observation points are visually sensitive gathering points, where the public has access to areas that have an open view to the surrounding landscape without being obstructed by terrain or vegetation. This unencumbered view of the surrounding landscape is also referred to as a viewshed.

The analysis area for visual quality and aesthetics ranges from within the ROW to upwards of 2 miles from the ROW, depending on topography, vegetation, and the potential visibility of the C-HC Project. The analysis area for visual resources was determined through the application of visibility mapping and field reconnaissance.

3.11.1 *Affected Environment*

Aesthetics can be defined as a mix of landscape character, the context in which the landscape is being viewed, and the visual quality of the landscape. Natural landforms, vegetation, water features, and human modifications give the landscape within a specific area its visual quality. The visual character of an area is influenced by natural systems as well as by human interactions and use of land. In natural settings, visual characteristics are natural elements, whereas in rural or pastoral/agricultural settings, attributes may include human-made elements such as fences, walls, barns and outbuildings, infrastructure (roads, utility poles, radio/cellular towers, water towers), and occasional residences. In a more developed setting, the visual character may include buildings, groomed lawns and landscaping, pavement, and more extensive utility infrastructure.

3.11.1.1 VISUAL CHARACTERISTICS

The existing landscape character across the analysis area varies from towns and suburban developed areas with private residences to farmsteads and agricultural lands to forested lands and riparian and river environments. The landscape's topography varies from mostly flat to rolling agricultural land and from rolling forested areas to blufflands near the Mississippi River. There are several existing 69-kV and 138- kV transmission lines that occur within the analysis area and one 161-kV line. The Millville to Stoneman 69-kV transmission line and the Turkey River to Stoneman 161-kV line are collocated where they cross the Mississippi River in Cassville, Wisconsin (known as the "Stoneman" crossing). Additional 345-kV transmission lines connect to the Cardinal and Hickory Creek Substations from other directions (see Figure 1.4-1 in Chapter 1).

The western portion of the analysis area intersects the Driftless Area, which is a region in Minnesota, Wisconsin, northwestern Illinois, and northeastern Iowa of the American Midwest that was never glaciated. Colloquially, the term is expanded to include the broader incised Paleozoic Plateau, which contains deeply carved river valleys and extends into southeastern Minnesota and northeastern Iowa. The region includes elevations ranging from 603 to 1,719 feet at Blue Mound State Park (described below) and covers an area of 24,000 square miles. The rugged terrain is due both to the lack of glacial deposits, or drift, and to the incision of the upper Mississippi River and its tributaries into bedrock (Driftless Wisconsin 2018a). Approximately 85% of the Driftless Area lies within Wisconsin. Largely rural in character, land cover is forest, farmland, and grassland/pasture; modest wetlands are found in river valleys, and along the Mississippi. Row crop farming is less encountered than elsewhere in the state. Away from the Mississippi, the terrain is gently rolling, supporting dairy farms. Wildlife is abundant in the Driftless area providing opportunities for hunting, wildlife viewing, and bird watching (Anderson and Anderson 2007).

3.11.1.2 SCENIC RESOURCES

Within the analysis area, there is one National Scenic Trail, two state parks, and one National Wildlife Refuge offering designated scenic areas within their boundaries. In addition, the Great River Road National Scenic Byway runs through the analysis area. These are depicted in Figure 3.11-1 and described below.

3.11.1.2.1 Ice Age National Scenic Trail

The Ice Age Trail is a National Scenic Trail located entirely within Wisconsin. The Ice Age NST crosses the eastern edge of the analysis 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.” Authorized in 1980, the Ice Age NST encompasses 1,200 miles of lakes, river valleys, prairies, forests, gently rolling hills, and ridges formed by glacial activity thousands of years ago. Approximately 700 miles of trail has been built and is open for public use. The Ice Age NST is managed through strong partnerships between the NPS, the WDNR, and the Ice Age Trail Alliance, and is used by over 1 million people each year for hiking, backpacking, camping, skiing, snowshoeing, and other outdoor recreational activities. The trail provides opportunities for people to immerse themselves in a large natural landscape, and experience expansive views that provide a visual display between unglaciated driftless areas and lands shaped by continental glaciation. Expansive views from the site of the terminal moraine, the Driftless Area including Blue Mounds, and the glacial drainageway known as Black Earth Trench are vital for showcasing the unique story of the relationship between the glaciated and unglaciated areas of Wisconsin. In addition to the state parks and forests, the Ice Age NST travels through many state wildlife and fishery areas and some state natural areas (WDNR 2018i).

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 (Complex) is a 1,700-acre unit of the NPS located west of Madison, southeast of Cross Plains, and south of Highway 14. The Complex contains lands owned and managed by the NPS, the WDNR, Dane County Parks, the USFWS, the Ice Age Trail Alliance, 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 for the lands within the boundaries of the Complex (NPS 2013). The intent of the Complex is to provide visitors with interpretation of its evolution from the last glacial retreat, with opportunities to enjoy low-impact outdoor recreation. There is currently no visitor infrastructure at the Complex other than parking along an existing road, an old farmhouse, and a barn. Current development plans include the installation of a new sustainable visitor center, new protected Ice Age National Scenic Trail segments, additional interpretive and recreational sites, administrative and maintenance facilities, and expansion to complete the park out to State Highway 14. In 2018, the NPS is slated to work with WDNR, Dane County Parks, and the USFWS to develop a Use Management Plan, which will identify locations for visitor infrastructure (NPS 2017a). Once completed, the NPS anticipates up to 250,000 annual visitors per year at the Ice Age Complex.

3.11.1.2.2 Governor Dodge State Park

Located outside Dodgeville, Wisconsin in Iowa County and in Wisconsin's Driftless Area, 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. The park 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. In fiscal year 2016, the total attendance of Governor Dodge State Park was 496,847 (WDNR 2018h).

3.11.1.2.3 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 south 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. In fiscal year 2016, the total attendance at Blue Mound State Park was 162,138 (WDNR 2018m).

3.11.1.2.4 Upper Mississippi River National Wildlife and Fish 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). The Refuge is also an important area for tourists. The area receives nearly 3.7 million annual visits (USFWS 2006a). 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 Byway (described below) on either side of the Refuge. Additional information about the Refuge is provided in Section 3.14.

The viewshed within the Refuge from the position of a human observer standing in the Refuge, looking west to Wisconsin, can be characterized as having native vegetation in the foreground and middle ground, which some human disturbances, such as Oak Road and the existing transmission line in the middle ground. The background of the Refuge viewshed contains the developed area of Cassville and the demolished Nelson Dewey generation plant site. Due to the sensitivity of the Refuge's viewshed, RUS and USFWS completed extensive visual resource analysis from multiple observation points within and outside the Refuge.

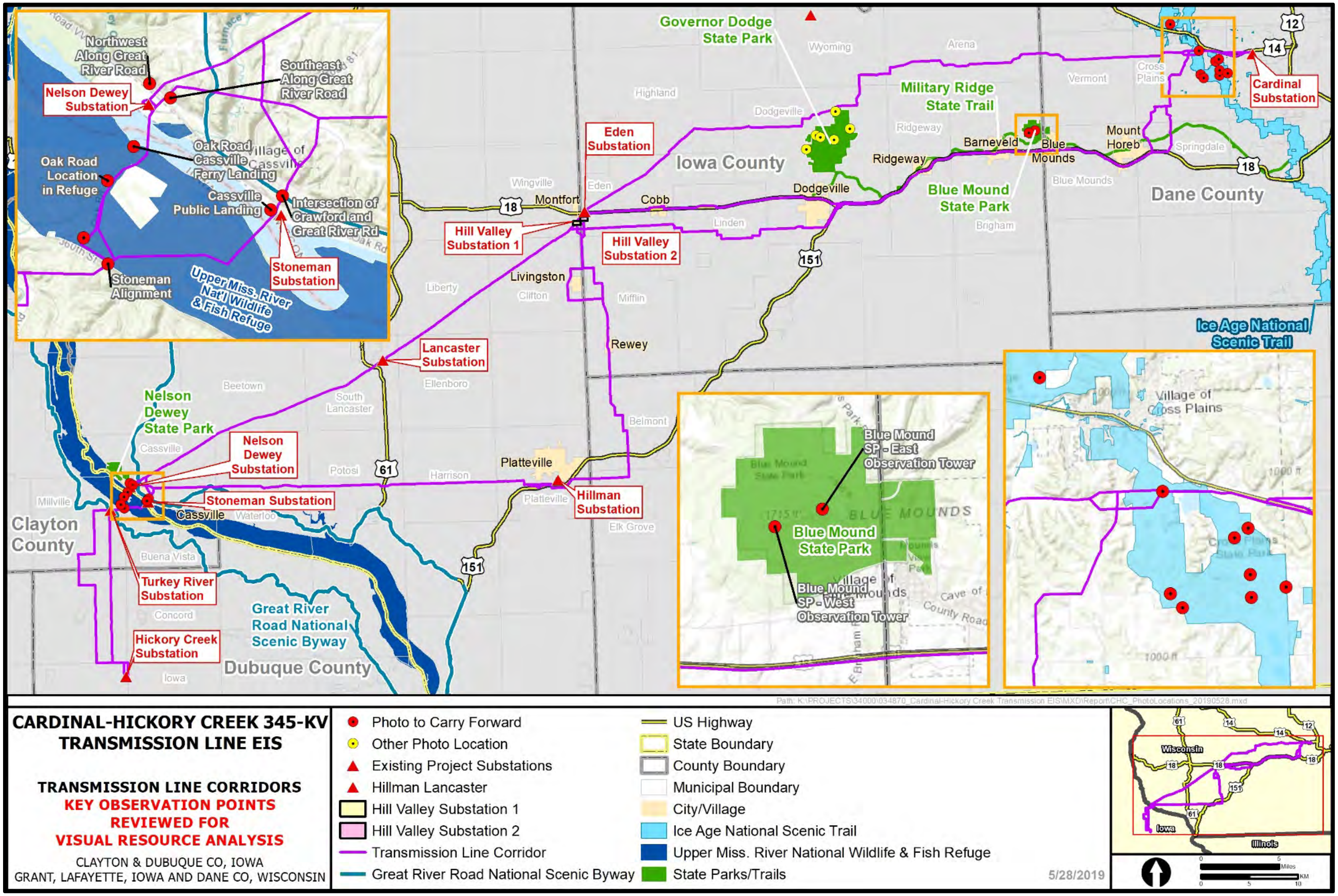

Figure 3.11-1. Key observation points.

3.11.1.2.5 Great River Road National Scenic Byway

The Great River Road National Scenic Byway has been recognized as a scenic highway for many years, and more recently has been designated as a National Scenic Byway. The National Scenic Byway program is part of the FHWA. To be designated as a National Scenic Byway, a highway must have special scenic, historic, recreational, cultural, archaeological, and/or natural qualities that have been recognized as such through legislation or some other official declaration (FHWA 2018). The Great River Road, managed by the Mississippi River Parkway Commission, follows the Mississippi River for 3,000 miles through 10 states, from northern Minnesota to the Gulf of Mexico. The Great River Road consists of separate units that have been designated and are administered by the states along the river. In Wisconsin, the state purchased scenic easements along the Great River Road in the 1950s to help preserve its value (Wisconsin Great River Road 2018).

The Great River Road attracts a diversity of audiences that have different motivations for driving the road, but tourists primarily use the road for shopping and sightseeing. According to the Wisconsin Department of Tourism, the top attributes of the Great River Road are overall scenic views and access to scenic overlooks (Schmeckle Reserve Interpreters 2005). Within the analysis area, the Great River Road runs along both sides of the Mississippi River, in Wisconsin and Iowa, near the town of Cassville, Wisconsin. This portion of the Scenic Byway overlaps the Great River Road and Mississippi River Bicycle Trail, which provides users with scenic viewing opportunities. In addition to the Mississippi River itself, the Blufflands, the nearby wildlife refuges, wildlife management areas, state parks, historic sites, and natural communities all contribute to the value of the Great River Road.

3.11.2 *Environmental Consequences*

A “visual impact” describes the change in visual resources brought about by a project and the public's sensitivity to that change. This section describes impacts to visual quality and aesthetics from the construction, operation, and maintenance of the C-HC Project. The visual resources impact analysis is largely documented from the KOPs, or important viewpoints identified as being important to the landscape and affected public.

Potential visual impacts to sites listed in the NRHP are discussed in Section 3.9.

3.11.2.1 DATA SOURCES, METHODS, AND ANALYSIS ASSUMPTIONS

The following impact indicators were considered when analyzing impacts to visual resources from the C-HC Project:

- Number of residences within 300 feet of the C-HC Project (i.e., the analysis area).
- Number of recreational users likely to see the transmission line and level of changes in the landscape from designated overlooks at state parks, Ice Age National Scenic Trail.
- Number of people likely to see the transmission line from the Great River Road.
- Qualitative discussion about the changes in the landscape from the C-HC Project.

Local residents include those who live, work, and travel for their daily business within the analysis area. They generally view the landscape from their yards, homes, local roads, and places of employment. Residents are concentrated in and around the Towns of Cross Plains, Mount Horeb, Dodgeville, and Platteville, but occur throughout the analysis area. Except when involved in local travel, residents are likely to be stationary, and have frequent or prolonged views of the landscape. Local residents may view the landscape from ground level or elevated viewpoints (typically upper floors/stories of homes).

Residents' sensitivity to visual quality is variable, and may be tempered by the aesthetic character/setting of their neighborhood or work place. Those living in more densely settled areas with views focused on their neighborhood street or their downtown centers may be less sensitive to landscape changes than those with a view of undeveloped land. It is generally assumed, however, that all residents are familiar with the surrounding landscape and may be sensitive to changes in their views. To analyze potential impacts to the visual quality and aesthetics experienced at private residences in the analysis area, all residences within 150 feet of the project centerline were identified for each subsegment. The results of that analysis are provided below under the visual characteristics impacts analysis for each alternative; however, impacts to residences may occur outside the analysis area depending on the visibility of the C-HC Project from each residence.

Recreational users consist of residents and visitors who come to the area for the purpose of experiencing its scenic and recreational resources. They may view the landscape on their way to a destination (i.e., on a roadway) or from the destination itself. Recreational users in the area are generally involved in outdoor recreational activities at parks, trails, water bodies, and forests. Typical activities include bicycling, recreational boating, fishing, and more passive recreational activities (e.g., wildlife viewing). Recreational users are generally considered to have relatively high sensitivity to aesthetic quality and landscape character. They will often have continuous views of landscape features over relatively long periods of time, and scenic quality generally enhances the quality of any outdoor recreational activity. Passive recreational activities generally do not require as much concentration as more active recreational activities and tend to be more focused on the enjoyment of scenery. Those engaged in passive activities therefore may be particularly sensitive to visual change. Recreational users would be primarily concentrated in public areas such as parks, trails, and scenic roadways (i.e., scenic resources).

To evaluate potential C-HC Project visibility from sensitive viewsheds, SWCA conducted a viewshed analysis for the proposed C-HC Project. Potentially sensitive viewsheds were identified based on a review of public scoping comments and a review of public lands within the analysis area. Topographic viewshed maps were prepared for these areas using USGS digital elevation model (DEM) data (USGS National Elevation Dataset ⅓ arc-second), superimposed with transmission line structures to illustrate potential visibility of the C-HC Project. The resulting viewshed maps defined the maximum area from which the tallest elements of the C-HC Project (i.e., the tops of the transmission line structures) could potentially be seen from ground-level vantage points (existing grade plus 1.7 meters to account for viewer height). The topographic viewshed analysis was run using the maximum height of the transmission line structures (at 150 feet tall and 850 feet apart). The analysis was also run using bare earth, meaning it does not take into account the screening effect of vegetation or built structures, and it provides a very conservative (i.e., "worst case") assessment of potential visibility. The viewshed analysis was run a second time estimating tree height at 35 feet above the ground surface to replicate forested conditions. It should also be noted that its accuracy is also directly related to the accuracy of the USGS DEM data used in the analysis.

Based on the results of the viewshed analysis and discussions with RUS, USFWS, and USACE (for the Refuge), and NPS (for the Ice Age NST), key observations points were identified to evaluate potential impacts to the visual quality and aesthetics experienced at scenic resources. RUS and SWCA requested that the Utilities provide photographs from KOPs along the proposed transmission line route(s). The most critical KOP views that represent areas of public sensitivity or heightened scenic quality were selected for simulation to illustrate the introduction of the C-HC Project features into the existing environment and to guide impact analysis. There are 19 KOPs total (see Figure 3.11-1), most of which are in the vicinity of Cassville/Refuge. Additionally, RUS and SWCA requested KOPs for Governor Dodge State Park and Blue Mound State Park. These locations represented areas where the proposed transmission line may be visible. SWCA assessed the photographs, and worked with RUS, Cooperating Agencies, and the NPS to identify locations to be carried forward in the detailed analysis of impacts, which included visual simulations for select locations.

Visual simulations were produced from high-resolution, digital photographs taken from each selected location. The GIS location of the camera, camera height above the ground, compass direction of the view as seen by the camera, and the approximate vertical angle of the camera view were documented at the time each photograph was taken. Simulations were developed with the photographs using GIS and modeling software to show how the C-HC Project might look like from sensitive and highly valued locations (KOPs) such as trails and overlooks, as well as places where the C-HC Project may be readily visible, such as road crossings. Engineered representations of the transmission line components (structures, conductors, insulators) were inserted to scale into the photographs to show a representation of how the C-HC Project would look on the landscape. The visual simulations were designed to reflect the exact view, coordinates, scale, shading, and coloration of the C-HC Project.

Photographs taken from multiple KOPs within Governor Dodge State Park revealed that the proposed transmission line would not be visible due to tall and dense vegetation and lack of a vantage point from within the park. The remaining KOPs are depicted (in red) in Figure 3.11-1. Visual impacts assessments and visual simulations from these KOPs are discussed below under each applicable alternative. Visual simulations were also conducted by the Utilities to assess impacts from KOPs along the Ice Age NST and in the vicinity of the Cross Plains Complex (see Figure 3.11-1). These simulations are discussed below in Section 3.11.

Impact thresholds and determinations are provided below, based on their intensity and duration (Table 3.11-1). Temporary impacts are those that are expected to occur during construction and specific to construction activities. Permanent impacts are those impacts that are expected to result from maintenance and operation of the project once construction is complete. Adverse impacts disclosed in the following sections would be minimized with implementation of the Visual Quality and Aesthetics environmental commitments listed in Section 3.1, Table 3.1-4.

Table 3.11-1. Impact Thresholds and Descriptions for Visual Quality and Aesthetics

	Minor Impact	Moderate Impact	Major Impact
Visual Quality and Aesthetics	Proposed changes could attract attention but would not dominate the view or detract from current user activities.	Proposed changes would attract attention and contribute to the landscape, but would not dominate the landscape. User activities would remain unaffected.	Changes to the characteristic landscape would be considered significant when those changes dominate the landscape and detract from current user activities.

3.11.2.2 NO ACTION

No additional adverse impacts to visual resources would occur under the No Action Alternative. Beneficial impacts to visual resources (described below) would also not occur under this alternative.

3.11.2.3 IMPACTS COMMON TO ALL ACTION ALTERNATIVES

Potential impacts to visual quality and aesthetics in the analysis area would result from construction of new transmission line structures and conductors, and the establishment of new or expanded ROW through forested areas. The height of transmission line structures would range from 90 to 175 feet for monopole structures and would be spaced every 900 to 1,100 feet. Within the Refuge, low-profile (75-foot) H-frame structures with a typical span length of 500 feet would be constructed within the main part of the Refuge with taller (approximately 196 feet), tubular steel, H-frame support structures at the Mississippi River crossings to allow the transmission line to span the channel and still provide adequate clearance for river-going vessels. The new structures would create additional lines and forms within the viewshed and could result in adverse impacts to scenic quality and aesthetics. The extent to which these additional lines and forms affect visual quality depends upon whether the new transmission line follows an existing linear corridor, such as transmission lines, roadways, and railroads; the degree to which it is shielded from view by terrain and vegetation; and the types of other visual elements (such as communications towers, industrial areas, farmsteads, and forests) that already exist in the landscape. Representative photographs from a similar and recently constructed Badger-Coulee transmission line have been included to illustrate the potential visual impacts to viewers from varying distances (Figure 3.11-2 through Figure 3.11-10).

Visual impacts from lighting on transmission structures and at the Hill Valley Substation would occur at discrete locations. Lights would be installed on transmission structures if required by the FAA for navigational safety. At this time, one location has been identified where safety lighting may be required, in the Cassville, Wisconsin area if the Mississippi River crossing at the Stoneman Substation is selected (Alternatives 2, 3, or 4). Impacts to visual resources resulting from lighting at the Hill Valley Substation are not expected to occur because the substation would not be lit full time and would be surrounded by a wall, thereby minimizing glare from substation lights when in use. Nighttime lighting of the substation would be used during discrete operation and maintenance activities. The adverse impacts from lighting installation on C-HC Project elements would be minor and long term.

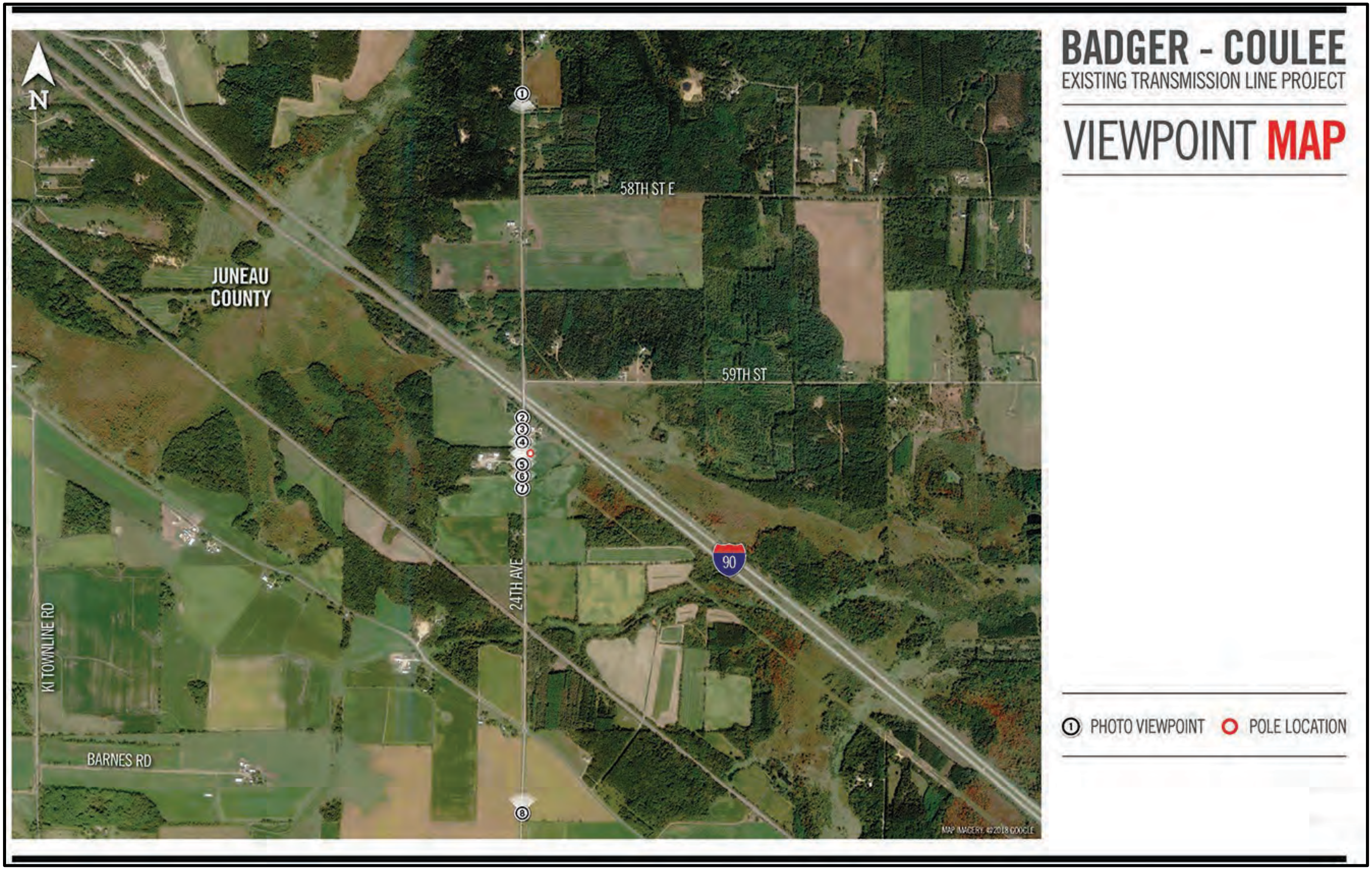

Figure 3.11-2. Overview of representative photographs from the Badger-Coulee Transmission Line project.

Figure 3.11-3. Representative photograph from Photo Viewpoint 1 within 1 mile of the Badger-Coulee Transmission Line project.

Figure 3.11-4. Representative photograph from Photo Viewpoint 2 within 500 feet of the Badger-Coulee Transmission Line project.

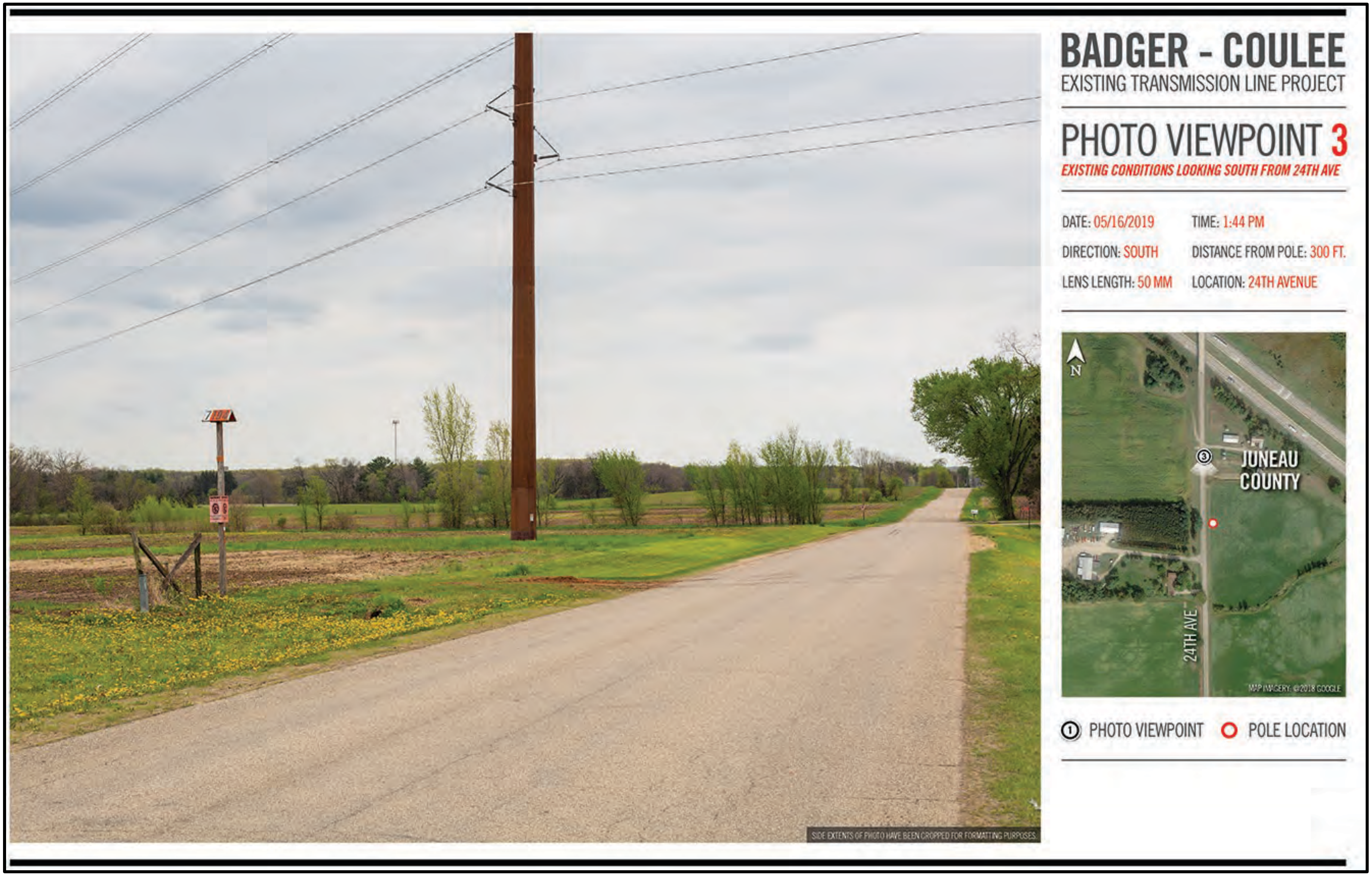

Figure 3.11-5. Representative photograph from Photo Viewpoint 3 within 300 feet of the Badger-Coulee Transmission Line project.

Figure 3.11-6. Representative photograph from Photo Viewpoint 4 within 150 feet of the Badger-Coulee Transmission Line project.

Figure 3.11-7. Representative photograph from Photo Viewpoint 5 within 150 feet of the Badger-Coulee Transmission Line project.

Figure 3.11-8. Representative photograph from Photo Viewpoint 6 within 300 feet of the Badger-Coulee Transmission Line project.

Figure 3.11-9. Representative photograph from Photo Viewpoint 7 within 500 feet of the Badger-Coulee Transmission Line project.

Figure 3.11-10. Representative photograph from Photo Viewpoint 8 within 1 mile of the Badger-Coulee Transmission Line project.

3.11.2.3.1 Visual Characteristics

When located near a community, transmission lines can lend an industrial feel to an otherwise tranquil residential neighborhood. The greatest individual visual impact would be to people living very close to the C-HC Project; therefore, there is a direct relationship between individual visual impact and the number of residences in proximity to the C-HC Project. The number of residences within the analysis area are presented below, by action alternative.

Temporary impacts to visual characteristics would occur from construction equipment and laydown yards, but these would be short-term and would only persist during the construction period. There would be long-term visual impacts from the construction of the proposed Hill Valley Substation near Montfort, Wisconsin; however, there are no private residences within 150 feet (300-foot analysis area) of the proposed Hill Valley Substation. All action alternatives would result in long-term adverse impacts to visual characteristics within the Driftless Area where the proposed transmission line is visible from roads, trails, and scenic viewpoints as illustrated in Figure 3.11-2 through Figure 3.11-10.

Retirement of the N-9 Transmission Line and Construction of a New 69-kV Tap Line

Retirement of Dairyland's N-9 transmission line would create direct short-term effects to visual resources by introducing vehicles, equipment, materials, and a workforce during the construction period. Viewers would temporarily witness the decommissioning activities resulting in moderate temporary visual impacts to the natural landscape. Visual effects from construction activities and decommissioning would be short term, anticipated to last 2 months, and these effects would be minor.

The removal of the N-9 transmission line would result in a long-term beneficial impact to visual quality and aesthetics due to the removal of transmission line structures and the natural revegetation of the previously maintained ROW, which is consistent with the natural rural character of the area.

Construction of the approximately 0.2-mile tap line connecting the existing portion of the N-9 transmission line with the Turkey River Substation would result in permanent, moderate adverse visual impacts to one residence in close proximity to the N-9 transmission line and to users of the Great River Road in Iowa. The new tap line would cross the Great River Road in Iowa, which is considered a scenic driving route. However, the new tap line would be within the viewshed of the remaining segment of the N-9 transmission line and the Turkey River Substation, which is an existing industrial land use. Given the presence of existing human-made features, the landscape has a higher visual absorption capacity for the new elements compared with landscapes that are less modified by human-made structures, because similar vertical elements have previously been introduced into the landscape setting.

3.11.2.3.2 Scenic Resources

Visual impacts to the scenic resources described below would be the same for all action alternatives.

Ice Age National Scenic Trail

The Ice Age NST would be crossed by the C-HC Project under all action alternatives due to the proximity of the trail to the eastern termini of the C-HC Project (Figure 3.11-11.). Visual resource analysis for potential impacts to the Ice Age NST and the associated Cross Plains Complex was completed by the Utilities in coordination with the NPS. Visual simulations were conducted from 9 viewpoints in areas where the proposed C-HC Project may be visible from the Ice Age NST and associated overlooks within the Cross Plains Complex (Figure 3.11-12.). Upon further review with NPS and RUS, it was determined that the C-HC Project would potentially be visible from photo viewpoints 1, 2, 3, 4, 5, 6, and 8. Therefore, visual simulations for viewpoints 7 and 9 are not presented in this FEIS. The visual impacts shown in these simulations apply to all alternatives. Note that for all visual simulations, the C-HC Project may be seen differently during leaf-off conditions. The results of the visual simulations are summarized below.

In the visual simulation from viewpoint 1 (Figure 3.11-13), the proposed C-HC Project would be partially obscured by topography and vegetation, but it would be visible towards the left and right of the viewshed. There is an existing transmission line approximately 0.7 miles from the photo point, and the proposed C-HC Project would be constructed approximately 1.7 to 2+ miles from the photo point. Based on viewpoint 1, the C-HC Project would have a long-term minor impact to visual quality and aesthetics at this location along the Ice Age NST.

In the simulation from viewpoint 2 (Figure 3.11-14), there is an existing distribution line that comes in from the south and is underbuilt along the existing east-west transmission line for a few spans, and then turns to the south on stand-alone poles. Where the underbuilt portion of the distribution line parallels the proposed C-HC Project, the smaller voltage transmission line would be relocated underground, and where it is outside the proposed ROW running to the south, it would remain above ground. The distribution pole would serve as a riser structure. Future segments of the Ice Age NST are planned for this location; therefore, there would be minor impacts to future segments of the Ice Age NST from the C-HC Project at this location. Impacts would be minor because the visual character represented in the existing viewshed would not be substantially altered by the C-HC Project given that there is an existing transmission line in this viewshed.

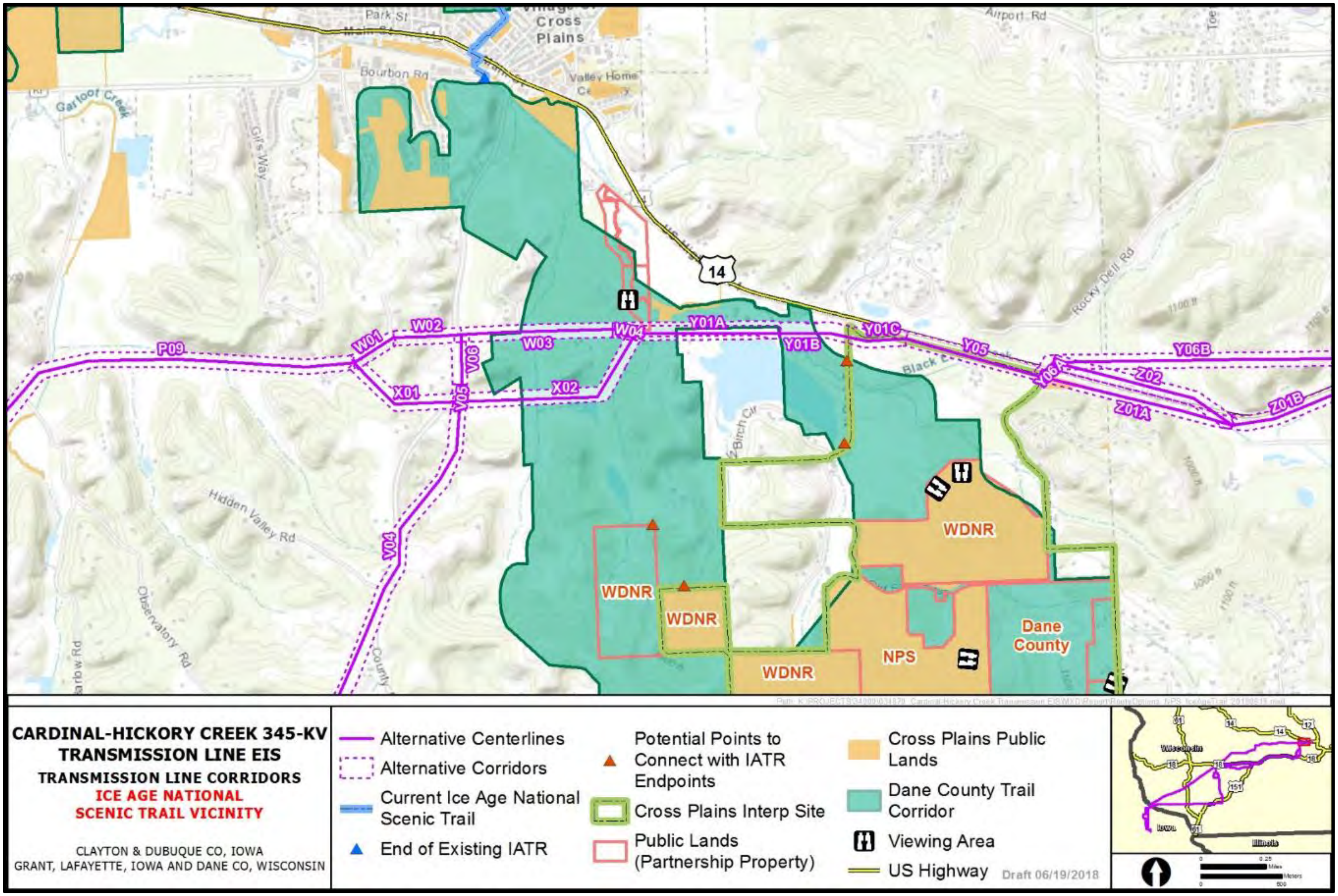

Figure 3.11-11. Proposed C-HC Project transmission line segments in the vicinity of the Ice Age NST.

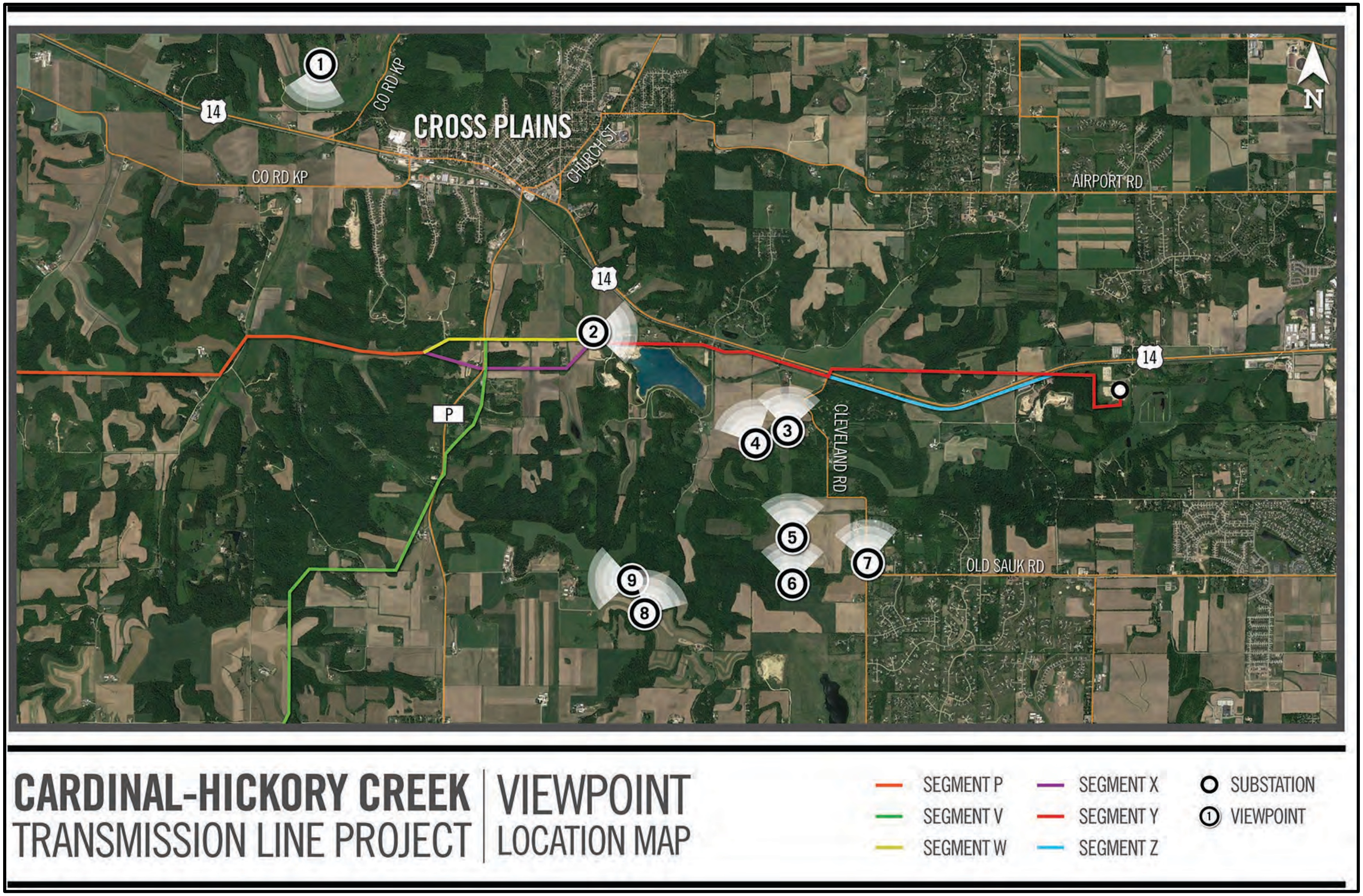

Figure 3.11-12. Overview of visual simulation viewpoints in the vicinity of the Ice Age NST.

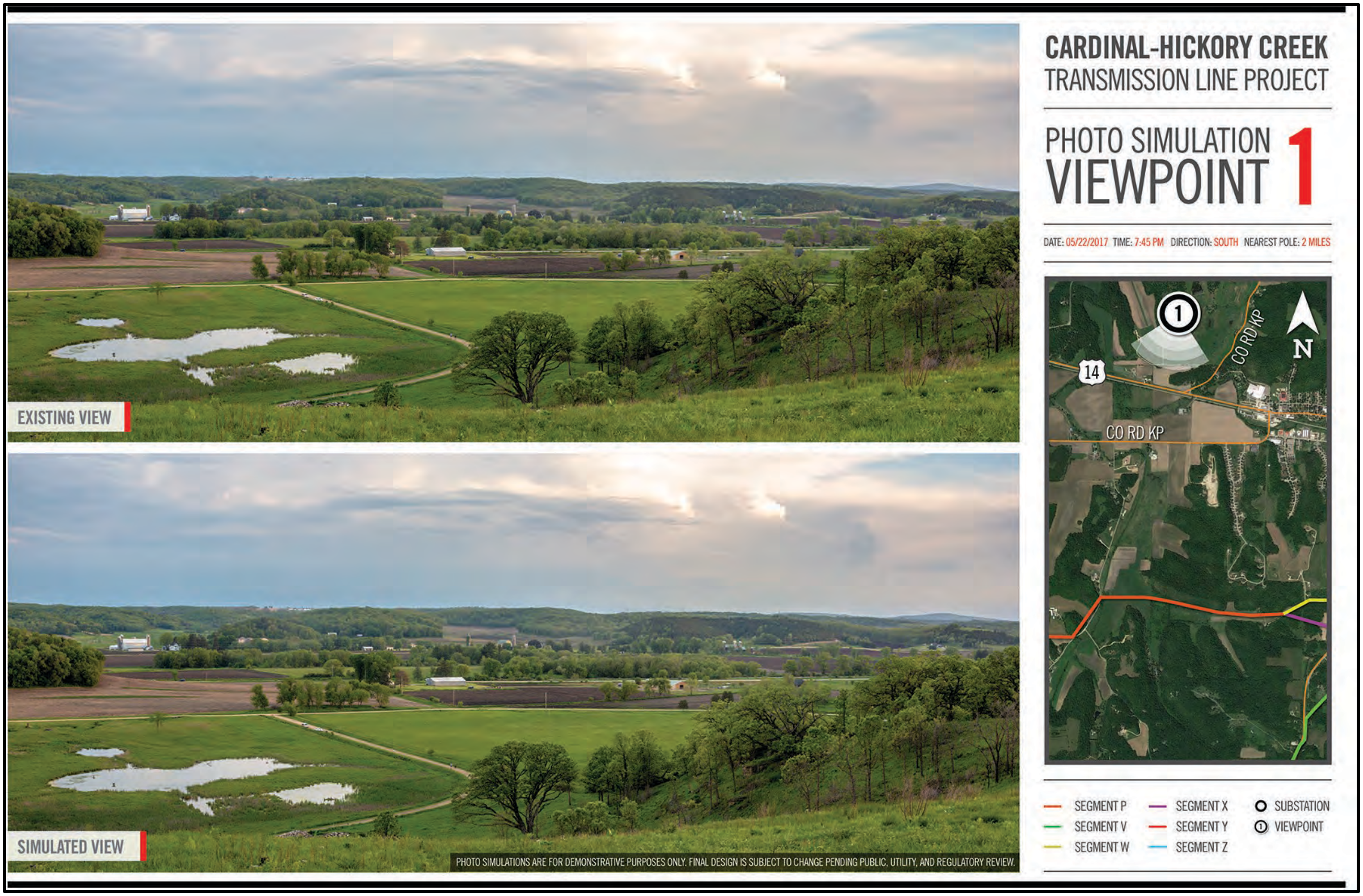

Figure 3.11-13. Visual simulation from viewpoint 1 in the vicinity of the Ice Age NST within 2 miles of the proposed C-HC Project.

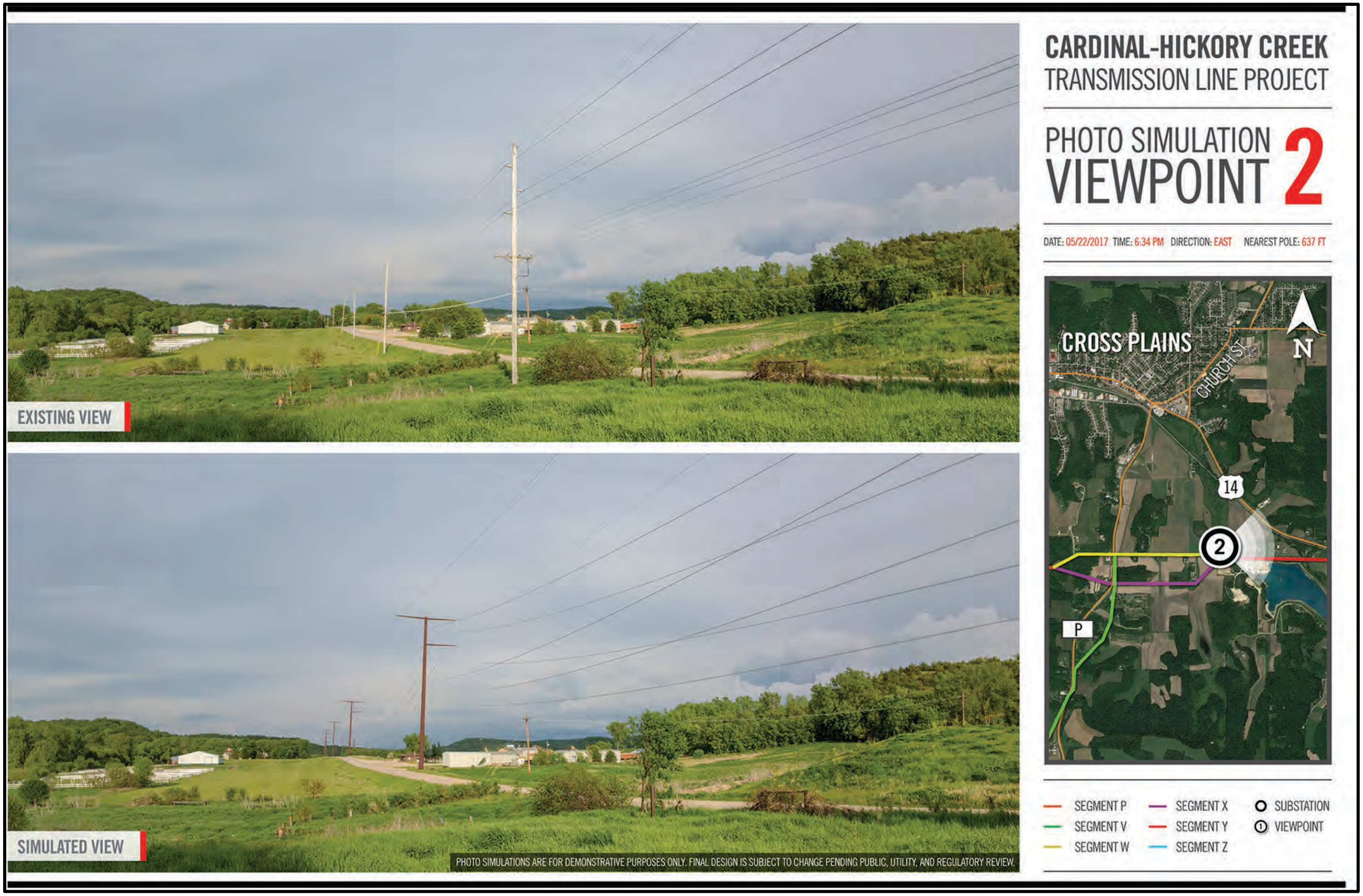

Figure 3.11-14. Visual simulation from viewpoint 2 in the vicinity of the Ice Age NST within 637 feet of the proposed C-HC Project.

Viewpoint 3 (Figure 3.11-15) represents a proposed Ice Age NST interpretive location for the Black Earth Trench. The C-HC Project would be visible from this location as the proposed transmission line would occur in the middle-ground approximately 2,400 feet away following Highway 14. Based on discussions between NPS and RUS, the NPS considers this a major long-term adverse impact to viewers at the interpretive overlook from the C-HC Project.

Viewpoint 4 (Figure 3.11-16) represents an important viewshed that is likely the most visually impacted viewpoint from WDNR land (see Figure 3.11-11). Based on discussions between NPS and RUS, the NPS considers any new aboveground utility develop along Stagecoach Road a major adverse impact to scenic resources because this is such an important viewshed for the Ice Age NST. Therefore, the C-HC Project, would have a long-term major adverse impact to scenic resources at this location.

Moderate adverse visual impacts would occur from either transmission line segment (Y or Z) at the location represented in the simulation from viewpoint 5 (Figure 3.11-17 and Figure 3.11-18). The C-HC Project would be visible in the middle-ground along Highway 14 approximately 1.1 miles away.

In the visual simulation from viewpoint 6 (Figure 3.11-19 and Figure 3.11-20), the proposed C-HC Project would be partially obscured by topography and vegetation, but it would be visible approximately 1.3 miles away towards the left of the viewshed. It should be noted that photographs from this viewpoint were collected using a drone due to obstructed ground-level visibility, and therefore were taken from locations higher than would be seen by a person standing on the ground. At this location, a view of a future segment of the Ice Age NST is in the foreground; therefore, the C-HC Project would result in moderate adverse impacts to viewers from the future segments of the NST at this location.

In the visual simulation for viewpoint 8 (Figure 3.11-21 and Figure 3.11-22), the C-HC Project would be approximately 1.5 miles away and partially obscured by topography and vegetation, but at least one transmission line structure would be visible toward the middle of the viewshed. Figure 3.11-22 shows a zoomed-in view of the structure. As shown in Figure 3.11-21, the structure would be difficult to see with the human eye from this Ice Age NST viewpoint. Therefore, C-HC Project would result in minor adverse impacts to viewers from the future segments of the NST at this location.

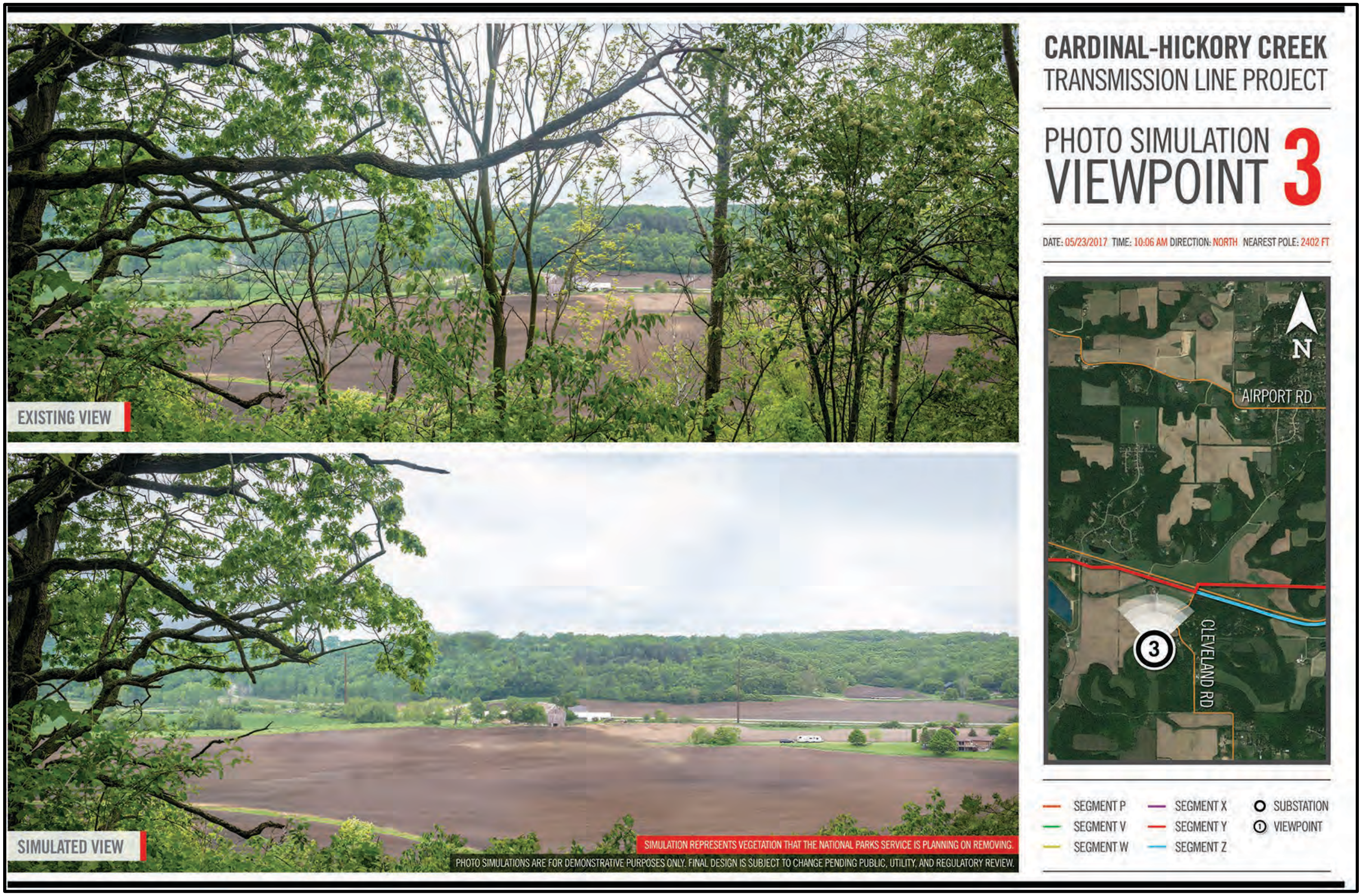

Figure 3.11-15. Visual simulation from viewpoint 3 in the vicinity of the Ice Age NST within 2,402 feet of the proposed C-HC Project.

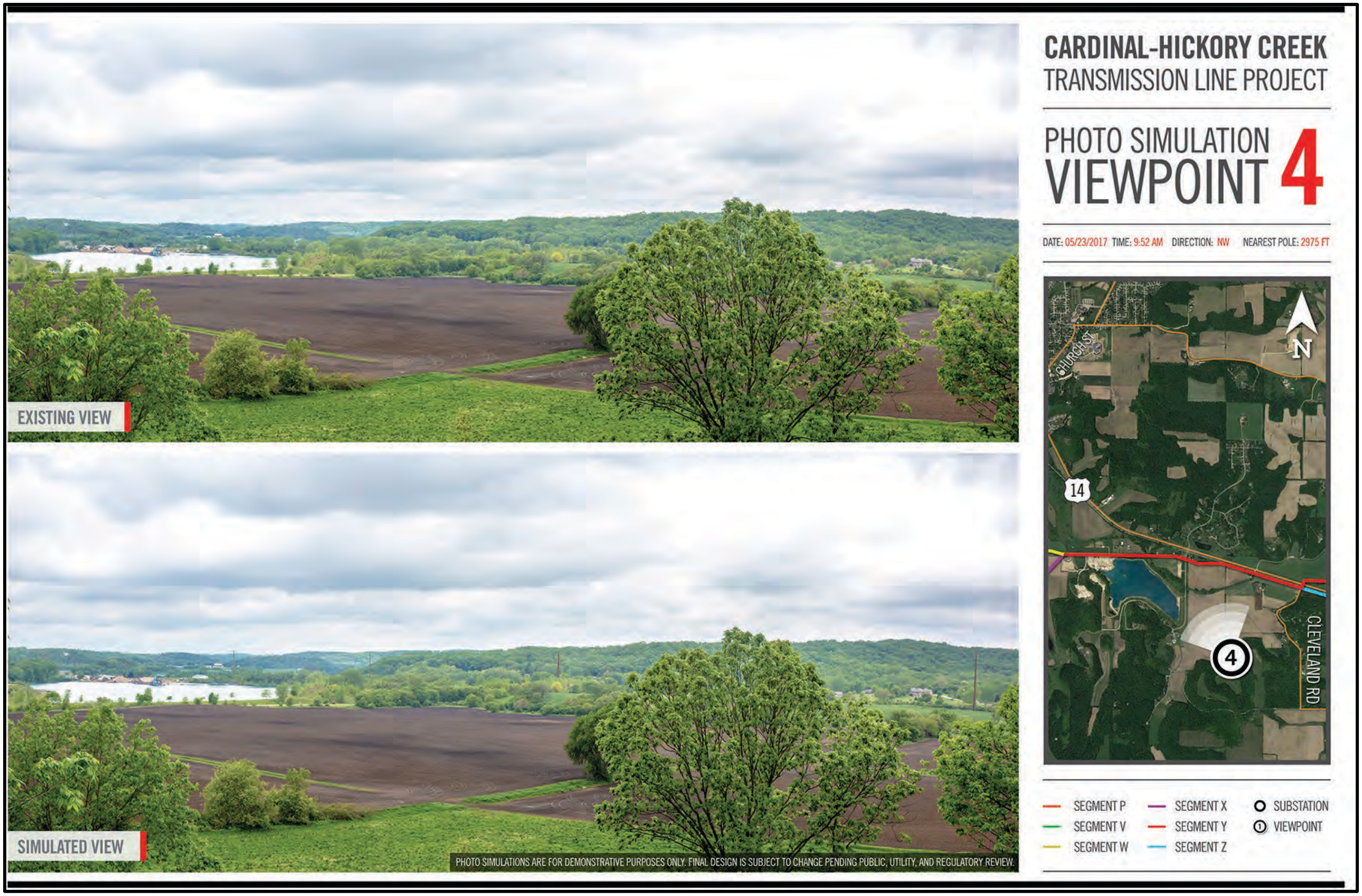

Figure 3.11-16. Visual simulation from viewpoint 4 in the vicinity of the Ice Age NST within 2,975 feet of the proposed C-HC Project.

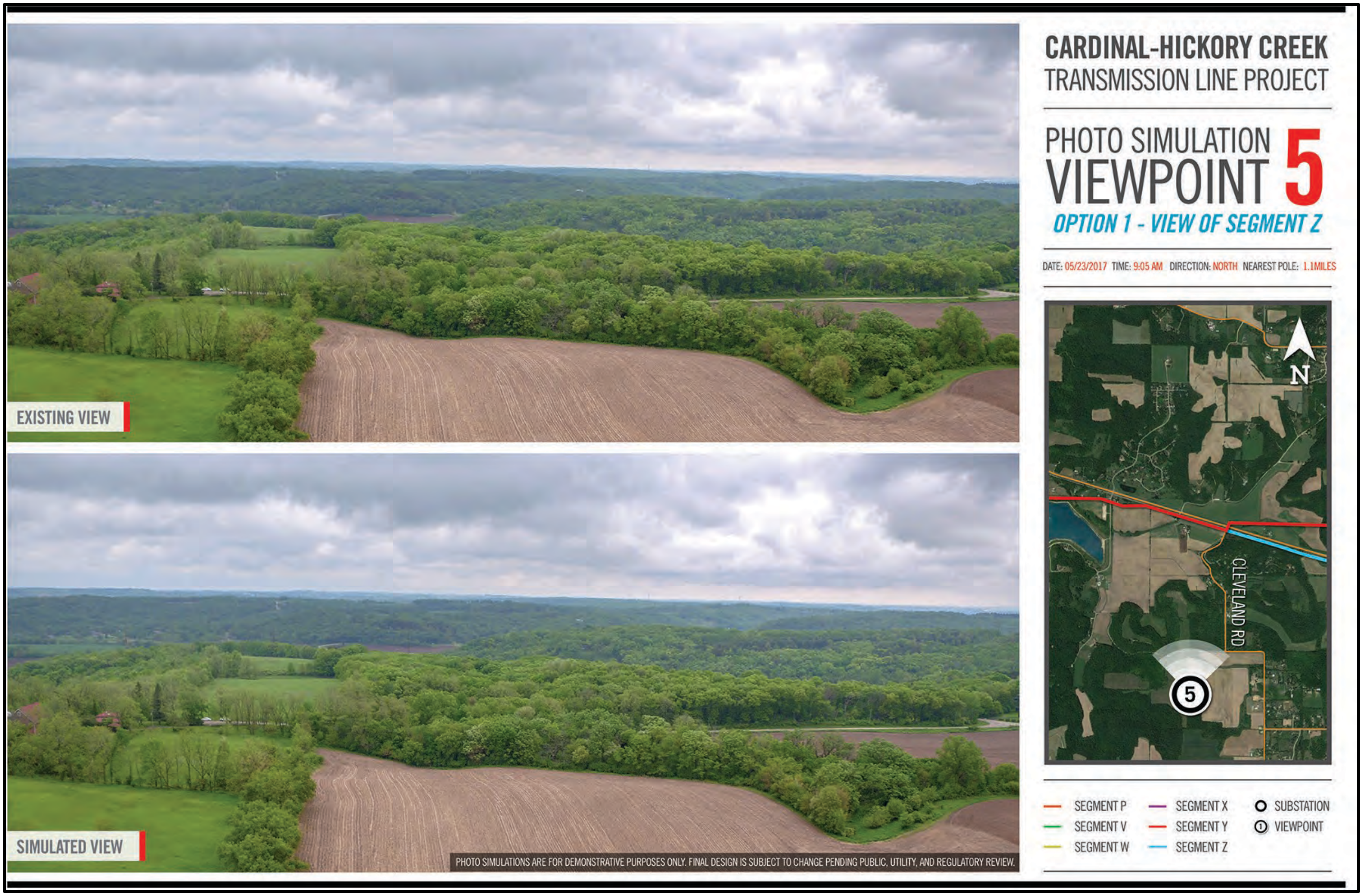

Figure 3.11-17. Visual simulation from viewpoint 5, Option 1 – view of Segment Z, in the vicinity of the Ice Age NST within 1.1 miles of the proposed C-HC Project.

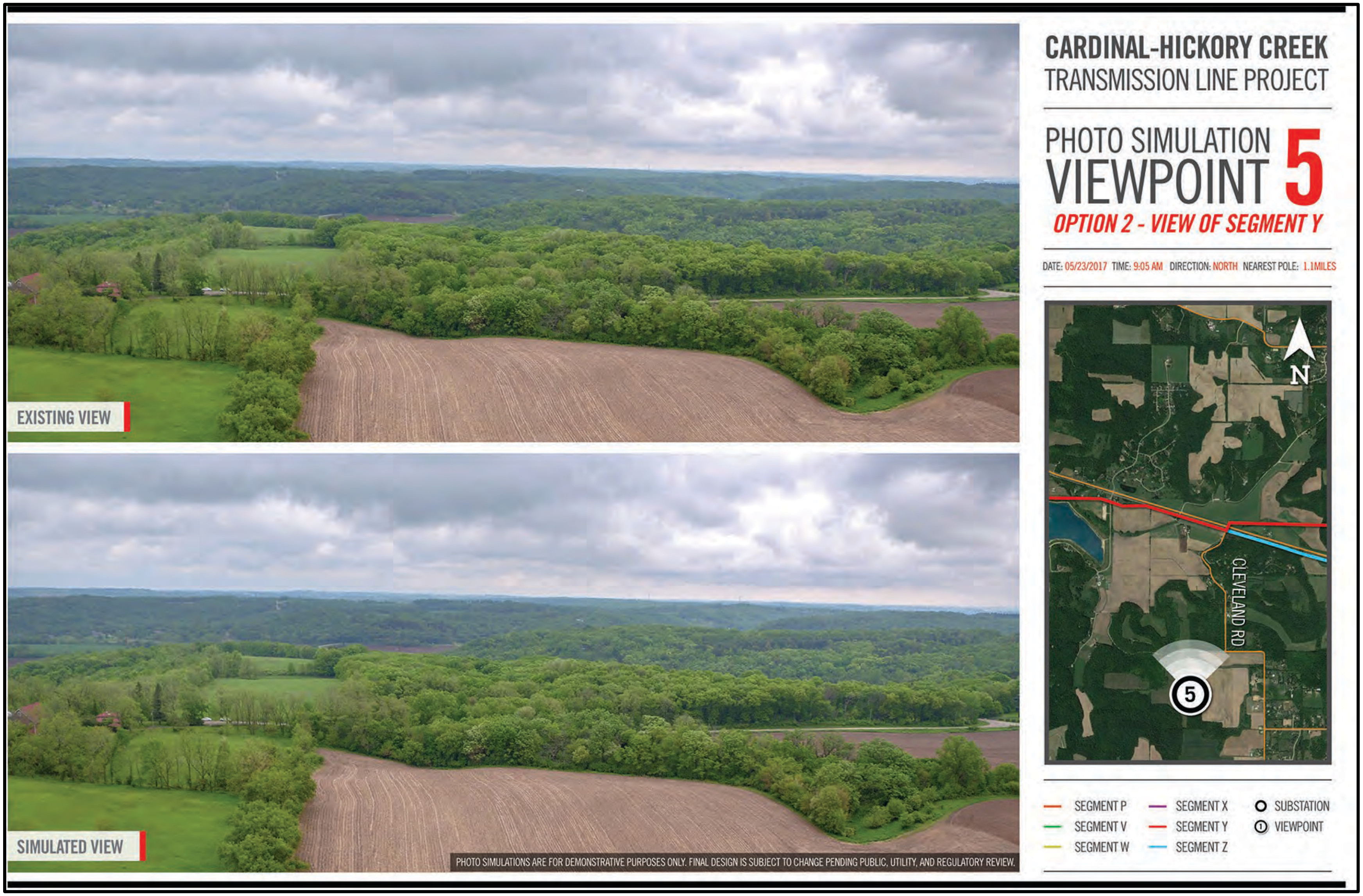

Figure 3.11-18. Visual simulation from viewpoint 5, Option 2 – view of Segment Y, in the vicinity of the Ice Age NST within 1.1 miles of the proposed C-HC Project.

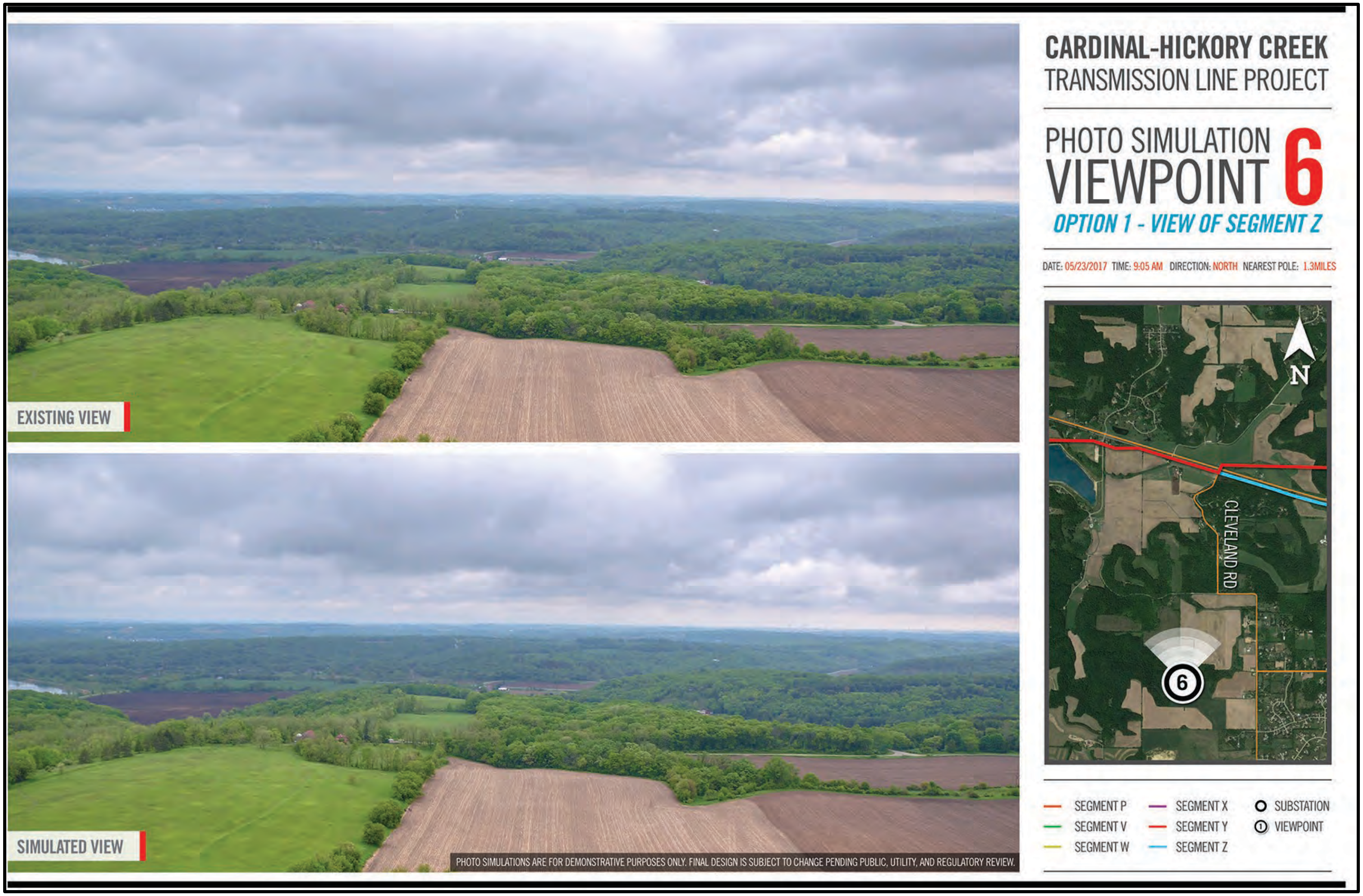

Figure 3.11-19. Visual simulation from viewpoint 6, Option 1 – view of Segment Z, in the vicinity of the Ice Age NST within 1.3 miles of the proposed C-HC Project.

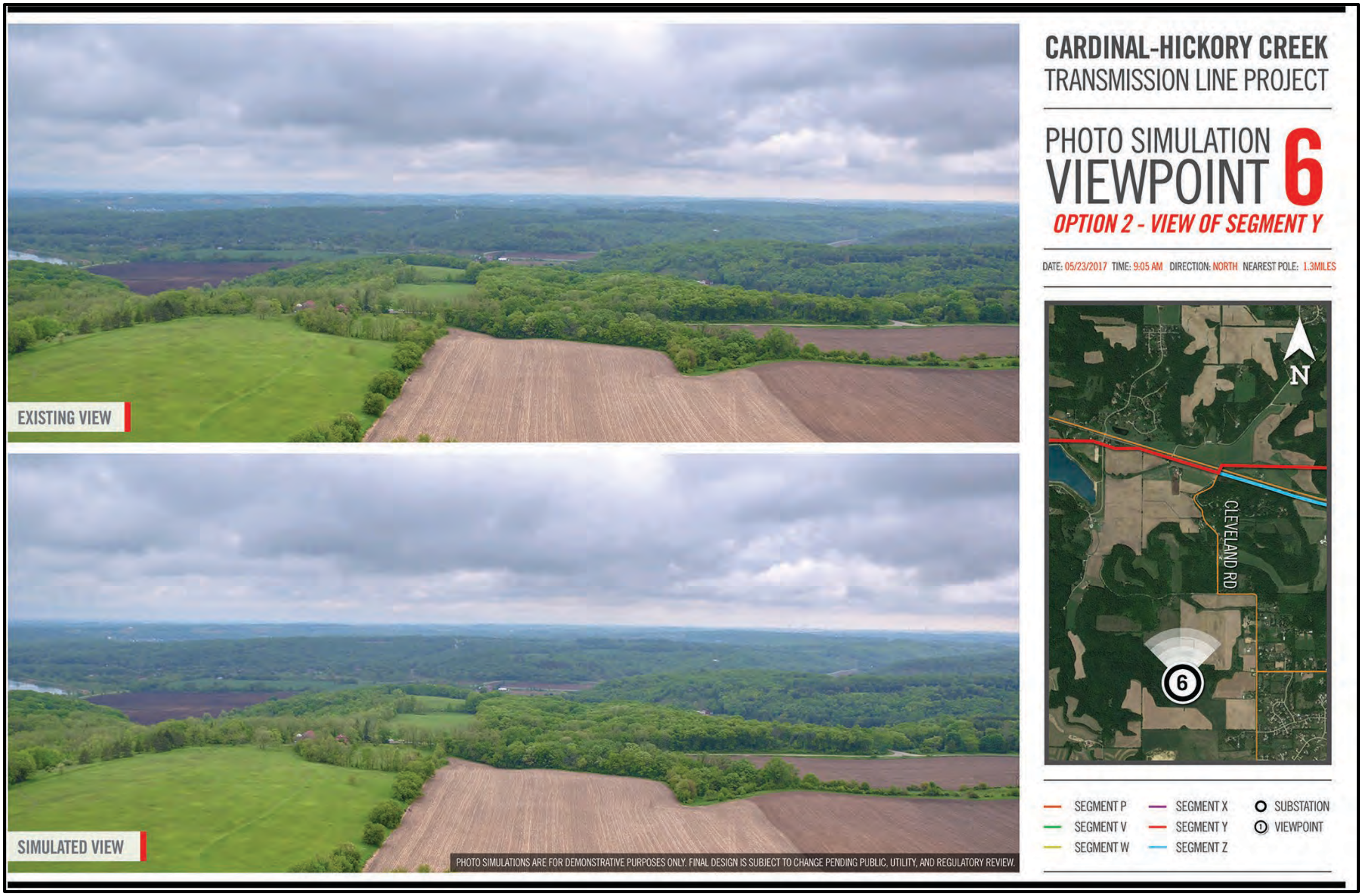

Figure 3.11-20. Visual simulation from viewpoint 6, Option 2 – view of Segment Y, in the vicinity of the Ice Age NST within 1.3 miles of the proposed C-HC Project.

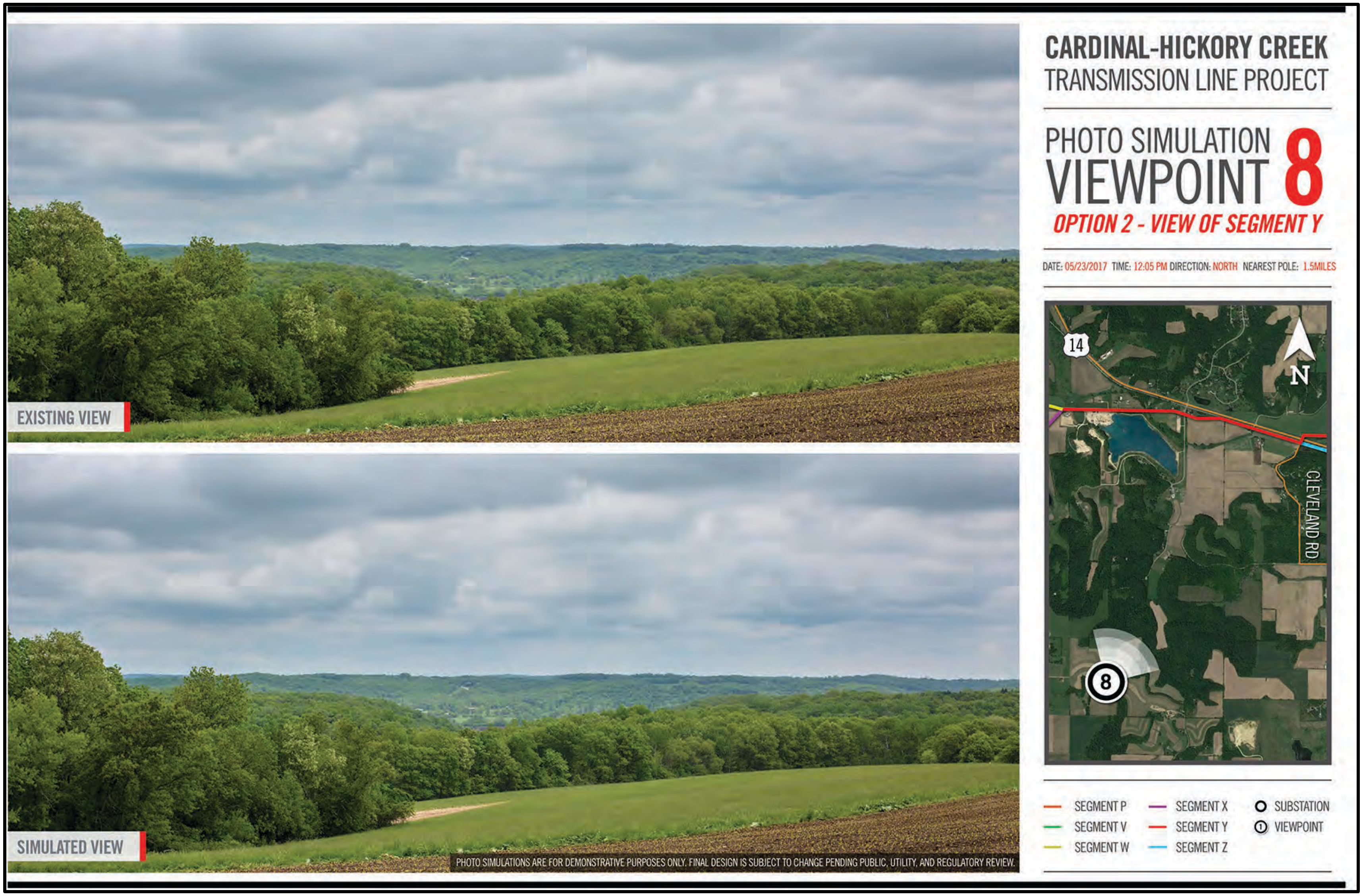

Figure 3.11-21. Visual simulation from viewpoint 8, Option 1 – view of Segment Y (human eye view), in the vicinity of the Ice Age NST within 1.5 miles of the proposed C-HC Project.

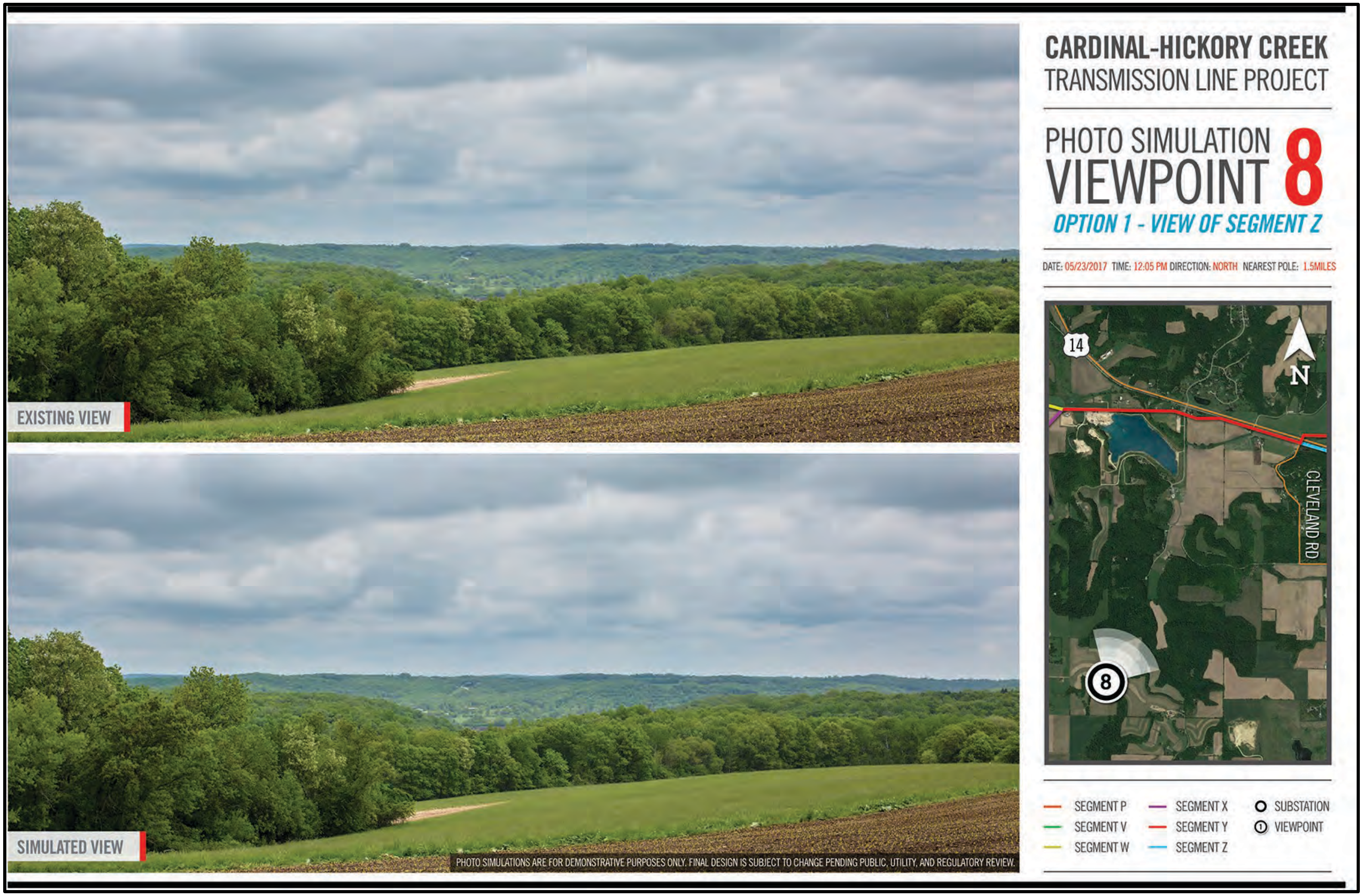

Figure 3.11-22. Visual simulation from viewpoint 8, Option 2 – view of Segment Z (zoomed-in), in the vicinity of the Ice Age NST within 1.5 miles of the proposed C-HC Project.

3.11.2.4 ALTERNATIVE 1

3.11.2.4.1 Visual Characteristics

The total length of transmission line in Alternative 1 is approximately 99.1 miles, making it the shortest of the six action alternatives. Within the proposed ROW for Alternative 1, there are two private residences; one is southeast of Cross Plains, Wisconsin, and the other is southeast of Millville, Iowa. Because these two residences are within the ROW in close proximity to the C-HC Project, the individual visual impact to these individual residences would be major and long term at these locations, depending on existing visual obstructions between the residences and the C-HC Project. Within the 300-foot analysis area, but outside the ROW, there are an additional 19 private residences, which would generally result in major visual impacts to these residences but could range from moderate to major depending on topography and vegetation screening at each residence. These visual resource impacts would be moderate at the overall project level. This alternative would impact the least number of private residences along the proposed transmission line route.

3.11.2.4.2 Scenic Resources

Upper Mississippi River National Wildlife and Fish Refuge

Visual simulations were conducted from multiple locations within the Refuge (Figure 3.11-23). All action alternatives would cross the Refuge. There are three different options for crossing the Refuge carried forward for detailed analysis as described in Section 2.3.2.7. Segments B-IA1 and B-IA2 are associated with the Nelson Dewey Mississippi River crossing. Impacts from Alternative 1 are represented in viewpoints 1, 2, 3, 4, and 5, which are described below.

Viewpoint 1 is southwest of the Mississippi River within the Refuge. Two photographs were taken from this location to simulate conditions from alternate proposed routes for the C-HC Project. The Nelson Dewey Alignment and Stoneman Revegetation photograph represents simulated conditions under Alternative 1 (Figure 3.11-24), and the nearest transmission structure would be approximately 522 feet away from this location. Under Alternative 1, the existing transmission line that crosses the Mississippi River at the Stoneman Substation would be removed and collocated in the C-HC Project ROW that would cross the Mississippi River at the Nelson Dewey Substation. Low-profile H-frame structures would be constructed within the Refuge under Alternative 1 (as with all action alternatives). The unused portion of the ROW would be revegetated, which would result in minor impacts to visual resources under Alternative 1.

Viewpoint 2 is on Oak Road, which is the access road used to reach the Cassville Car Ferry from Iowa as well as to reach the Turkey River Landing river access point. This location was selected to simulate visual impacts from both route options (B-IA1 and B-IA2) associated with the Nelson Dewey Mississippi River Crossing. Two simulations were conducted from this location to demonstrate the differences in visual impacts between route options. Figure 3.11-25 represents the potential visual impacts from route option B-IA1 where the nearest transmission structure would be approximately 703 feet away from the viewer. Figure 3.11-26.represents the potential visual impacts from route option B-IA2 where the nearest transmission structure would be approximately 118 feet away from the viewer. B-IA1 is the shorter of the two route options, and the C-HC Project would be farther from Oak Road than route option B-IA2. However, both options would result in a major long-term adverse visual impact to viewers along Oak Road in the Refuge.

Viewpoint 3 is also on Oak Road, and is adjacent to a private inholding, which is currently serves as an agricultural field (Figure 3.11-27). Under Alternative 1, the C-HC Project would be adjacent to Oak Road and would be visible from viewpoint 3, which is approximately 532 feet away from the nearest transmission structure, resulting in a major long-term adverse visual impact to viewers along Oak Road in the Refuge.

The visual simulation from viewpoint 4 is from the perspective of an observer on Oak Road near the ferry landing (Figure 3.11-28) approximately 640 feet away from the nearest transmission structure, and viewpoint 5 (Figure 3.11-29) is at the edge of the Mississippi River at the ferry landing approximately 752 feet away from the nearest transmission structure. Both visual simulations represent the C-HC Project crossing the Mississippi River at the Nelson Dewey Substation site. There are existing transmission line corridors visible on the north side of the river as well as the existing Nelson Dewey Substation and the recently demolished Nelson Dewey generation plant site. The C-HC Project would result in additional visual impacts to visitors, fishermen, and wildlife photographers as well as car ferry users in this area, particularly on the south side of the river. Due to the amount of development already occurring within this viewshed, the visual resource impacts to the Refuge from the C-HC Project would be long term and moderate at this location.

Under Alternative 1, the Utilities would remove the existing transmission lines that cross the Mississippi River at the Stoneman Substation because the ROW would be shifted north on the river to the Mississippi River crossing at the Nelson Dewey Substation. The existing ROW would be abandoned, and the Utilities would restore the vegetation within the ROW with native vegetation. The visual simulation from photo viewpoint 6 (Figure 3.11-30), at the Cassville Public Landing, represents the ROW revegetation that would occur following the removal of the existing transmission line that crosses the Mississippi River near the Stoneman Substation. The revegetation of the existing ROW would be a beneficial long-term visual impact to the Refuge as well as the observers looking into the Refuge from Cassville, Wisconsin.

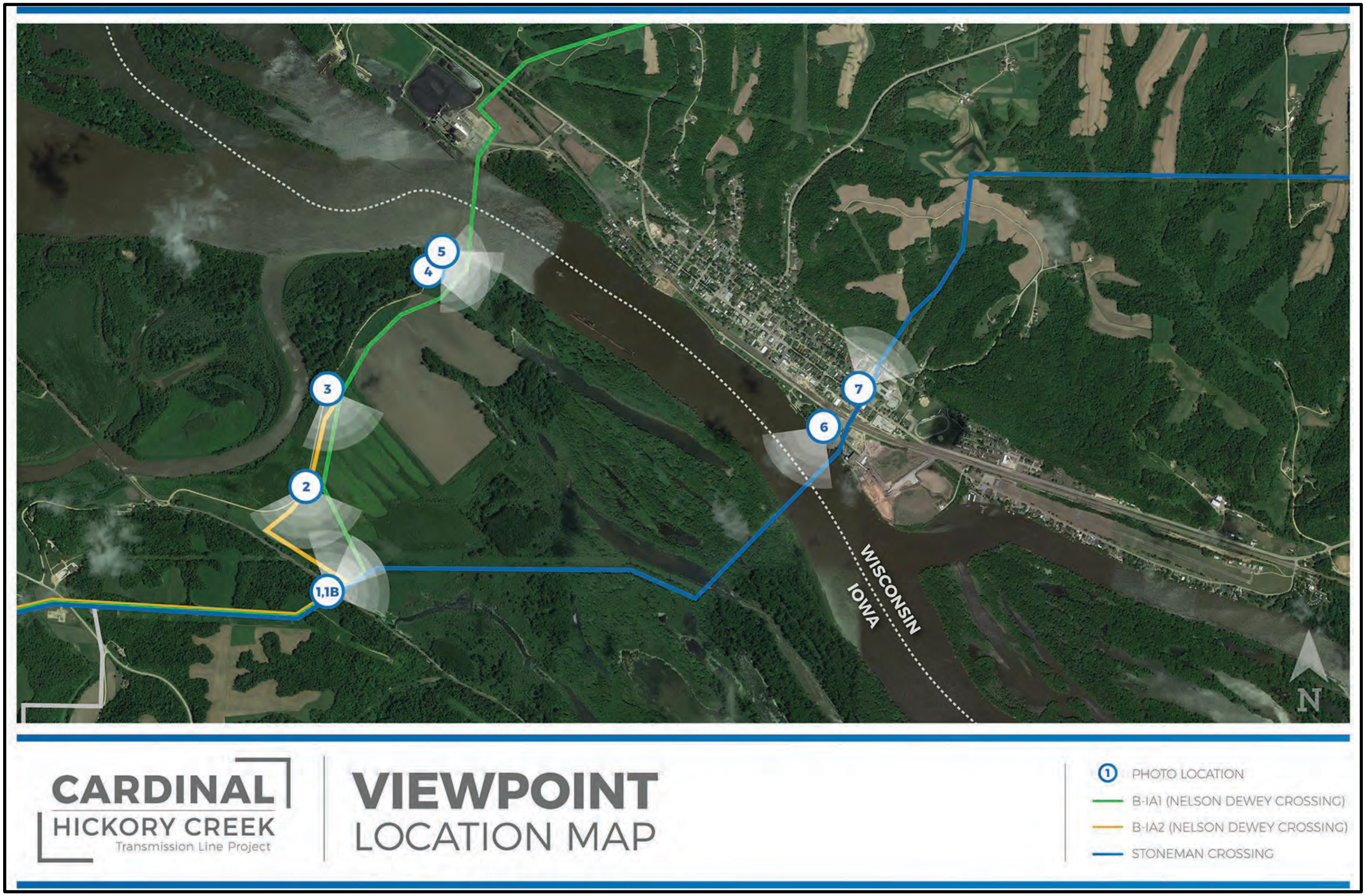

Figure 3.11-23. Overview of visual simulation viewpoints in the vicinity of the Refuge.

Figure 3.11-24. Visual simulation from viewpoint 1 under Alternative 1 within 522 feet of the proposed C-HC Project.

Figure 3.11-25. Visual simulation from viewpoint 2 within the Refuge, on Oak Road (Segment B-IA1) within 703 feet of the proposed C-HC Project.

Figure 3.11-26. Visual simulation from viewpoint 2 within the Refuge, on Oak Road (Segment B-IA2) within 118 feet of the proposed C-HC Project.

Figure 3.11-27. Visual simulation from viewpoint 3 within the Refuge, on Oak Road (Segments B-IA1 and B-IA2) within 532 feet of the proposed C-HC Project.

Figure 3.11-28. Visual simulation from viewpoint 4 showing Alternative 1 in the Refuge to the Mississippi River crossing at the Nelson Dewey Substation (Segments B-IA1 and B-IA2) within 640 feet of the proposed C-HC Project.

Figure 3.11-29. Visual simulation from viewpoint 5 showing the Mississippi River crossing under Alternative 1 (Segments B-IA1 and B-IA2) within 752 feet of the proposed C-HC Project.

Figure 3.11-30. Visual simulation from viewpoint 6 showing the revegetation of the existing transmission line crossing of the Mississippi River at the Stoneman Substation.

Great River Road National Scenic Byway

Three KOPs were identified along the Wisconsin portion of the Great River Road (see Figure 3.11-1), two of which would be impacted by Alternative 1. At these two locations, it was determined that a simulation would not be required to analyze impacts to visual resources due to the dense and tall vegetation along the Great River Road that would likely obstruct viewers from seeing most of the C-HC Project for a long duration of time. However, it is possible that viewers could observe lines crossing the road at these locations for a short duration, while driving or cycling on the road, or in leaf-off conditions, resulting in a minor impact at these locations. Figure 3.11-31 and Figure 3.11-32 represent the existing view from the northwest and southeast locations along the Great River Road, respectively.

Figure 3.11-31. Northwest KOP location on the Great River Road in Wisconsin.

Figure 3.11-32. Southeast KOP location on the Great River Road in Wisconsin.

3.11.2.5 ALTERNATIVE 2

3.11.2.5.1 Visual Characteristics

The total length of Alternative 2 is approximately 104.3 miles. Within the proposed ROW for Alternative 2, there are two private residences: one is southeast of Cross Plains and the other is north of Dodgeville. Because these two residences are within the ROW in close proximity to the C-HC Project, the visual impact to these individual residences would be major and long term at these locations depending on existing visual obstructions between the residences and the C-HC Project. Within the 300-foot analysis area, but outside the ROW, there are an additional 26 private residences, which would generally result in major visual impacts to these residences but could range from moderate to major depending on topography and vegetation screening at each residence. These visual resource impacts would be moderate at the overall project level.

3.11.2.5.2 Scenic Resources

Upper Mississippi River National Wildlife and Fish Refuge

Visual simulations were conducted from multiple locations within the Refuge (see Figure 3.11-23). Impacts from Alternative 2 are represented in viewpoints 1B and 6.

Viewpoint 1B is southwest of the Mississippi River within the Refuge (Figure 3.11-33) approximately 748 feet away from the nearest transmission structure. The Stoneman Alignment represents simulated conditions under Alternative 2 (Figure 3.11-34). At this viewpoint, the C-HC Project would be built within the ROW for the existing transmission lines using low-profile H-frame structures. Alternative 2 would result in long-term minor impacts to visual resources within the Refuge.

The visual simulation from viewpoint 6 (see Figure 3.11-34), at the Cassville Public Landing, represents the Stoneman crossing of the Mississippi River. Two simulations were conducted from this KOP to simulate conditions from alternate proposed routes for the C-HC Project. Under Alternative 2, the existing transmission line that crosses the river at this location would be removed and replaced with an H-frame structure (shown approximately 1,628 feet away from the viewpoint) resulting in a minor impact to viewers and recreational users at this location from the C-HC Project.

Great River Road National Scenic Byway

The visual simulation from photo viewpoint 7 (Figure 3.11-35) is in the town of Cassville on the Great River Road. At this viewpoint, the C-HC Project would be approximately 191 feet away from the viewer and would have angular redirections. New transmission line structures would be within Cassville and on the bluffs overlooking the community. There are existing multiple distribution lines and one transmission line visible from this viewpoint. The addition of the structures associated with the C-HC Project would dominate the view at this location; therefore, the C-HC Project would have a major long-term impact within Cassville and along the Great River Road at this location under Alternative 2.

Figure 3.11-33. Visual simulation from viewpoint 1 showing Alternative 2 in the Refuge to the Mississippi River Crossing at the Stoneman Substation within 748 feet of the proposed C-HC Project.

Figure 3.11-34. Visual simulation from viewpoint 6 showing the Stoneman crossing of the Mississippi River (Segment C-IA) within 1,628 feet of the proposed C-HC Project.

Figure 3.11-35. Visual simulation from viewpoint 7 showing the C-HC Project in the town of Cassville within 191 feet of the proposed C-HC Project.

3.11.2.6 ALTERNATIVE 3

3.11.2.6.1 Visual Characteristics

The total length of Alternative 3 is approximately 116.8 miles. Within the proposed ROW for Alternative 3, there are three private residences: one is southeast of Cross Plains, Wisconsin, one is north of Dodgeville, Wisconsin, and one is in the town of Cassville, Wisconsin. Because these three residences are within the ROW in close proximity to the C-HC Project, the visual impact to these individual residences would be major and long term at these locations depending on existing visual obstructions between the residences and the C-HC Project. Within the 300-foot analysis area, but outside the ROW, there are an additional 34 private residences, which would generally result in major visual impacts to these residences but could range from moderate to major depending on topography and vegetation screening at each residence. These visual resource impacts would be moderate at the overall project level.

3.11.2.6.2 Scenic Resources

Under Alternative 3, visual impacts to scenic resources within the Refuge and along the Great River Road would be the same as those described for Alternative 2.

3.11.2.7 ALTERNATIVE 4

3.11.2.7.1 Visual Characteristics

The total length of Alternative 4 is approximately 119.2 miles. Within the proposed ROW for Alternative 4, there are nine private residences; one is southeast of Cross Plains, Wisconsin, one is in Barneveld, Wisconsin, one is southwest of Ridgeway, Wisconsin, two are northwest of Dodgeville, Wisconsin, two are east of Montfort, Wisconsin along Highway 18, one is in Cassville, Wisconsin, and one is southeast of Millville, Iowa. Because these nine residences are within the ROW in close proximity to the C-HC Project, the visual impact to these individual residences would be major and long term at these locations depending on existing visual obstructions between the residences and the C-HC Project. Within the 300-foot analysis area, but outside the ROW, there are an additional 52 private residences, which would generally result in major visual impacts to these residences but could range from moderate to major depending on topography and vegetation screening at each residence. These visual resource impacts would be moderate at the overall project level. This alternative would impact the greatest number of private residences along the proposed transmission line route.

3.11.2.7.2 Scenic Resources

Under Alternative 4, visual impacts to scenic resources within the Refuge and along the Great River Road would be the same as those described for Alternative 2.

Blue Mound State Park

Under this alternative, the proposed C-HC Project would be approximately 1.2 miles from the park and constructed within the existing ROW of Highway 18/151. Simulations from two KOPs at the west and east observation towers within Blue Mound State Park revealed that the proposed C-HC Project would most likely not be visible from either location (Figure 3.11-36 and Figure 3.11-37, respectively); therefore, there would be no impact to scenic resources within Blue Mound State Park.

Figure 3.11-36. Visual simulation from the west observation tower in Blue Mound State Park in Wisconsin within 1.2 miles of the proposed C-HC Project.

Figure 3.11-37.

3.11.2.8 ALTERNATIVE 5

3.11.2.8.1 Visual Characteristics

The total length of Alternative 5 is approximately 128.2 miles, making it the longest of the six action alternatives. Within the proposed ROW for Alternative 5, there are two private residences: one is southeast of Cross Plains, Wisconsin, and one is in Barneveld, Wisconsin. Because these two residences are within the ROW in close proximity to the C-HC Project, the visual impact to these individual residences would be major and long term at these locations depending on existing visual obstructions between the residences and the C-HC Project. Within the 300-foot analysis area, but outside the ROW, there are an additional 53 private residences, which would generally result in major visual impacts to these residences but could range from moderate to major depending on topography and vegetation screening at each residence. These visual resource impacts would be moderate at the overall project level.

3.11.2.8.2 Scenic Resources

Under Alternative 5, visual impacts to scenic resources within the Refuge and along the Great River Road would be the same as those described for Alternative 1.

Visual impacts to Blue Mound State Park would be the same as those described for Alternative 4.

3.11.2.9 ALTERNATIVE 6

3.11.2.9.1 Visual Characteristics

The total length of Alternative 6 is approximately 101.9 miles. Within the proposed ROW for Alternative 6, there are eight private residences: one is southeast of Cross Plains, Wisconsin; one is in Barneveld, Wisconsin; one is southwest of Ridgeway, Wisconsin, along Highway 18; two are west of Dodgeville, Wisconsin; two are east of Montfort, Wisconsin; and one is southeast of Millville, Iowa. Because these eight residences are within the ROW in close proximity to the C-HC Project, the visual impact to these individual residences would be major and long term at these locations depending on existing visual obstructions between the residences and the C-HC Project. Within the 300-foot analysis area, but outside the ROW, there are an additional 39 private residences, which would generally result in major visual impacts to these residences but could range from moderate to major depending on topography and vegetation screening at each residence. These visual resource impacts would be moderate at the overall project level.

3.11.2.9.2 Scenic Resources

Under Alternative 6, visual impacts to scenic resources within the Refuge and along the Great River Road would be the same as those described for Alternative 1.

Visual impacts to Blue Mound State Park would be the same as those described for Alternative 4.

3.11.3 *Summary of Impacts*

The greatest individual visual impact would be to people living very close to the C-HC Project; therefore, there is a direct relationship between individual visual impact and the number of residences in proximity to the C-HC Project. Table 3.11-2 is a comparison of the number of private residences impacted for each action alternative. Alternative 4 would impact the greatest number of private residences within the ROW (i.e., major impacts), and would also impact the greatest number of residences overall. Alternatives 1, 2, and 5 would have the least amount of major impacts to residences within the ROW, and Alternative 1 would impact the least number of residences overall.

Table 3.11-2. Number of Private Residences with Potential Visual Impacts for All Alternatives

	Private Residences within ROW	Private Residences Outside ROW, within Analysis Area
Alternative 1	2	19
Alternative 2	2	26
Alternative 3	3	34
Alternative 4	9	52
Alternative 5	2	53
Alternative 6	8	35

The N-9 transmission line decommissioning that would occur within the Refuge would result in short-term minor impacts to visual resources during decommissioning. There would be long-term beneficial impacts after decommissioning to the Refuge. The N-9 transmission line decommissioning and tap line construction on private land would also result in short-term minor impacts during decommissioning. There would also be long-term beneficial impacts after decommissioning.

3.11.3.1 ICE AGE NATIONAL SCENIC TRAIL

Under all alternatives, visual impacts to users of the Ice Age NST would occur. The severity of these impacts from various KOPs was determined by conducting visual simulations. From most of the KOPs, minor visual impacts would occur in areas where the proposed C-HC Project would be partially visible from existing or future segments of the Ice Age NST. Moderate impacts would occur where the C-HC Project would be in closer proximity and/or entirely visible from overlooks. At two KOPs, which represent important viewsheds for the Ice Age NST, major visual impacts would occur (see Figure 3.11-15 and Figure 3.11-16).

3.11.3.2 UPPER MISSISSIPPI RIVER NATIONAL WILDLIFE AND FISH REFUGE

Under Alternatives 1, 5, and 6, minor impacts to scenic resources within the Refuge would occur from the C-HC Project at the Stoneman alignment/revegetation KOP. Major adverse impacts would occur from the C-HC Project at the KOP along Oak Road. Moderate impacts to viewers would occur at the Nelson Dewey River crossing KOP at the Oak Road Ferry Landing, and beneficial impacts to viewers would occur from the Stoneman River crossing at the Cassville public landing KOP due to the removal of the existing transmission line and revegetation of the ROW.

Under Alternatives 2, 3, and 4, minor impacts to scenic resources within the Refuge would occur from the C-HC Project.

3.11.3.3 GREAT RIVER ROAD NATIONAL SCENIC BYWAY

Alternatives 1, 5, and 6, would result in minor impacts to users of the Great River Road from the C-HC Project at two KOPs in Wisconsin.

Alternatives 2, 3, and 4, would result in major impacts to users of the Great River Road from the KOP in Cassville, Wisconsin.

3.11.3.4 BLUE MOUND STATE PARK

Alternatives 4, 5, and 6 would be in the vicinity of Blue Mound State Park; however, photographs from two KOPs revealed that the C-HC Project would not be visible from either location.

3.12 Socioeconomics and Environmental Justice

This section describes the social and economic (commonly referred to as socioeconomic) conditions of the analysis area. Socioeconomic characteristics used to describe the affected environment include population and demographics, housing, employment sectors, tourism, and property values. This section also identifies any environmental justice communities in the analysis area. Environmental justice includes the fair treatment and meaningful involvement of all people—regardless of race, ethnicity, or income level—in Federal environmental decision-making.

3.12.1 *Affected Environment*

The socioeconomics analysis area stretches across four counties in Wisconsin (Dane, Iowa, Lafayette, and Grant Counties) and two counties in Iowa (Clayton and Dubuque Counties). This analysis area was chosen because it contains the project area and because socioeconomic statistics are typically measured according to political boundaries, such as counties and towns. Socioeconomic information for the analysis area and the states are provided in this section.

3.12.1.1 DEMOGRAPHICS

The counties in the analysis area are predominantly rural with small populations in towns and communities across the study area. Dane County, Wisconsin, has the largest 2016 population of all the counties in the analysis area (approximately 516,818), followed by Dubuque County, Iowa (approximately 93,359), and Grant County, Wisconsin (approximately 51,723).

The population of all of the analysis area counties combined increased approximately 4.6% between 2010 and 2016, while the populations of Wisconsin and Iowa increased approximately 1.2% and 2.0%, respectively, during that time. The counties in the analysis area that have experienced the greatest growth between 2010 and 2016 include Dane County, Wisconsin (approximately 5.9%) and Dubuque County, Iowa (approximately 2.9%), while Clayton County, Iowa, and Lafayette County, Wisconsin, have both experienced decreases in population between 2010 and 2016 (2.2% and 0.3% decreases, respectively). The populations of these counties are shown in Table 3.12-1.

Table 3.12-1. Population of Study Area Counties (2000, 2010, 2016)

County/State	2000 Population	2010 Population	2016 Population	% Change 2000–2010	% Change 2010–2016
Dane County	426,526	488,073	516,818	14.4%	5.9%
Iowa County	22,780	23,687	23,751	4.0%	0.3%
Lafayette County	16,137	16,836	16,793	4.3%	−0.3%
Grant County	49,597	51,208	51,723	3.2%	1.0%
State of Wisconsin	5,363,675	5,686,986	5,754,798	6.0%	1.2%
Clayton County	18,678	18,129	17,735	−2.9%	−2.2%
Dubuque County	89,143	93,653	96,359	5.1%	2.9%
State of Iowa	2,926,324	3,046,355	3,106,589	4.1%	2.0%
Total Analysis Area	**622,861**	**691,586**	**723,179**	**11.0%**	**4.6%**

Source: U.S. Census Bureau (2000, 2010, 2016a)

There are several communities within the analysis area. The populations of communities within and near the analysis area are shown in Table 3.12-2.The largest town is Platteville, Wisconsin, followed by Mount Horeb, Wisconsin; Dodgeville, Wisconsin; Lancaster, Wisconsin; Cross Plains, Wisconsin; and Fennimore, Wisconsin. The remaining towns all have populations of less than 1,600 people.

Table 3.12-2. Populations of Towns within Study Area (2014)

Town	County	2014 Population
Black Earth, WI	Dane	1,410
Blue Mounds, WI	Dane	870
Cross Plains, WI	Dane	3,755
Mazomanie, WI	Dane	1,585
Mount Horeb, WI	Dane	7,286
Arena, WI	Iowa	807
Barneveld, WI	Iowa	1,223
Cobb, WI	Iowa	506
Dodgeville, WI	Iowa	4,693
Highland, WI	Iowa	914
Linden, WI	Iowa	541
Rewey, WI	Iowa	300
Ridgeway, WI	Iowa	584
Livingston, WI	Grant and Iowa	645
Montfort, WI	Grant and Iowa	710
Bloomington, WI	Grant	836
Cassville, WI	Grant	804
Fennimore, WI	Grant	2,416
Lancaster, WI	Grant	3,830
Platteville, WI	Grant	11,480
Millville, IA	Clayton	21
Luxemburg, IA	Dubuque	192
Holy Cross, IA	Dubuque	369

Source: U.S. Census Bureau (2014)

It is expected that the population in the analysis area will continue to increase following existing population trends. Estimates indicate that the population of the state of Wisconsin and the state of Iowa increased by approximately 166,608 and 39,122 between 2016 and 2017 (U.S. Census Bureau 2018). The population in the analysis area counties increased by approximately 20,370 people between 2016 and 2017 (U.S. Census Bureau 2018).

3.12.1.2 HOUSING

The total number of housing units within the analysis area counties, the state of Wisconsin as a whole, and the state of Iowa as a whole are displayed in Table 3.12-3, along with various characteristics of the housing in the study area. The percent of housing that is owner-occupied is higher in the analysis area counties (70.6%–76.0%), compared with 67.0% for Wisconsin and 71.1% for Iowa, except for Dane

County, Wisconsin (with 58.3%). Clayton County, Iowa, and Lafayette County, Wisconsin, have the highest rates of owner-occupied housing. Vacancy rates are relatively low throughout the study area (0.6%–1.7% for homeowner units) and the states as a whole (1.7% for Wisconsin and 1.5% for Iowa), with the lowest rates occurring in Dubuque County, Iowa, and Lafayette County, Wisconsin.

Single-family housing accounts for the majority of housing in Wisconsin (70.9%) and Iowa (77.4%) as well as the analysis area counties, with Lafayette County, Wisconsin, having the highest percentage of single-family housing (83.9%). There is a higher percentage of multifamily housing in the states compared to the analysis area counties, except for Dane County, Wisconsin, and Dubuque County, Iowa.

Conversely, mobile homes constitute a smaller percentage of housing units in the states, compared with the analysis area counties, except for Dane County, Wisconsin.

Table 3.12-3. Housing Characteristics in the Analysis Area (2016)

	Dane County	Iowa County	Lafayette County	Grant County	State of Wisconsin	Clayton County	Dubuque County	State of Iowa	Analysis Area
Number of Housing Units	222,808	10,760	7,238	21,783	2,649,597	9,019	40,424	1,362,619	312,032
Percent Owner-Occupied	58.3%	75.6%	75.9%	70.6%	67.0%	76.0%	72.3%	71.1%	71.5%
Vacancy Rate (homeowner/rental)	1.3/2.2	1.7/5.6	1.1/3.0	1.2/8.1	1.7/4.9	1.6/7.8	0.6/6.4	1.5/6.1	1.3/5.5
Percent Single Family	59.3%	82.0%	83.9%	77.2%	70.9%	80.9%	73.9%	77.4%	76.2%
Percent Mobile Homes	0.7%	5.0%	5.5%	6.0%	3.6%	7.8%	3.8%	3.7%	4.8%
Median Value	$236,000	$166,900	$124,100	$135,400	$167,000	$111,500	$153,000	$132,800	$154,483
Median Rent	$942	$703	$649	$656	$789	$584	$720	$715	$709

Source: U.S. Census Bureau (2016a)

Housing values are lower on average in the analysis area counties ($111,500–$166,900), compared with $167,000 in Wisconsin and $132,800 in Iowa, except for $236,000 in Dane County, Wisconsin and $153,00 in Dubuque County, Iowa, with median values lowest in Clayton County, Iowa and Lafayette County, Wisconsin, and highest in Dane County, Wisconsin, and Iowa County, Wisconsin. Rents are also lower in the study area than in the states as a whole, except for Dane County, Wisconsin, and Dubuque County, Iowa, with the lowest median rent in Clayton County, Iowa, and the highest in Dane County, Wisconsin.

3.12.1.3 EMPLOYMENT

The labor forces in the states of Wisconsin and Iowa increased between 2000 and 2010, as well as between 2010 and 2017. Most of the analysis area counties' labor forces also increased over these time periods. However, the labor force of Grant County, Wisconsin, experienced a slight decrease between 2010 and 2017, and the labor force of Clayton County, Iowa, decreased between 2000 and 2010 and then increased between 2010 and 2017. The labor forces in the analysis area counties between 2000 and 2017 are included in Table 3.12-4.

Unemployment rates in Wisconsin and Iowa and within the analysis area counties were relatively low in 2000, increased between 2000 and 2010, and were back to near 2000 levels for the states and most analysis area counties by 2016 and 2017. The states' annual unemployment rates were below 4.0% in 2000, as was the case for all analysis area counties in 2000. The states' and analysis area counties' annual unemployment rates were all above 5% in 2010. In 2017, the states' and analysis area counties' annual unemployment rates were all at or below 4.0%. Labor force and unemployment rates for the states and analysis area counties are summarized in Table 3.12-4.

Table 3.12-4. Analysis Area Labor Force and Unemployment Rates (2000–2017) (Labor Force / Annual Unemployment Rate)

County or State	2000	2002	2004	2006	2008	2010	2012	2014	2016	2017
Dane County	264,274 / 2.4%	277,232 / 3.4%	283,220 / 3.2%	288,708 / 3.3%	295,779 / 3.4%	293,228 / 5.9%	297,439 / 4.9%	305,805 / 3.7%	318,936 / 2.8%	322,336 / 2.4%
Iowa County	13,590 / 2.9%	14,044 / 4.2%	14,145 / 4.0%	14,358 / 4.3%	14,069 / 4.7%	13,772 / 8.2%	13,549 / 6.7%	13,556 / 5.1%	13,748 / 3.5%	13,969 / 2.9%
Lafayette County	9,145 / 3.1%	9,333 / 5.2%	9,025 / 4.4%	9,163 / 4.1%	9,098 / 4.2%	9,489 / 7.2%	9,399 / 5.6%	9,403 / 4.2%	9,755 / 3.7%	10,213 / 2.5%
Grant County	27,351 / 3.4%	28,151 / 4.9%	27,420 / 4.6%	27,172 / 4.5%	28,114 / 4.8%	28,735 / 7.5%	27,698 / 6.0%	27,747 / 4.8%	28,307 / 3.9%	28,404 / 3.2%
State of Wisconsin	2,973,221 / 3.5%	3,024,319 / 5.4%	3,034,581 / 5.0%	3,058,935 / 4.7%	3,091,796 / 4.9%	3,081,512 / 8.7%	3,073,981 / 7.0%	3,082,564 / 5.4%	3,130,520 / 4.0%	3,151,909 / 3.3%
Clayton County	10,207 / 3.4%	9,943 / 5.7%	9,472 / 6.8%	9,689 / 5.0%	9,972 / 5.5%	9,996 / 8.6%	10,166 / 5.7%	10,204 / 5.0%	10,314 / 4.2%	10,169 / 4.0%
Dubuque County	48,376 / 3.2%	48,870 / 4.0%	49,023 / 4.4%	51,906 / 3.7%	52,196 / 4.4%	54,224 / 5.8%	54,623 / 4.5%	55,648 / 4.1%	55,757 / 3.7%	54,459 / 3.0%
State of Iowa	1,590,453 / 2.6%	1,637,909 / 4.0%	1,601,788 / 4.5%	1,657,584 / 3.7%	1,679,293 / 4.2%	1,678,281 / 6.0%	1,653,141 / 5.0%	1,700,756 / 4.2%	1,696,113 / 3.6%	1,678,549 / 3.1%
Total Study Area	372,943 / 3.1%	387,573 / 4.6%	392,305 / 4.6%	400,996 / 4.2%	409,228 / 4.5%	409,444 / 7.2%	412,874 / 5.6%	422,363 / 4.5%	436,817 / 3.6%	439,550 / 3.0%

Source: U.S. Bureau of Labor Statistics (2018a, 2018b)

Recent monthly unemployment rates in the state and analysis area counties have continued to be below 4.0% except for Clayton County, Iowa, which fluctuated between 6.1% and 2.3% from March 2017 to March 2018 (Table 3.12-5). As expected, unemployment rates tend to rise somewhat during the winter months of January through March, when agricultural and construction activities decrease.

Table 3.12-5. Recent Monthly Unemployment Rates in the Analysis Area

Month	Dane County (%)	Iowa County (%)	Lafayette County (%)	Grant County (%)	State of Wisconsin (%)	Clayton County (%)	Dubuque County (%)	State of Iowa (%)
Mar 2018	2.2	3.2	2.4	3.2	3.2	4.7	3.1	3.0
Feb 2018	2.3	3.6	2.9	3.6	3.3	5.5	3.6	3.5
Jan 2018	2.2	3.1	2.5	3.3	3.1	6.1	3.8	3.6
Dec 2017	1.9	2.3	1.8	2.4	2.7	4.1	3.0	2.9
Nov 2017	2.1	2.4	2.0	2.4	2.8	2.7	2.3	2.5
Oct 2017	2.1	2.2	2.0	2.4	2.7	2.3	2.0	2.3
Sep 2017	2.3	2.3	2.2	2.6	2.9	2.8	2.5	2.8
Aug 2017	2.4	2.6	2.3	3.1	3.3	3.2	3.0	3.1

Month	Dane County (%)	Iowa County (%)	Lafayette County (%)	Grant County (%)	State of Wisconsin (%)	Clayton County (%)	Dubuque County (%)	State of Iowa (%)
July 2017	2.5	2.5	2.6	3.4	3.4	2.9	2.8	3.0
June 2017	2.8	3.0	2.7	3.6	3.6	3.2	2.9	3.2
May 2017	2.4	2.6	2.3	2.9	3.1	3.0	2.6	2.9
Apr 2017	2.2	2.8	2.3	2.7	3.1	3.8	2.8	3.0
Mar 2017	2.5	3.7	3.0	3.9	3.7	5.9	3.7	3.6

Source: U.S. Bureau of Labor Statistics (2018a)

For the state of Wisconsin, the top three sectors in terms of employment in 2016 were manufacturing; government and government enterprises; and health care and social assistance. The top three sectors for the state of Iowa in 2016 were government and government enterprises; state and local government; and retail trade. These sectors are among the top sectors in many of the analysis area counties as well. However, farm employment is among the top sectors in more rural counties such as Lafayette County, Wisconsin, Iowa County, Wisconsin, and Clayton County, Iowa. The utilities sector accounts for 0.3% of the employment in both Wisconsin and Iowa. Annual earnings[2] for the construction industry in the analysis area counties as a whole totaled approximately $1.9 billion in 2016 (BEA 2017). Table 3.12-6 summarizes the employment by industry for the states and analysis area counties.

Table 3.12-6. Analysis Area Employment by Industry (2016)

Industry	Dane County	Iowa County	Lafayette County	Grant County	State of Wisconsin	Clayton County	Dubuque County	State of Iowa	Analysis Area
Farm employment	3,375	1,817	1,577	2,961	85,997	1,610	1,567	90,141	12,907
Forestry, fishing, and related activities	1,267	N/A	N/A	N/A	16,882	N/A	N/A	14,977	1,267
Mining, quarrying, and oil and gas extraction	532	N/A	N/A	N/A	6,934	N/A	N/A	5,000	532
Utilities	1,232	N/A	N/A	72	10,190	N/A	165	6,928	1,469
Construction	19,119	1,006	543	1,510	171,982	1,105	3,592	119,671	26,875
Manufacturing	25,177	1,232	801	2,364	481,518	1,045	9,248	220,989	39,867
Wholesale trade	14,895	641	566	796	142,252	351	3,299	75,763	20,548
Retail trade	38,759	3,986	601	3,143	385,365	1,088	8,420	227,978	55,997
Transportation and warehousing	9,095	N/A	N/A	799	126,582	N/A	2,710	78,785	12,604
Information	17,796	81	N/A	236	56,725	85	1,004	26,846	19,202
Finance and insurance	25,606	420	321	1,165	178,530	418	4,999	130,300	32,929
Real estate and rental and leasing	17,993	552	N/A	1,535	130,664	280	2,453	71,647	22,813
Professional, scientific, and technical services	34,043	419	N/A	913	172,857	273	3,372	82,168	39,020

[2] Earnings is the sum of three components of personal income: wages and salaries, supplements to wages and salaries, and proprietor's income.

Industry	Dane County	Iowa County	Lafayette County	Grant County	State of Wisconsin	Clayton County	Dubuque County	State of Iowa	Analysis Area
Management of companies and enterprises	10,245	34	N/A	217	71,332	N/A	818	20,416	11,314
Administrative and support and waste management and remediation services	21,551	233	206	1,176	178,544	N/A	2,645	87,366	25,811
Educational services	8,230	N/A	25	361	72,295	N/A	3,840	50,497	12,456
Health care and social assistance	40,121	N/A	323	2,647	426,954	N/A	9,152	219,689	52,243
Arts, entertainment, and recreation	9,797	494	83	312	71,849	317	2,004	35,648	13,007
Accommodation and food services	29,604	671	294	1,634	258,043	494	4,757	131,589	37,454
Other services (except government and government enterprises)	20,966	584	N/A	1,560	193,943	623	3,884	110,062	27,617
Government and government enterprises	82,702	1,474	1,116	5,835	437,348	1,389	5,121	269,771	97,637
Federal civilian	5,216	78	47	150	29,157	78	269	17,789	5,838
Military	1,470	62	44	125	15,820	65	366	11,639	2,132
State and local government	76,016	1,334	1,025	5,560	392,371	1,246	4,486	240,343	89,667
Total Employment	**432,105**	**15,732**	**8,004**	**29,683**	**3,676,786**	**11,144**	**73,451**	**2,076,231**	**570,119**

Source: U.S. Bureau of Economic Analysis (2018)

Note: Some employment information is not available (N/A) due to the proprietary nature of the data.

3.12.1.3.1 Agriculture

Based on the 2012 Census of Agriculture, 34.8% (14,568,926 acres) of the total land area in Wisconsin and 85.0% (30,622,731 acres) of the total land area of Iowa is farmland, with an average farm size of 209 acres and 345 acres, respectively (USDA Census of Agriculture 2014). The acres of agricultural lands in the analysis area are discussed in detail in Section 3.10.1.2 (Agricultural Lands). Wisconsin and Iowa ranked ninth and second, respectively, in the United States in total value of agricultural products sold in 2012 ($11.7 billion and $30.8 billion). Crop sales accounted for approximately 39.3% and livestock sales accounted for the remaining 60.7% of total value of agricultural products sold in Wisconsin (USDA Census of Agriculture 2014). In Iowa, crop sales accounted for approximately 56.5% of total value of agricultural products sold and livestock accounted for the remaining 43.5% (USDA Census of Agriculture 2014).

Compared with the state as a whole, the analysis area counties in Wisconsin have a much higher percentage of land in farms, and the analysis area counties in Iowa have a slightly lower percentage of land in farms. Lafayette County, Wisconsin, has the largest percentage of farmland in the analysis area and Dane County, Wisconsin, has the lowest percentage of farmland in the analysis area. Average farm sizes in the analysis area counties were larger than the state averages in all counties except Dane County, Clayton County, and Dubuque County. In terms of the total value of agricultural products sold, Dane County had the highest value and Iowa County had the lowest value. In all the analysis area counties, livestock sales comprise a majority of the total value of agricultural products sold. Iowa County had the highest percentage of livestock sales, while Dane County had the highest percentage of crop sales.

3.12.1.4 TOURISM

Tourism in the analysis area counties identified by members of the public during the public scoping period includes activities such as birdwatching and visitation to Military Ridge State Trail. Popular birdwatching areas in the analysis area includes the Mississippi River, as the Great River Birding Trail parallels the river all the way from the Gulf of Mexico north to its headwaters in Minnesota (Audubon Society 2016). The Refuge is also a popular destination for birdwatching. The Village of Cassville, Wisconsin hosts the Cassville Eagle Days annual event and advertises its birding opportunities resulting from the Village's proximity to the Refuge (Cassville Tourism 2016). Other popular birdwatching areas in the analysis area include Governor Dodge State Park (approximately 3 miles north of Dodgeville, Wisconsin), Festge County Park (approximately 1 mile west of Cross Plains, Wisconsin), and Military Ridge State Trail (Wisconsin Department of Tourism 2018a). Besides birdwatching, Military Ridge State Trail is also a popular destination for cross-country skiing, snowshoeing, hiking, and cycling (Wisconsin Department of Tourism 2018b). Other popular tourist destinations in the analysis area include the Driftless Area, Black Earth Creek, Ice Age National Scenic Trail, and Blue Mound State Park, which provide opportunities for hiking, canoeing, kayaking, cycling, fishing, and other outdoors activities. The Driftless Area, which is a region that overlaps a large portion of the analysis area, attracts tourists because of its unique topography, opportunities for outdoor activities, historic sites, arts and culture, and other entertainment (Driftless Wisconsin 2018b). The Ice Age National Scenic Trail stretches approximately 1,200 miles across Wisconsin and traces the edge of a huge glacier that covered much of North America approximately 15,000 years ago (NPS 2017b). Table 3.12-7 and Table 3.12-8 provide a summary of the economic impact of tourism in the analysis area counties.

Table 3.12-7. Tourism Economic Statistics for Analysis Area Counties in Iowa (2015–2016)

County	Expenditures (Millions)	Payroll (Millions)	Employment	State Tax Receipts (Millions)	Local Tax Receipts
Clayton	$33.2	$4.6	250	$2.2	$670,000
Dubuque	$338.1	$55.9	2,980	$19.9	$4,720,000
State of Iowa	$8,225.2	$1,350.5	69,450	$502.3	$121,980,000

Source: Research Department of the U.S. Travel Association (2017)

Table 3.12-8. Tourism Economic Statistics for Analysis Area Counties in Wisconsin (2017)

County	Direct Visitor Spending (Millions)	Total Business Sales (Millions)	Employment	Total Labor Income (Millions)	State and Local Taxes (Millions)
Dane County	$1,246.8	$2,136.3	21,918	$653.6	$159.4
Iowa County	$36.2	$57.5	423	$11.3	$3.5
Lafayette County	$13.4	$23.2	233	$3.4	$1.7
Grant County	$43.9	$82.9	863	$21.4	$5.4
State of Wisconsin	$12,701.1	$20,607.4	195,255	$5,368.1	$1,536.8

Source: Wisconsin Department of Tourism (2018c)

3.12.1.5 PROPERTY VALUES

Much of the analysis area consists of agricultural, undeveloped, or forested lands. Table 3.12-9 summarizes the acres and value of these lands in analysis area municipalities. Table 3.12-10 summarizes median home values and median property taxes collected on homes in the analysis area counties.

Table 3.12-9. Acres and Value of Agricultural, Undeveloped, and Forested Lands in Analysis Area Municipalities

	Agricultural Land (acres) / Value of Land ($)	Undeveloped Land (acres) / Value of Land ($)	Agricultural Forest Land (acres) / Value of Land ($)	Forest Lands (acres) / Value of Land ($)	Total Acres / Total Value ($)
Town of Black Earth, WI	4,867 / 1,084,600	800 / 1,287,200	1,809 / 3,894,100	981 / 4,500,500	8,457 / 10,766,400
Town of Blue Mounds, WI	12,552 / 2,384,300	1,423 / 2,675,400	2,883 / 6,296,700	749 / 3,247,000	17,607 / 14,603,400
Village of Blue Mounds, WI	130 / 26,600	15 / 22,100	29 / 50,800	15 / 59,700	189 / 159,200
Town of Middleton, WI	3,129 / 786,700	63 / 3,800	218 / 415,000	67 / 418,800	3,477 / 1,624,300
Town of Cross Plains, WI	11,653 / 2,701,000	1,597 / 4,047,400	3,449 / 8,643,800	1,212 / 6,031,500	17,911 / 21,423,700
Town of Mazomanie, WI	6,776 / 1,406,600	1,386 / 2,289,300	1,323 / 3,424,600	482 / 2,382,700	9,967 / 9,503,200
Village of Mount Horeb, WI	78 / 19,000	15 / 32,600	0 / 0	0 / 0	93 / 51,600
Town of Arena, WI	25,123 / 4,018,500	2,643 / 620,400	7,537 / 13,766,200	2,727 / 9,284,500	38,030 / 27,689,600
Village of Arena, WI	382 / 71,700	16 / 3,900	10 / 15,700	0 / 0	408 / 91,300
Village of Barneveld, WI	578 / 80,900	81 / 98,200	7 / 9,800	3 / 8,400	669 / 197,300
Village of Cobb, WI	195 / 44,300	1 / 1,800	1 / 300	0 / 0	197 / 46,400
City of Dodgeville, WI	816 / 155,100	61 / 151,200	25 / 62,500	0 / 0	902 / 368,800
Town of Dodgeville	34,771 / 5,543,200	1,766 / 848,500	3,629 / 6,904,500	1,986 / 7,470,800	42,152 / 20,767,000
Town of Highland, WI	29,158 / 3,853,000	1,671 / 822,000	3,127 / 4,356,000	918 / 2,570,700	34,874 / 11,601,700
Town of Linden, WI	33,463 / 5,647,800	882 / 978,000	342 / 513,600	264 / 777,100	34,951 / 7,916,500
Village of Rewey, WI	218 / 49,500	15 / 4,200	0 / 0	0 / 0	233 / 53,700
Town of Ridgeway, WI	15,502 / 2,437,400	1,553 / 1,924,200	2,231 / 4,647,800	1,056 / 4,428,900	20,342 / 13,438,300
Village of Ridgeway, WI	215 / 34,800	56 / 14,300	77 / 96,300	90 / 232,600	438 / 348,000
Village of Livingston, WI	448 / 115,100	1 / 200	0 / 0	0 / 0	449 / 115,300
Town of Montfort, WI	126 / 20,700	10 / 3,200	0 / 0	0 / 0	136 / 23,900
Village of Montfort, WI	122 / 19,800	10 / 3,200	0 / 0	0 / 0	132 / 23,000
Bloomington, WI	18,316 / 3,931,400	437 / 88,300	1,190 / 1,667,800	372 / 1,043,400	20,315 / 6,730,900
Town of Cassville, WI	13,868 / 2,192,100	663 / 276,900	2,414 / 2,292,600	692 / 1,327,100	17,637 / 6,088,700

	Agricultural Land (acres) / Value of Land ($)	Undeveloped Land (acres) / Value of Land ($)	Agricultural Forest Land (acres) / Value of Land ($)	Forest Lands (acres) / Value of Land ($)	Total Acres / Total Value ($)
Village of Cassville, WI	9 / 2,600	0 / 0	33 / 39,600	0 / 0	42 / 42,200
Town of Fennimore, WI	20,302 / 4,480,700	438 / 131,600	587 / 734,700	121 / 303,500	21,448 / 5,650,500
City of Lancaster, WI	455 / 108,100	21 / 26,800	0 / 0	3 / 4,500	479 / 139,400
Town of South Lancaster	18,587 / 3,494,200	675 / 161,800	447 / 672,700	70 / 209,000	19,779 / 4,537,700
City of Platteville, WI	521 / 128,900	103 / 236,900	0 / 0	25 / 79,900	649 / 445,700
Town of Platteville, WI	15,171 / 2,745,100	898 / 479,600	460 / 460,600	417 / 833,700	16,946 / 4,519,000
Town of Springdale, WI	11,985 / 2,477,400	2,492 / 7,443,800	2,136 / 4,285,400	624 / 2,447,900	17,237 / 16,654,500
Town of Beetown, WI	25,788 / 4,731,000	1,029 / 1,004,100	1,472 / 1,621,400	448 / 984,700	28,737 / 8,341,200
Town of Clifton, WI	18,577 / 3,251,200	1,485 / 1,003,300	1,159 / 1,275,700	370 / 639,700	21,591 / 6,169,900
Town of Ellenboro, WI	18,637 / 2,804,500	1,330 / 920,100	1,969 / 2,285,800	104 / 248,600	22,040 / 6,259,000
Town of Liberty, WI	19,671 / 2,597,700	561 / 236,800	1,674 / 1,762,100	221 / 464,400	22,127 / 5,061,000
Town of Waterloo, WI	16,133 / 2,685,800	833 / 476,700	3,721 / 4,283,800	557 / 1,261,900	21,244 / 8,708,200
Town of Wingville, WI	20,877 / 3,274,850	435 / 44,600	0 / 0	654 / 857,000	21,966 / 4,176,450
Town of Brigham, WI	24,797 / 3,922,600	3,907 / 6,891,200	1,984 / 3,948,300	1,379 / 5,500,400	32,067 / 20,262,500
Town of Eden, WI	17,642 / 3,076,900	839 / 754,900	524 / 786,100	350 / 1,019,300	19,355 / 5,637,200
Town of Vermont, WI	8,261 / 1,480,900	2,334 / 2,768,600	4,779 / 10,731,000	1,648 / 7,155,000	17,022 / 22,135,500
Town of Harrison, WI	18,904 / 2,870,600	891 / 536,400	1,690 / 2,183,600	557 / 1,448,100	22,042 / 7,038,700
Town of Potosi, WI	22,731 / 3,396,800	1,032 / 185,600	2,363 / 2,013,600	944 / 1,616,400	27,070 / 7,212,400
Town of Mifflin, WI	30,146 / 4,809,500	568 / 101,600	330 / 513,000	32 / 98,900	31,076 / 5,523,000
Town of Wyoming, WI	6,920 / 1,157,000	2,094 / 2,853,000	3,451 / 6,884,900	3,722 / 14,319,000	16,187 / 25,213,900
Town of Belmont, WI	21,809 / 4,671,400	1,142 / 560,500	476 / 638,300	152 / 392,600	23,579 / 6,262,800
Town of Elk Grove, WI	21,234 / 4,952,200	640 / 390,300	172 / 215,900	7 / 17,200	22,053 / 5,575,600
Millville, IA*	N/A	N/A	N/A	N/A	
Luxemburg, IA*	N/A	N/A	N/A	N/A	
Holy Cross, IA*	N/A	N/A	N/A	N/A	

Source: Wisconsin Department of Revenue (2017)

*Acreages and values not available (N/A) for municipalities in the State of Iowa.

Table 3.12-10. Median Home Value in Analysis Area Counties

	Dane County	Iowa County	Lafayette County	Grant County	State of Wisconsin	Clayton County	Dubuque County	State of Iowa
Median Home Value (2016)	$236,000	$166,900	$124,100	$135,400	$167,000	$111,500	$153,000	$132,800

Source: U.S. Census Bureau (2016a)

3.12.1.6 ENVIRONMENTAL JUSTICE

Environmental justice includes the fair treatment and meaningful involvement of all people—regardless of race, ethnicity, or income level—in Federal environmental decision-making. Environmental justice programs promote the protection of human health and the environment, empowerment by means of public participation, and the dissemination of relevant information to inform and educate affected communities. Consideration of environmental justice issues is mandated by EO 12898, which was published on February 11, 1994. This EO requires that all Federal agencies incorporate environmental justice into their mission by "identifying and addressing . . . disproportionately high and adverse human health or environmental effects of [their] programs, policies and activities on minority and low-income populations in the United States" (USEPA 1994).

The USEPA defines a community with potential environmental justice populations as one that has a greater percentage of minority or low-income populations than does an identified reference community. Minority populations are those populations having 1) 50% minority population in the affected area, or 2) a significantly greater minority population than the reference area (USEPA 1994). The USEPA has not specified what percentage of the population can be characterized as "significantly greater" in order to define environmental justice populations. Therefore, for the purposes of this analysis, a conservative approach is used to identify potential environmental justice populations; it is assumed that if an analysis area county's minority and/or poverty status population is at least 20% greater than the respective state's minority and/or poverty status populations, there is likely an environmental justice population of concern. Low-income populations were defined as those individuals who are considered living below poverty levels, as defined by the U.S. Census Bureau. The U.S. Census Bureau's poverty thresholds are adjusted to reflect the needs of families of different types and sizes. The poverty threshold is the same throughout the United States and in 2016, the poverty threshold for a family with two adults and two children was $24,339 (U.S. Census Bureau 2017b).

To determine potential environmental justice communities in the analysis area, this analysis looks at minority group populations and poverty levels at the census tract level. A census tract is a geographic region established by the U.S. Census Bureau for analyzing populations. Census tracts often coincde with the limits of cities, towns, or other administrative areas. In the states of Wisconsin and Iowa as a whole, the majority of the population is white (82.1% and 87.0%, respectively) (Table 3.12-11). The largest minority group in the states of Wisconsin and Iowa is Hispanic or Latino (6.5% and 5.6%, respectively). As shown in Table 3.12-11, there are several census tracts in Wisconsin and Iowa that are identified as environmental justice communities because the proportion of a minority group in the census tracts is at least 20% greater than the proportion of that minority group in the state as a whole. These census tracts are highlighted in gray in Table 3.12-11. In Dane County, Wisconsin, 82 of the 105 census tracts have at least one minority group that is at least 20% greater than the proportion of that minority group in the state as a whole. In Grant County, Wisconsin, 4 of the 12 census tracts have at least one minority group that is at least 20% greater than the proportion of that minority group in the state as a whole. In Iowa County, Wisconsin, two of the six census tracts have at least one minority group that is at least 20% greater than the proportion of that minority group in the state as a whole. In Lafayette County, Wisconsin, two of the five census tracts have at least one minority group that is at least 20% greater than the proportion of that minority group in the state as a whole. In Clayton County, Iowa, two of the six census tracts have at least one minority group that is at least 20% greater than the proportion of that minority group in the state as a whole. In Dubuque County, Iowa, 15 of the 26 census tracts have at least one minority group that is at least 20% greater than the proportion of that minority group in the state as a whole.

Table 3.12-11. Racial Characteristics in the Study Area Counties (2016)

Census Tract/State	Total Population*	White, not Hispanic or Latino (% of state or census block group pop.)	Hispanic or Latino (% of state or census block group pop.)	Black or African American (% of state or census block group pop.)	American Indian or Alaskan Native (% of state or census block group pop.)	Asian (% of state or census block group pop.)	Native Hawaiian/ Pacific Islander (% of state or census block group pop.)	Other (% of state or census block group pop.)	Two or More Races (% of state or census block group pop.)
State of Wisconsin	**5,628,875**	**4,727,553 (82.1)**	**371,205 (6.5)**	**355,387 (6.2)**	**47,157 (0.8)**	**147,191 (2.6)**	**1,149 (0.0)**	**3,464 (0.1)**	**101,692 (1.8)**
Dane County Census Tract 1	2,537	1,983 (78.2)	269 (10.6)	42 (1.7)	0 (0.0)	115 (4.5)	0 (0.0)	0 (0.0)	128 (5.0)
Dane County Census Tract 2.01	2,029	1,722 (84.9)	106 (5.2)	0 (0.0)	8 (0.4)	140 (6.9)	0 (0.0)	0 (0.0)	53 (2.6)
Dane County Census Tract 2.02	3,366	2,528 (75.1)	224 (6.7)	87 (2.6)	0 (0.0)	407 (12.1)	5 (0.1)	0 (0.0)	115 (3.4)
Dane County Census Tract 2.04	5,379	3,489 (64.9)	184 (3.4)	327 (6.1)	58 (1.1)	1,064 (19.8)	46 (1.0)	11 (0.2)	200 (3.7)
Dane County Census Tract 2.05	5,119	4,347 (84.9)	0 (0.0)	158 (3.1)	0 (0.0)	419 (8.2)	0 (0.0)	14 (0.3)	181 (3.5)
Dane County Census Tract 3	5,786	3,327 (57.5)	335 (5.8)	29 (0.5)	74 (1.3)	1,805 (31.2)	0 (0.0)	21 (0.4)	195 (3.4)
Dane County Census Tract 4.01	3,344	2,914 (87.1)	169 (5.0)	15 (0.4)	2 (0.1)	153 (4.6)	0 (0.0)	0 (0.0)	91 (2.7)
Dane County Census Tract 4.02	2,536	2,176 (85.8)	38 (1.5)	102 (4.0)	0 (0.0)	186 (7.3)	0 (0.0)	0 (0.0)	34 (1.3)
Dane County Census Tract 4.05	6,585	4,085 (62.0)	923 (14.0)	468 (7.1)	32 (0.5)	943 (14.3)	0 (0.0)	0 (0.0)	134 (2.0)
Dane County Census Tract 4.06	3,142	2,537 (80.7)	90 (2.9)	32 (1.0)	0 (0.0)	440 (14.0)	0 (0.0)	7 (0.2)	36 (1.1)
Dane County Census Tract 4.07	5,500	3,515 (63.9)	507 (9.2)	947 (17.2)	0 (0.0)	382 (6.9)	0 (0.0)	0 (0.0)	149 (2.7)
Dane County Census Tract 4.08	1,747	1,370 (78.4)	77 (4.4)	66 (3.8)	9 (0.5)	102 (5.8)	0 (0.0)	0 (0.0)	123 (7.0)
Dane County Census Tract 5.01	4,364	3,472 (79.6)	290 (6.6)	400 (9.2)	0 (0.0)	194 (4.4)	0 (0.0)	0 (0.0)	8 (0.2)
Dane County Census Tract 5.03	7,541	4,898 (65.0)	994 (13.2)	975 (12.9)	0 (0.0)	401 (5.3)	0 (0.0)	0 (0.0)	273 (3.6)
Dane County Census Tract 5.04	7,208	5,716 (79.3)	228 (3.2)	421 (5.8)	20 (0.3)	690 (9.6)	0 (0.0)	0 (0.0)	133 (1.8)

Census Tract/State	Total Population*	White, not Hispanic or Latino (% of state or census block group pop.)	Hispanic or Latino (% of state or census block group pop.)	Black or African American (% of state or census block group pop.)	American Indian or Alaskan Native (% of state or census block group pop.)	Asian (% of state or census block group pop.)	Native Hawaiian/ Pacific Islander (% of state or census block group pop.)	Other (% of state or census block group pop.)	Two or More Races (% of state or census block group pop.)
Dane County Census Tract 6	6,262	2,304 (36.8)	2,497 (39.9)	693 (11.1)	12 (0.2)	393 (6.3)	0 (0.0)	0 (0.0)	363 (5.8)
Dane County Census Tract 7	3,174	2,741 (86.4)	206 (6.5)	93 (2.9)	7 (0.2)	87 (2.7)	0 (0.0)	0 (0.0)	40 (1.3)
Dane County Census Tract 8	3,762	3,219 (85.6)	174 (4.6)	143 (3.8)	11 (0.3)	135 (3.6)	0 (0.0)	0 (0.0)	80 (2.1)
Dane County Census Tract 9.01	2,227	1,974 (88.6)	86 (3.9)	28 (1.3)	0 (0.0)	68 (3.1)	0 (0.0)	0 (0.0)	71 (3.2)
Dane County Census Tract 9.02	6,021	4,634 (77.0)	281 (4.7)	178 (3.0)	27 (0.4)	758 (12.6)	0 (0.0)	0 (0.0)	143 (2.4)
Dane County Census Tract 10	2,649	2,430 (91.7)	83 (3.1)	49 (1.8)	0 (0.0)	41 (1.5)	0 (0.0)	0 (0.0)	46 (1.7)
Dane County Census Tract 11.01	5,280	3,939 (74.6)	158 (3.0)	360 (6.8)	8 (0.2)	620 (11.7)	0 (0.0)	10 (0.2)	185 (3.5)
Dane County Census Tract 11.02	3,904	2,578 (66.0)	170 (4.4)	123 (3.2)	6 (0.2)	900 (23.1)	0 (0.0)	0 (0.0)	127 (3.3)
Dane County Census Tract 12	6,662	5,193 (77.9)	633 (9.5)	189 (2.8)	8 (0.1)	528 (7.9)	0 (0.0)	0 (0.0)	111 (1.7)
Dane County Census Tract 13	2,386	1,902 (79.7)	185 (7.8)	77 (3.2)	0 (0.0)	111 (4.7)	0 (0.0)	7 (0.3)	104 (4.4)
Dane County Census Tract 14.01	6,935	2,312 (33.3)	2,015 (29.1)	1,200 (17.3)	30 (0.4)	1,021 (14.7)	0 (0.0)	0 (0.0)	357 (5.1)
Dane County Census Tract 14.02	5,242	2,996 (57.2)	1,045 (19.9)	887 (16.9)	54 (1.0)	175 (3.3)	0 (0.0)	0 (0.0)	85 (1.6)
Dane County Census Tract 14.03	8,682	5,737 (66.1)	1,671 (19.2)	603 (6.9)	70 (0.8)	342 (3.9)	0 (0.0)	0 (0.0)	259 (3.0)
Dane County Census Tract 15.01	1,894	1,430 (75.5)	182 (9.6)	225 (11.9)	0 (0.0)	21 (1.1)	0 (0.0)	5 (0.3)	31 (1.6)
Dane County Census Tract 15.02	5,110	2,286 (44.7)	1,153 (22.6)	819 (16.0)	0 (0.0)	426 (8.3)	0 (0.0)	10 (0.2)	414 (8.1)
Dane County Census Tract 16.03	4,277	2,919 (68.2)	436 (10.2)	41 (1.0)	14 (0.3)	760 (17.8)	21 (0.5)	0 (0.0)	86 (2.0)

Census Tract/State	Total Population*	White, not Hispanic or Latino (% of state or census block group pop.)	Hispanic or Latino (% of state or census block group pop.)	Black or African American (% of state or census block group pop.)	American Indian or Alaskan Native (% of state or census block group pop.)	Asian (% of state or census block group pop.)	Native Hawaiian/ Pacific Islander (% of state or census block group pop.)	Other (% of state or census block group pop.)	Two or More Races (% of state or census block group pop.)
Dane County Census Tract 16.04	5,957	5,187 (87.1)	147 (2.5)	46 (0.8)	0 (0.0)	471 (7.9)	0 (0.0)	0 (0.0)	106 (1.8)
Dane County Census Tract 16.05	2,899	2,475 (85.4)	103 (3.6)	34 (1.2)	0 (0.0)	218 (7.5)	0 (0.0)	8 (0.3)	61 (2.1)
Dane County Census Tract 16.06	6,616	5,541 (83.8)	321 (4.9)	185 (2.8)	8 (0.1)	347 (5.2)	0 (0.0)	8 (0.1)	205 (3.1)
Dane County Census Tract 17.04	3,390	2,766 (81.6)	153 (4.5)	174 (5.1)	10 (0.3)	170 (5.0)	0 (0.0)	0 (0.0)	117 (3.5)
Dane County Census Tract 17.05	4,250	3,820 (89.9)	163 (3.8)	49 (1.2)	25 (0.6)	65 (1.5)	0 (0.0)	0 (0.0)	128 (3.0)
Dane County Census Tract 18.02	3,118	2,642 (84.7)	148 (4.7)	188 (6.0)	0 (0.0)	70 (2.2)	0 (0.0)	0 (0.0)	70 (2.2)
Dane County Census Tract 18.04	3,366	2,503 (74.4)	367 (10.9)	167 (5.0)	0 (0.0)	254 (7.5)	0 (0.0)	0 (0.0)	75 (2.2)
Dane County Census Tract 19	6,594	5,869 (89.0)	193 (2.9)	212 (3.2)	4 (0.1)	206 (3.1)	0 (0.0)	17 (0.3)	93 (1.4)
Dane County Census Tract 20	5,691	4,700 (82.6)	141 (2.5)	466 (8.2)	0 (0.0)	149 (2.6)	0 (0.0)	0 (0.0)	235 (4.1)
Dane County Census Tract 21	4,533	3,795 (83.7)	246 (5.4)	393 (8.7)	10 (0.2)	44 (1.0)	0 (0.0)	0 (0.0)	45 (1.0)
Dane County Census Tract 22	4,046	2,694 (66.6)	378 (9.3)	523 (12.9)	0 (0.0)	245 (6.1)	0 (0.0)	0 (0.0)	206 (5.1)
Dane County Census Tract 23.01	2,965	1,474 (49.7)	275 (9.3)	756 (25.5)	0 (0.0)	318 (10.7)	0 (0.0)	0 (0.0)	142 (4.8)
Dane County Census Tract 23.02	1,723	1,363 (79.1)	31 (1.8)	188 (10.9)	13 (0.8)	41 (2.4)	0 (0.0)	0 (0.0)	87 (5.0)
Dane County Census Tract 24.01	3,469	2,696 (77.7)	253 (7.3)	224 (6.5)	5 (0.1)	183 (5.3)	0 (0.0)	18 (0.5)	90 (2.6)
Dane County Census Tract 24.02	4,079	2,256 (55.3)	328 (8.0)	646 (15.8)	13 (0.3)	598 (14.7)	0 (0.0)	8 (0.2)	230 (5.6)
Dane County Census Tract 25	1,959	1,229 (62.7)	359 (18.3)	213 (10.9)	0 (0.0)	116 (5.9)	0 (0.0)	5 (0.3)	37 (1.9)

Census Tract/State	Total Population*	White, not Hispanic or Latino (% of state or census block group pop.)	Hispanic or Latino (% of state or census block group pop.)	Black or African American (% of state or census block group pop.)	American Indian or Alaskan Native (% of state or census block group pop.)	Asian (% of state or census block group pop.)	Native Hawaiian/ Pacific Islander (% of state or census block group pop.)	Other (% of state or census block group pop.)	Two or More Races (% of state or census block group pop.)
Dane County Census Tract 26.01	2,107	1,526 (72.4)	234 (11.1)	108 (5.1)	28 (1.3)	67 (3.2)	0 (0.0)	0 (0.0)	144 (6.8)
Dane County Census Tract 26.02	6,001	3,963 (66.0)	608 (10.1)	876 (14.6)	8 (0.1)	408 (6.8)	0 (0.0)	0 (0.0)	138 (2.3)
Dane County Census Tract 26.03	5,562	3,400 (61.1)	515 (9.3)	802 (14.4)	0 (0.0)	742 (13.3)	0 (0.0)	0 (0.0)	103 (1.9)
Dane County Census Tract 27	3,269	2,939 (89.9)	236 (7.2)	16 (0.5)	7 (0.2)	52 (1.6)	0 (0.0)	0 (0.0)	19 (0.6)
Dane County Census Tract 28	2,172	2,002 (92.2)	63 (2.9)	75 (3.5)	3 (0.1)	11 (0.5)	0 (0.0)	0 (0.0)	18 (0.8)
Dane County Census Tract 29	3,246	2,622 (80.8)	198 (6.1)	198 (6.1)	0 (0.0)	169 (5.2)	12 (0.4)	18 (0.6)	29 (0.9)
Dane County Census Tract 30.01	5,080	4,414 (86.9)	202 (4.0)	271 (5.3)	0 (0.0)	125 (2.5)	0 (0.0)	0 (0.0)	68 (1.3)
Dane County Census Tract 30.02	3,987	2,110 (52.9)	630 (15.8)	670 (16.8)	2 (0.1)	212 (5.3)	0 (0.0)	0 (0.0)	363 (9.1)
Dane County Census Tract 31	6,226	4,872 (78.3)	590 (9.5)	430 (6.9)	56 (0.9)	0 (0.0)	0 (0.0)	0 (0.0)	278 (4.5)
Dane County Census Tract 32	2,861	823 (28.8)	352 (12.3)	192 (6.7)	114 (4.0)	1,332 (46.6)	0 (0.0)	0 (0.0)	48 (1.7)
Dane County Census Tract 101	2,057	1,737 (84.4)	91 (4.4)	85 (4.1)	11 (0.5)	83 (4.0)	2 (0.1)	3 (0.1)	45 (2.2)
Dane County Census Tract 102	1,386	1,266 (91.3)	93 (6.7)	0 (0.0)	0 (0.0)	3 (0.2)	0 (0.0)	0 (0.0)	24 (1.7)
Dane County Census Tract 103	3,502	3,160 (90.2)	194 (5.5)	22 (0.6)	0 (0.0)	84 (2.4)	0 (0.0)	0 (0.0)	42 (1.2)
Dane County Census Tract 104	3,428	3,033 (88.5)	235 (6.9)	49 (1.4)	0 (0.0)	29 (0.8)	0 (0.0)	0 (0.0)	82 (2.4)
Dane County Census Tract 105.01	3,276	2,647 (80.8)	50 (1.5)	168 (5.1)	0 (0.0)	186 (5.7)	0 (0.0)	0 (0.0)	225 (6.9)
Dane County Census Tract 105.02	8,070	7,637 (94.6)	78 (1.0)	164 (2.0)	0 (0.0)	88 (1.1)	0 (0.0)	0 (0.0)	103 (1.3)

Census Tract/State	Total Population*	White, not Hispanic or Latino (% of state or census block group pop.)	Hispanic or Latino (% of state or census block group pop.)	Black or African American (% of state or census block group pop.)	American Indian or Alaskan Native (% of state or census block group pop.)	Asian (% of state or census block group pop.)	Native Hawaiian/ Pacific Islander (% of state or census block group pop.)	Other (% of state or census block group pop.)	Two or More Races (% of state or census block group pop.)
Dane County Census Tract 106	5,248	4,925 (93.8)	158 (3.0)	52 (1.0)	0 (0.0)	3 (0.1)	0 (0.0)	0 (0.0)	110 (2.1)
Dane County Census Tract 107.01	6,549	5,622 (85.8)	322 (4.9)	112 (1.9)	0 (0.0)	290 (4.4)	29 (0.4)	0 (0.0)	174 (2.7)
Dane County Census Tract 107.02	7,034	6,007 (85.4)	167 (2.4)	480 (6.8)	0 (0.0)	343 (4.9)	0 (0.0)	0 (0.0)	37 (0.5)
Dane County Census Tract 108	11,193	9,519 (85.0)	322 (2.9)	238 (2.1)	0 (0.0)	746 (6.7)	15 (0.1)	0 (0.0)	353 (3.2)
Dane County Census Tract 109.01	6,357	4,754 (74.8)	333 (5.2)	144 (2.3)	15 (0.2)	858 (13.5)	0 (0.0)	0 (0.0)	253 (4.0)
Dane County Census Tract 109.03	3,558	2,876 (80.8)	50 (1.4)	231 (6.5)	10 (0.3)	323 (9.1)	0 (0.0)	0 (0.0)	68 (1.9)
Dane County Census Tract 109.04	8,810	7,978 (90.6)	134 (1.5)	31 (0.4)	28 (0.3)	557 (6.3)	0 (0.0)	0 (0.0)	82 (0.9)
Dane County Census Tract 110	4,274	3,560 (83.3)	69 (1.6)	317 (7.4)	12 (0.3)	141 (3.2)	24 (0.6)	68 (1.6)	83 (1.9)
Dane County Census Tract 111.01	4,805	3,553 (73.9)	373 (7.8)	622 (12.9)	14 (0.3)	114 (2.4)	0 (0.0)	36 (0.7)	93 (1.9)
Dane County Census Tract 111.02	8,809	7,254 (82.3)	395 (4.5)	324 (3.7)	14 (0.2)	540 (6.1)	0 (0.0)	121 (1.4)	161 (1.8)
Dane County Census Tract 112	9,675	8,703 (90.0)	363 (3.8)	27 (0.3)	9 (0.1)	286 (3.0)	0 (0.0)	0 (0.0)	287 (3.0)
Dane County Census Tract 113.01	6,483	6,143 (94.8)	200 (3.1)	12 (0.2)	0 (0.0)	31 (0.5)	0 (0.0)	0 (0.0)	97 (1.5)
Dane County Census Tract 113.02	3,161	2,960 (93.6)	84 (2.7)	17 (0.5)	0 (0.0)	38 (1.2)	0 (0.0)	0 (0.0)	62 (2.0)
Dane County Census Tract 114.01	7,924	6,501 (82.0)	447 (5.6)	460 (5.8)	2 (0.0)	343 (4.3)	10 (0.1)	13 (0.2)	148 (1.9)
Dane County Census Tract 114.02	10,343	8,274 (80.0)	538 (5.2)	83 (0.8)	18 (0.2)	1,092 (10.6)	0 (0.0)	20 (0.2)	318 (3.1)
Dane County Census Tract 115.03	8,708	7,558 (86.8)	215 (2.5)	369 (4.2)	0 (0.0)	329 (3.8)	0 (0.0)	0 (0.0)	237 (2.7)

Census Tract/State	Total Population*	White, not Hispanic or Latino (% of state or census block group pop.)	Hispanic or Latino (% of state or census block group pop.)	Black or African American (% of state or census block group pop.)	American Indian or Alaskan Native (% of state or census block group pop.)	Asian (% of state or census block group pop.)	Native Hawaiian/ Pacific Islander (% of state or census block group pop.)	Other (% of state or census block group pop.)	Two or More Races (% of state or census block group pop.)
Dane County Census Tract 115.04	3,691	2,616 (70.9)	217 (5.9)	563 (15.3)	4 (0.1)	264 (7.2)	0 (0.0)	0 (0.0)	217 (5.9)
Dane County Census Tract 115.05	4,855	3,284 (67.6)	710 (14.6)	672 (13.8)	24 (0.5)	0 (0.0)	0 (0.0)	0 (0.0)	165 (3.4)
Dane County Census Tract 115.06	5,092	4,030 (79.1)	187 (3.7)	574 (11.3)	0 (0.0)	141 (2.8)	6 (0.1)	0 (0.0)	154 (3.0)
Dane County Census Tract 116	6,647	6,021 (90.6)	120 (1.8)	229 (3.4)	0 (0.0)	236 (3.6)	0 (0.0)	0 (0.0)	41 (0.6)
Dane County Census Tract 117	4,259	3,558 (83.5)	519 (12.2)	21 (0.5)	0 (0.0)	85 (2.0)	8 (0.2)	0 (0.0)	68 (1.6)
Dane County Census Tract 118	5,930	5,154 (86.9)	652 (11.0)	78 (1.3)	0 (0.0)	3 (0.1)	1 (0.0)	0 (0.0)	42 (0.7)
Dane County Census Tract 119	6,925	6,523 (94.2)	159 (2.3)	121 (1.7)	10 (0.1)	18 (0.3)	0 (0.0)	0 (0.0)	94 (1.4)
Dane County Census Tract 120.01	8,680	7,348 (83.5)	767 (8.8)	0 (0.0)	5 (0.1)	513 (5.9)	0 (0.0)	0 (0.0)	47 (0.5)
Dane County Census Tract 120.02	5,190	4,924 (94.9)	46 (0.9)	43 (0.8)	17 (0.3)	79 (1.5)	6 (0.1)	0 (0.0)	75 (1.4)
Dane County Census Tract 121	2,673	2,531 (94.7)	118 (4.4)	2 (0.1)	0 (0.0)	8 (0.3)	0 (0.0)	0 (0.0)	14 (0.5)
Dane County Census Tract 122.01	2,095	1,934 (92.3)	64 (3.1)	8 (0.4)	18 (0.9)	54 (2.6)	0 (0.0)	0 (0.0)	17 (0.8)
Dane County Census Tract 122.02	6,771	6,219 (91.8)	84 (1.2)	191 (2.8)	0 (0.0)	68 (1.0)	0 (0.0)	0 (0.0)	209 (3.1)
Dane County Census Tract 123	5,867	5,356 (91.3)	106 (1.8)	267 (4.6)	0 (0.0)	7 (0.1)	0 (0.0)	0 (0.0)	131 (2.2)
Dane County Census Tract 124	5,017	4,729 (94.3)	86 (1.7)	17 (0.3)	12 (0.2)	26 (0.5)	2 (0.0)	4 (0.1)	141 (2.8)
Dane County Census Tract 125.01	6,867	6,217 (90.5)	213 (3.1)	284 (4.1)	32 (0.5)	21 (0.3)	0 (0.0)	0 (0.0)	100 (1.5)
Dane County Census Tract 125.02	5,541	4,738 (85.5)	75 (1.4)	582 (10.5)	24 (0.4)	23 (0.4)	0 (0.0)	0 (0.0)	99 (1.8)

Census Tract/State	Total Population*	White, not Hispanic or Latino (% of state or census block group pop.)	Hispanic or Latino (% of state or census block group pop.)	Black or African American (% of state or census block group pop.)	American Indian or Alaskan Native (% of state or census block group pop.)	Asian (% of state or census block group pop.)	Native Hawaiian/ Pacific Islander (% of state or census block group pop.)	Other (% of state or census block group pop.)	Two or More Races (% of state or census block group pop.)
Dane County Census Tract 126	4,595	4,162 (90.6)	279 (6.1)	40 (0.9)	4 (0.1)	18 (0.4)	0 (0.0)	0 (0.0)	92 (2.0)
Dane County Census Tract 127	4,112	3,970 (96.5)	39 (0.9)	0 (0.0)	0 (0.0)	37 (0.9)	0 (0.0)	2 (0.1)	64 (1.6)
Dane County Census Tract 128	8,055	7,548 (93.7)	161 (2.0)	107 (1.3)	0 (0.0)	31 (0.4)	0 (0.0)	0 (0.0)	208 (2.6)
Dane County Census Tract 129	3,978	3,878 (97.5)	69 (1.7)	8 (0.2)	3 (0.1)	9 (0.2)	0 (0.0)	0 (0.0)	11 (0.3)
Dane County Census Tract 130	4,590	4,387 (95.6)	88 (1.9)	0 (0.0)	0 (0.0)	32 (0.7)	0 (0.0)	0 (0.0)	83 (1.8)
Dane County Census Tract 131	4,690	4,397 (93.8)	105 (2.2)	41 (0.9)	0 (0.0)	21 (0.4)	0 (0.0)	4 (0.1)	122 (2.6)
Dane County Census Tract 132	9,212	8,395 (91.1)	205 (2.2)	57 (0.6)	0 (0.0)	369 (4.0)	0 (0.0)	0 (0.0)	186 (2.0)
Dane County Census Tract 133.01	4,937	4,380 (88.7)	100 (2.0)	79 (1.6)	31 (0.6)	173 (3.5)	0 (0.0)	0 (0.0)	174 (3.5)
Dane County Census Tract 133.02	5,814	5,178 (89.1)	444 (7.6)	0 (0.0)	38 (0.7)	90 (1.5)	0 (0.0)	0 (0.0)	64 (1.1)
Dane County Census Tract 137	6,288	5,732 (91.2)	8 (0.1)	297 (4.7)	0 (0.0)	130 (2.1)	0 (0.0)	0 (0.0)	121 (1.9)
Grant County Census Tract 9601	3,862	3,732 (96.6)	79 (2.0)	18 (0.5)	0 (0.0)	12 (0.3)	0 (0.0)	0 (0.0)	21 (0.5)
Grant County Census Tract 9602	4,302	3,848 (89.4)	47 (1.1)	282 (6.6)	2 (0.1)	9 (0.2)	4 (0.1)	0 (0.0)	110 (2.6)
Grant County Census Tract 9603	4,329	4,217 (97.4)	63 (1.5)	0 (0.0)	0 (0.0)	49 (1.1)	0 (0.0)	0 (0.0)	0 (0.0)
Grant County Census Tract 9604	3,354	3,141 (93.6)	145 (4.3)	4 (0.1)	7 (0.2)	32 (1.0)	0 (0.0)	0 (0.0)	25 (0.7)
Grant County Census Tract 9605	3,568	3,477 (97.4)	25 (0.7)	0 (0.0)	3 (0.1)	25 (0.7)	0 (0.0)	8 (0.2)	30 (0.8)
Grant County Census Tract 9606	3,667	3,549 (96.8)	60 (1.6)	11 (0.3)	0 (0.0)	7 (0.2)	0 (0.0)	0 (0.0)	40 (1.1)

Census Tract/State	Total Population*	White, not Hispanic or Latino (% of state or census block group pop.)	Hispanic or Latino (% of state or census block group pop.)	Black or African American (% of state or census block group pop.)	American Indian or Alaskan Native (% of state or census block group pop.)	Asian (% of state or census block group pop.)	Native Hawaiian/ Pacific Islander (% of state or census block group pop.)	Other (% of state or census block group pop.)	Two or More Races (% of state or census block group pop.)
Grant County Census Tract 9607	3,962	3,796 (95.8)	37 (0.9)	44 (1.1)	0 (0.0)	80 (2.0)	0 (0.0)	0 (0.0)	5 (0.1)
Grant County Census Tract 9608	2,889	2,830 (98.0)	37 (1.3)	0 (0.0)	0 (0.0)	15 (0.5)	0 (0.0)	0 (0.0)	7 (0.2)
Grant County Census Tract 9609	4,833	4,571 (94.6)	80 (1.7)	182 (3.8)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Grant County Census Tract 9610	8,335	7,770 (93.2)	110 (1.3)	54 (0.6)	66 (0.8)	172 (2.1)	0 (0.0)	43 (0.5)	120 (1.4)
Grant County Census Tract 9611	4,535	4,408 (97.2)	38 (0.8)	44 (1.0)	8 (0.2)	5 (0.1)	0 (0.0)	0 (0.0)	32 (0.7)
Grant County Census Tract 9612	4,106	3,953 (96.3)	70 (1.7)	14 (0.3)	5 (0.1)	6 (0.1)	9 (0.2)	0 (0.0)	49 (1.2)
Iowa County Census Tract 9501	3,818	3,705 (97.0)	15 (0.4)	20 (0.5)	16 (0.4)	6 (0.2)	0 (0.0)	40 (1.0)	16 (0.4)
Iowa County Census Tract 9502	3,127	3,022 (96.6)	32 (1.0)	26 (0.8)	4 (0.1)	6 (0.2)	0 (0.0)	0 (0.0)	37 (1.2)
Iowa County Census Tract 9503	3,197	3,054 (95.5)	131 (4.1)	4 (0.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	8 (0.3)
Iowa County Census Tract 9504	5,220	5,054 (96.8)	16 (0.3)	7 (0.1)	0 (0.0)	105 (2.0)	0 (0.0)	0 (0.0)	38 (0.7)
Iowa County Census Tract 9505	4,773	4,449 (93.2)	179 (3.8)	57 (1.2)	12 (0.3)	7 (0.1)	17 (0.4)	0 (0.0)	52 (1.1)
Iowa County Census Tract 9506	3,441	3,263 (94.8)	30 (0.9)	49 (1.4)	29 (0.8)	23 (0.7)	0 (0.0)	0 (0.0)	47 (1.4)
Lafayette County Census Tract 9701	3,047	2,952 (96.9)	54 (1.8)	0 (0.0)	0 (0.0)	11 (0.4)	0 (0.0)	3 (0.1)	27 (0.9)
Lafayette County Census Tract 9702	3,970	3,574 (90.0)	343 (8.6)	35 (0.9)	17 (0.4)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.0)
Lafayette County Census Tract 9703	3,534	3,295 (93.2)	136 (3.8)	7 (0.2)	0 (0.0)	22 (0.6)	0 (0.0)	1 (0.0)	73 (2.1)
Lafayette County Census Tract 9704	3,108	3,033 (97.6)	34 (1.1)	23 (0.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	18 (0.6)

Census Tract/State	Total Population*	White, not Hispanic or Latino (% of state or census block group pop.)	Hispanic or Latino (% of state or census block group pop.)	Black or African American (% of state or census block group pop.)	American Indian or Alaskan Native (% of state or census block group pop.)	Asian (% of state or census block group pop.)	Native Hawaiian/ Pacific Islander (% of state or census block group pop.)	Other (% of state or census block group pop.)	Two or More Races (% of state or census block group pop.)
Lafayette County Census Tract 9705	3,096	2,988 (96.5)	38 (1.2)	5 (0.2)	42 (1.4)	18 (0.6)	0 (0.0)	0 (0.0)	5 (0.2)
State of Iowa	**3,106,589**	**2,701,600 (87.0)**	**172,707 (5.6)**	**100,660 (3.2)**	**8,310 (0.3)**	**66,187 (2.1)**	**2,276 (0.1)**	**2,756 (0.1)**	**52,093 (1.7)**
Clayton County Census Tract 701	2,946	2,836 (96.3)	65 (2.2)	7 (0.2)	11 (0.4)	8 (0.3)	0 (0.0)	0 (0.0)	19 (0.6)
Clayton County Census Tract 702	3,522	3,216 (91.3)	131 (3.7)	138 (3.9)	8 (0.2)	22 (0.6)	0 (0.0)	0 (0.0)	7 (0.2)
Clayton County Census Tract 703	3,453	3,360 (97.3)	49 (1.4)	24 (0.7)	1 (0.0)	4 (0.1)	0 (0.0)	0 (0.0)	15 (0.4)
Clayton County Census Tract 704	2,376	2,306 (97.1)	40 (1.7)	7 (0.3)	1 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	22 (0.9)
Clayton County Census Tract 705	2,220	2,149 (96.8)	38 (1.7)	0 (0.0)	0 (0.0)	32 (1.4)	0 (0.0)	0 (0.0)	1 (0.1)
Clayton County Census Tract 706	3,194	3,163 (99.0)	9 (0.3)	8 (0.3)	0 (0.0)	13 (0.4)	0 (0.0)	0 (0.0)	1 (0.0)
Dubuque County Census Tract 1	2,993	1,765 (59.0)	201 (6.7)	669 (22.4)	5 (0.2)	111 (3.7)	20 (0.7)	45 (1.5)	177 (5.9)
Dubuque County Census Tract 3	1,804	1,562 (86.6)	73 (4.0)	129 (7.2)	9 (0.5)	0 (0.0)	0 (0.0)	0 (0.0)	31 (1.7)
Dubuque County Census Tract 4	3,978	3,648 (91.7)	23 (0.6)	56 (1.4)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	251 (6.3)
Dubuque County Census Tract 5	3,434	2,547 (74.2)	95 (2.8)	466 (13.6)	0 (0.0)	0 (0.0)	250 (7.2)	65 (1.9)	11 (0.3)
Dubuque County Census Tract 6	3,326	2,782 (83.6)	86 (2.6)	360 (10.8)	0 (0.0)	32 (1.0)	0 (0.0)	0 (0.0)	66 (2.0)
Dubuque County Census Tract 7.01	3,776	3,140 (83.2)	241 (6.4)	276 (7.3)	0 (0.0)	65 (1.7)	0 (0.0)	0 (0.0)	54 (1.4)
Dubuque County Census Tract 7.02	3,110	2,787 (89.6)	99 (3.2)	43 (1.4)	5 (0.2)	33 (1.1)	60 (1.9)	0 (0.0)	83 (2.7)
Dubuque County Census Tract 8.01	4,240	4,040 (95.3)	47 (1.1)	0 (0.0)	0 (0.0)	80 (1.9)	6 (0.1)	0 (0.0)	67 (1.6)

Census Tract/State	Total Population*	White, not Hispanic or Latino (% of state or census block group pop.)	Hispanic or Latino (% of state or census block group pop.)	Black or African American (% of state or census block group pop.)	American Indian or Alaskan Native (% of state or census block group pop.)	Asian (% of state or census block group pop.)	Native Hawaiian/ Pacific Islander (% of state or census block group pop.)	Other (% of state or census block group pop.)	Two or More Races (% of state or census block group pop.)
Dubuque County Census Tract 8.02	3,306	3,161 (95.6)	0 (0.0)	0 (0.0)	3 (0.1)	38 (1.1)	0 (0.0)	0 (0.0)	104 (3.1)
Dubuque County Census Tract 9	3,539	2,986 (84.4)	138 (3.9)	210 (5.9)	0 (0.0)	107 (3.0)	0 (0.0)	0 (0.0)	98 (2.8)
Dubuque County Census Tract 11.01	3,492	3,207 (91.8)	85 (2.4)	64 (1.8)	0 (0.0)	101 (2.9)	0 (0.0)	8 (0.2)	27 (0.8)
Dubuque County Census Tract 11.02	7,061	6,835 (96.8)	65 (0.9)	69 (1.0)	0 (0.0)	39 (0.6)	12 (0.2)	4 (0.1)	37 (0.5)
Dubuque County Census Tract 12.01	4,173	3,886 (93.1)	54 (1.3)	47 (1.1)	0 (0.0)	50 (1.2)	9 (0.2)	0 (0.0)	127 (3.0)
Dubuque County Census Tract 12.02	2,051	1,951 (95.1)	28 (1.4)	31 (1.5)	0 (0.0)	13 (0.6)	0 (0.0)	0 (0.0)	28 (1.4)
Dubuque County Census Tract 12.04	2,686	2,464 (91.7)	17 (0.6)	16 (0.6)	0 (0.0)	119 (4.4)	0 (0.0)	0 (0.0)	70 (2.6)
Dubuque County Census Tract 12.05	4,255	3,966 (93.2)	27 (0.6)	101 (2.4)	0 (0.0)	102 (2.4)	0 (0.0)	0 (0.0)	59 (1.4)
Dubuque County Census Tract 101.01	1,992	1,928 (96.8)	34 (1.7)	0 (0.0)	0 (0.0)	17 (0.9)	0 (0.0)	0 (0.0)	13 (0.7)
Dubuque County Census Tract 101.03	3,182	3,107 (97.6)	21 (0.7)	34 (1.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	20 (0.6)
Dubuque County Census Tract 101.04	5,283	4,787 (90.6)	148 (2.8)	41 (0.8)	3 (0.1)	246 (4.7)	0 (0.0)	0 (0.0)	58 (1.1)
Dubuque County Census Tract 101.05	3,833	3,764 (98.2)	54 (1.4)	7 (0.2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	8 (0.2)
Dubuque County Census Tract 102.01	6,195	5,927 (95.7)	66 (1.1)	94 (1.5)	2 (0.0)	30 (0.5)	0 (0.0)	0 (0.0)	76 (1.2)
Dubuque County Census Tract 102.02	4,264	4,178 (98.0)	10 (0.2)	6 (0.1)	0 (0.0)	3 (0.1)	0 (0.0)	0 (0.0)	67 (1.6)
Dubuque County Census Tract 103	3,235	2,981 (92.1)	248 (7.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	6 (0.2)
Dubuque County Census Tract 104	3,841	3,617 (94.2)	172 (4.5)	9 (0.2)	0 (0.0)	1 (0.0)	0 (0.0)	0 (0.0)	42 (1.1)

Census Tract/State	Total Population*	White, not Hispanic or Latino (% of state or census block group pop.)	Hispanic or Latino (% of state or census block group pop.)	Black or African American (% of state or census block group pop.)	American Indian or Alaskan Native (% of state or census block group pop.)	Asian (% of state or census block group pop.)	Native Hawaiian/ Pacific Islander (% of state or census block group pop.)	Other (% of state or census block group pop.)	Two or More Races (% of state or census block group pop.)
Dubuque County Census Tract 105	4,572	4,477 (97.9)	79 (1.7)	16 (0.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Dubuque County Census Tract 106	2,950	2,787 (94.5)	117 (4.0)	2 (0.1)	1 (0.0)	22 (0.7)	0 (0.0)	0 (0.0)	21 (0.7)
Total Study Area	**724,131**	**608,528 (84.0)**	**32,545 (4.5)**	**28,608 (4.0)**	**2,115 (0.3)**	**24,454 (3.4)**	**481 (0.1)**	**9,901 (1.4)**	**11,022 (1.5)**

Source: U.S. Census Bureau (2016a)

Note: Gray shading indicates minority population exceeds 120% of the state's minority population.

The percentage of families and individuals in Wisconsin whose income is below the poverty level is approximately 8.1% and 12.3%, respectively. In Iowa, the percentage of families and individuals whose income is below the poverty level is approximately 7.6% and 12.0%, respectively. As shown in Table 3.12-12, there are several census tracts in Wisconsin and Iowa that are identified as environmental justice communities because the percentage of families and individuals whose income is below the poverty level is 20% or greater than the percentage in the states as a whole. These census tracts are highlighted in gray in Table 3.12-12. In Dane County, 30 out of the 105 census tracts in the county have at least a 20% greater percentage of families or individuals with income under the poverty level than the percentage in the state as a whole. In Grant County, 4 out of the 12 census tracts in the county have at least a 20% greater percentage of families or individuals with income under the poverty level than the percentage in the state as a whole. In Iowa County, one out of the six census tracts in the county has at least a 20% greater percentage of families or individuals with income under the poverty level than the percentage in the state as a whole. In Lafayette County, one out of the five census tracts in the county has at least a 20% greater percentage of families or individuals with income under the poverty level than the percentage in the state as a whole. In Clayton County, one out of the six census tracts in the county has at least a 20% greater percentage of families or individuals with income under the poverty level than the percentage in the state as a whole. In Dubuque County, 8 out of the 26 census tracts in the county have at least a 20% greater percentage of families or individuals with income under the poverty level than the percentage in the state as a whole.

Table 3.12-12. Families and Individuals with Income below the Poverty Level in the Study Area (2010, 2016)

Census Tract/State	Percentage of Families with Income below the Poverty Level	Percentage of Individuals with Income below the Poverty Level
State of Wisconsin	**8.1**	**12.3**
Dane County Census Tract 1	2.1	6.9
Dane County Census Tract 2.01	0.0	3.7
Dane County Census Tract 2.02	3.2	8.4
Dane County Census Tract 2.04	15.3	13.6
Dane County Census Tract 2.05	0.0	4.4
Dane County Census Tract 3	7.8	17.2
Dane County Census Tract 4.01	0.5	2.8
Dane County Census Tract 4.02	2.7	5.3
Dane County Census Tract 4.05	6.2	9.4
Dane County Census Tract 4.06	2.1	4.5
Dane County Census Tract 4.07	15.9	18.4
Dane County Census Tract 4.08	13.8	12.0
Dane County Census Tract 5.01	11.1	12.5
Dane County Census Tract 5.03	3.7	8.3
Dane County Census Tract 5.04	5.7	4.6
Dane County Census Tract 6	25.9	27.5
Dane County Census Tract 7	1.4	3.4
Dane County Census Tract 8	5.4	12.2
Dane County Census Tract 9.01	3.2	4.3
Dane County Census Tract 9.02	7.5	43.8

Census Tract/State	Percentage of Families with Income below the Poverty Level	Percentage of Individuals with Income below the Poverty Level
Dane County Census Tract 10	1.8	1.9
Dane County Census Tract 11.01	100.0	81.9
Dane County Census Tract 11.02	--	93.1
Dane County Census Tract 12	12.7	33.9
Dane County Census Tract 13	5.5	11.2
Dane County Census Tract 14.01	26.9	32.4
Dane County Census Tract 14.02	25.7	23.9
Dane County Census Tract 14.03	6.6	14.3
Dane County Census Tract 15.01	25.2	22.3
Dane County Census Tract 15.02	21.4	27.0
Dane County Census Tract 16.03	65.5	84.5
Dane County Census Tract 16.04	25.6	75.5
Dane County Census Tract 16.05	0.0	33.6
Dane County Census Tract 16.06	34.7	58.3
Dane County Census Tract 17.04	1.9	24.1
Dane County Census Tract 17.05	0.0	24.2
Dane County Census Tract 18.02	2.9	14.2
Dane County Census Tract 18.04	11.9	19.0
Dane County Census Tract 19	0.0	12.3
Dane County Census Tract 20	8.2	9.5
Dane County Census Tract 21	5.6	12.4
Dane County Census Tract 22	20.4	19.8
Dane County Census Tract 23.01	20.6	25.5
Dane County Census Tract 23.02	2.9	9.3
Dane County Census Tract 24.01	4.2	18.7
Dane County Census Tract 24.02	7.8	30.7
Dane County Census Tract 25	17.0	23.1
Dane County Census Tract 26.01	20.2	24.8
Dane County Census Tract 26.02	6.8	10.1
Dane County Census Tract 26.03	8.8	9.5
Dane County Census Tract 27	5.5	7.8
Dane County Census Tract 28	1.7	5.7
Dane County Census Tract 29	6.5	11.9
Dane County Census Tract 30.01	7.5	10.4
Dane County Census Tract 30.02	16.1	18.9
Dane County Census Tract 31	2.9	8.6
Dane County Census Tract 32	21.5	20.8
Dane County Census Tract 101	4.0	4.6
Dane County Census Tract 102	0.0	0.9
Dane County Census Tract 103	2.7	5.0

Census Tract/State	Percentage of Families with Income below the Poverty Level	Percentage of Individuals with Income below the Poverty Level
Dane County Census Tract 104	3.6	7.8
Dane County Census Tract 105.01	5.6	6.3
Dane County Census Tract 105.02	0.9	2.6
Dane County Census Tract 106	3.6	6.3
Dane County Census Tract 107.01	3.0	4.6
Dane County Census Tract 107.02	1.2	2.4
Dane County Census Tract 108	1.2	3.0
Dane County Census Tract 109.01	2.5	3.5
Dane County Census Tract 109.03	0.0	1.5
Dane County Census Tract 109.04	0.6	1.0
Dane County Census Tract 110	4.4	6.6
Dane County Census Tract 111.01	8.1	13.9
Dane County Census Tract 111.02	5.0	6.0
Dane County Census Tract 112	1.9	2.2
Dane County Census Tract 113.01	3.6	4.1
Dane County Census Tract 113.02	5.4	7.6
Dane County Census Tract 114.01	5.0	6.0
Dane County Census Tract 114.02	1.3	2.2
Dane County Census Tract 115.03	3.5	5.2
Dane County Census Tract 115.04	7.5	9.5
Dane County Census Tract 115.05	11.9	20.5
Dane County Census Tract 115.06	6.4	9.7
Dane County Census Tract 116	3.7	7.8
Dane County Census Tract 117	5.3	8.0
Dane County Census Tract 118	9.6	13.4
Dane County Census Tract 119	2.9	5.1
Dane County Census Tract 120.01	3.8	6.7
Dane County Census Tract 120.02	0.5	4.7
Dane County Census Tract 121	5.7	8.5
Dane County Census Tract 122.01	1.7	6.6
Dane County Census Tract 122.02	4.3	7.3
Dane County Census Tract 123	4.7	9.3
Dane County Census Tract 124	1.5	2.9
Dane County Census Tract 125.01	2.0	5.1
Dane County Census Tract 125.02	2.9	3.2
Dane County Census Tract 126	3.8	5.0
Dane County Census Tract 127	1.3	3.1
Dane County Census Tract 128	0.8	3.4
Dane County Census Tract 129	3.6	3.9
Dane County Census Tract 130	4.2	3.1

Census Tract/State	Percentage of Families with Income below the Poverty Level	Percentage of Individuals with Income below the Poverty Level
Dane County Census Tract 131	6.3	7.8
Dane County Census Tract 132	1.7	3.2
Dane County Census Tract 133.01	4.8	8.1
Dane County Census Tract 133.02	7.9	6.8
Dane County Census Tract 137	1.8	4.9
Grant County Census Tract 9601	11.5	15.1
Grant County Census Tract 9602	8.0	10.1
Grant County Census Tract 9603	6.0	11.1
Grant County Census Tract 9604	9.2	13.3
Grant County Census Tract 9605	8.1	14.8
Grant County Census Tract 9606	6.4	10.1
Grant County Census Tract 9607	9.2	11.3
Grant County Census Tract 9608	5.4	8.8
Grant County Census Tract 9609	17.4	35.9
Grant County Census Tract 9610	6.1	25.3
Grant County Census Tract 9611	5.9	7.3
Grant County Census Tract 9612	7.0	10.5
Iowa County Census Tract 9501	6.7	8.4
Iowa County Census Tract 9502	8.4	12.1
Iowa County Census Tract 9503	6.9	9.7
Iowa County Census Tract 9504	5.0	9.1
Iowa County Census Tract 9505	2.7	4.7
Iowa County Census Tract 9506	9.9	12.2
Lafayette County Census Tract 9701	8.4	10.7
Lafayette County Census Tract 9702	11.9	12.3
Lafayette County Census Tract 9703	5.7	7.8
Lafayette County Census Tract 9704	8.2	10.4
Lafayette County Census Tract 9705	6.4	10.9
State of Iowa	**7.6**	**12.0**
Clayton County Census Tract 701	6.6	12.2
Clayton County Census Tract 702	7.6	15.5
Census Tract 703	3.3	8.2
Clayton County Census Tract 704	4.5	9.0
Clayton County Census Tract 705	6.3	8.1
Clayton County Census Tract 706	5.4	7.9
Dubuque County Census Tract 1	30.0	36.0
Dubuque County Census Tract 3	13.7	16.2
Dubuque County Census Tract 4	14.3	20.4
Dubuque County Census Tract 5	23.9	31.3
Dubuque County Census Tract 6	10.3	21.7

Census Tract/State	Percentage of Families with Income below the Poverty Level	Percentage of Individuals with Income below the Poverty Level
Dubuque County Census Tract 7.01	21.1	40.1
Dubuque County Census Tract 7.02	4.5	11.2
Dubuque County Census Tract 8.01	6.7	13.9
Dubuque County Census Tract 8.02	7.4	8.1
Dubuque County Census Tract 9	3.9	10.2
Dubuque County Census Tract 11.01	8.8	9.9
Dubuque County Census Tract 11.02	5.5	9.8
Dubuque County Census Tract 12.01	5.5	12.3
Dubuque County Census Tract 12.02	12.5	12.6
Dubuque County Census Tract 12.04	8.5	8.4
Dubuque County Census Tract 12.05	6.0	7.1
Dubuque County Census Tract 101.01	9.3	10.5
Dubuque County Census Tract 101.03	8.2	11.5
Dubuque County Census Tract 101.04	1.4	3.7
Dubuque County Census Tract 101.05	3.3	5.2
Dubuque County Census Tract 102.01	4.1	5.8
Dubuque County Census Tract 102.02	2.7	6.4
Dubuque County Census Tract 103	2.6	3.9
Dubuque County Census Tract 104	5.7	9.9
Dubuque County Census Tract 105	2.5	4.2
Dubuque County Census Tract 106	2.4	5.1

Source: U.S. Census Bureau, Selected Economic Characteristics, 2013-2017 American Community Survey 5-Year Estimates

Note: Gray shading indicates poverty level that exceeds 20% of the state's poverty level.

There are seven census tracts overlapped by the C-HC Project that are identified as environmental justice communities. These census tracts include Grant County Census Tract 9601, Grant County Census Tract 9605, Grant County Census Tract 9609, Iowa County Census Tract 9501, Iowa County Census Tract 9505, Dane County Census Tract 128, and Dane County Census Tract 109.4. Environmental indicators and other characteristics for each of these census tracts, as identified by the USEPA's Environmental Justice Screening Tool, are described below.

Grant County Census Tract 9601 has no Superfund sites and one hazardous waste treatment, storage, disposal facility. This tract is above the fiftieth percentile in the state of Wisconsin for the following environmental indicators: Ozone (parts per billion [ppb]), lead paint (percentage of pre-1960 housing), and wastewater discharge (toxicity-weighted concentration/m distance) (USEPA 2019a).

Grant County Census Tract 9605 has no Superfund sites and no hazardous waste treatment, storage, disposal facilities. This tract is above the fiftieth percentile in the state of Wisconsin for the following environmental indicators: Ozone (ppb), lead paint (percentage of pre-1960 housing), and wastewater discharge (toxicity-weighted concentration/m distance) (USEPA 2019a).

Grant County Census Tract 9609 has no Superfund sites and no hazardous waste treatment, storage, disposal facilities. This tract is above the fiftieth percentile in the state of Wisconsin for the following environmental indicators: Ozone (ppb), traffic proximity and volume (daily traffic count/distance to road), and lead paint (percentage of pre-1960 housing) (USEPA 2019a).

Iowa County Census Tract 9501 has no Superfund sites and no hazardous waste treatment, storage, disposal facilities. This tract is above the fiftieth percentile in the state of Wisconsin for the following environmental indicators: Ozone (ppb) and wastewater discharge (toxicity-weighted concentration/m distance) (USEPA 2019a).

Iowa County Census Tract 9505 has no Superfund sites and no hazardous waste treatment, storage, disposal facilities. This tract is above the fiftieth percentile in the state of Wisconsin for the following environmental indicators: Ozone (ppb) and lead paint (percentage of pre-1960 housing) (USEPA 2019a).

Dane County Census Tract 128 has no Superfund sites and no hazardous waste treatment, storage, disposal facilities. This tract is above the fiftieth percentile in the state of Wisconsin for the following environmental indicators: Ozone (ppb) and traffic proximity and volume (daily traffic count/distance to road) (USEPA 2019a).

Dane County Census Tract 109.4 has one Superfund site and four hazardous waste treatment, storage, and disposal facilities. This tract is above the fiftieth percentile in the state of Wisconsin for the following environmental indicators: particulate matter ($PM_{2.5}$ in micrograms per cubic meter [$\mu g/m^3$]), ozone (ppb), Superfund proximity (site count/km distance), and hazardous waste proximity (facility count/km distance) (USEPA 2019a).

Of the 12 other census tracts that are crossed by the C-HC Project, but have not been identified as environmental justice communities, none have Superfund sites, one has a hazardous waste treatment, storage, and disposal facility, and all of the tracts have at least one environmental indicator that is above the fiftieth percentile in the respective state (USEPA 2019). Most of these tracts have two to three environmental indicators that are above the fiftieth percentile in the respective state. Ozone is above the fiftieth percentile for all of these tracts. Other common environmental indicators that are above the fiftieth percentile include lead paint and wastewater discharge.

3.12.2 *Environmental Consequences*

This section describes the potential impacts to socioeconomics and environmental justice communities associated with the construction, operation, and maintenance of the transmission line, substations, and ancillary facilities. Impacts to socioeconomics are discussed in terms of effects on the economy, population, housing, property values, and tourism. The impacts described in this section are based on prior experience and analyses in other locations, as well as other resource assessments provided in this FEIS.

3.12.2.1 DATA SOURCES, METHODS, AND ANALYSIS ASSUMPTIONS

Data sources that were considered when analyzing impacts to socioeconomics and environmental justice include U.S. Census Bureau statistics, employment and wage data from the U.S. Bureau of Labor Statistics (BLS) and U.S. Department of Commerce, property value statistics from the Wisconsin Department of Revenue,[3] and studies regarding transmission line impacts on property values.

The following impact indicators were considered when analyzing impacts to socioeconomics and environmental justice:

[3] Property tax statistics for the analysis area counites in Iowa were not available from the Iowa Department of Revenue.

- Changes in employment within the counties crossed by the project.
- Revenue generated by the proposed project
- Qualitative discussion of impacts to tourism revenue within the counties crossed by the project.
- Changes in property values in close proximity to the project.
- Minor population increase or decrease impacts are 0% to 10% over 10 years (i.e., an average of 0% to 1% per year), moderate impacts are 11% to 20% over 10 years (i.e., an average of 1% to 2% per year), and major impacts are 21% or more over 10 years (i.e., greater than 2% per year).
- Minor unemployment levels are 6% or less, moderate levels are 6% to 8%, and major levels are greater than 8%.

While it is possible that property owners near the proposed project may have the perception that their homes will diminish in value because of project implementation, the actual loss of property value and potential effects can only be tested through data from home sales. The multiple regression analysis method requires that data be collected on as many market sales transactions as possible within the impact area and within one or more similar control areas over a few years prior to an awareness of a project to accurately reflect what buyers and sellers actually do as opposed to what potential buyers say they might do under specified hypothetical circumstances (Kinnard and Dickey 1995). It has been suggested that understanding the effects of transmission lines on home prices is a dynamic process, requiring on-going study, identification of accurate and reliable sources of data, consistency in measurement, and rich data sets, allowing for variety in analytical methods (Wolverton and Bottemiller 2003).

To assess what particular environmental and physical changes associated with the proposed project could affect property values within an immediate distance, a market study of current and future values of properties potentially affected by the proposed project would have to be conducted to evaluate property values with and without the proposed project being constructed. The data that would be required to conduct a more detailed analysis are unavailable, consequently, the proposed project's impacts on property values, any conclusions regarding effects on property values are speculative. Studies have shown a wide range of potential impacts to property values from transmission lines, from a 0% decrease to a more than 20% decrease in property values, but this impact decreases over time (see discussion in Section 3.12.2.3.5). One study has also shown a potential increase in property values from transmission lines (see discussion in Section 3.12.2.3.5). This analysis assumes that the proposed transmission line could reduce property values from 0% to 20% within 150 feet of the ROW centerline, but that the impact would decrease over time. Therefore, impacts to property values within 150 feet of the ROW centerline under all action alternatives are expected to be moderate in the short term and minor in the long term.

Table 3.12-13 defines the impact thresholds for defining impacts to socioeconomics and environmental justice. These thresholds are used below to characterize the intensity of impacts that are estimated for each alternative.

Table 3.12-13. Impact Thresholds and Descriptions for Socioeconomics and Environmental Justice

	Minor Impact	Moderate Impact	Major Impact
Socioeconomics and Environmental Justice	Population changes of 0% to 10% over 10 years (i.e., an average of 0% to 1% per year). A few individuals, groups, businesses, properties or institutions would be impacted. Impacts would be minor and limited to a small geographic area. These impacts are not expected to substantively alter social and/or economic conditions. No impacts to environment justice communities.	Population changes of 11% to 20% over 10 years (i.e., an average of 1% to 2% per year). Many individuals, groups, businesses, properties, or institutions would be impacted. Impacts would be readily apparent and detectable across a wider geographic area and could have a noticeable effect on social and/or economic conditions. No impacts to environment justice communities.	Population changes of 21% or more over 10 years (i.e., greater than 2% per year). A large number of individuals, groups, businesses, properties, or institutions would be impacted. Impacts would be readily detectable and observed, extend to a wider geographic area, possibly regionally, and have a substantial influence on social and/or economic conditions. Greater than 50% of a county's total population and/or a significantly greater the percentage of the county (i.e., 20 percentage points or more) is composed of minorities or low-income households (i.e., living below the poverty level). One or more environmental justice communities or groups would be disproportionately impacted.

3.12.2.2 NO ACTION

Under the No Action Alternative, existing socioeconomic trends in the analysis area counties are expected to continue. In general, gradual population growth would likely continue in the analysis area. The employment rate in the analysis area would likely continue to fluctuate. The agricultural industry would likely continue to play a large role in the analysis area. Existing levels of tourism in the analysis area are also expected to continue under the No Action Alternative.

3.12.2.3 IMPACTS COMMON TO ALL ACTION ALTERNATIVES

3.12.2.3.1 Demographics

Under all action alternatives, the potential impact to populations in the analysis area counties is expected to be minor and short term. It is expected that the construction phase of the proposed project would require approximately 170 temporary workers. These workers would likely already live in the analysis area or would temporarily relocate to the analysis area during the construction phase of the proposed project. If all 170 temporary workers were to come from outside the analysis area and temporarily reside in the analysis area during the construction phase, it would represent an approximately 0.02% increase in the population of the analysis area, and no greater than a 1% increase in any of the individual analysis area counties. The potential increase in population would be short term because the overall construction phase for the entire project would last 2 years; however, construction in any one location would be significantly less and intermittent because of the construction process (see Chapter 2).

No more than two additional full-time employees would be needed for operation of the C-HC Project. These staff would have no impacts on area populations during operation and maintenance.

3.12.2.3.2 Housing

Under all action alternatives, the potential impact to housing in the analysis area counties is expected to be minor and short term. As described in the section above, 170 temporary workers would be needed during the construction phase of the proposed project. The construction workers would likely already live in the analysis area or would temporarily relocate to the analysis area. Workers who temporarily relocate to the analysis area would likely stay at hotels, motels or other temporary housing within a reasonable commuting distance from the construction locations. Assuming a reasonable commute time to be approximately 15 to 60 minutes, the majority of the proposed transmission line routes are within an approximately 15-to-60-minute commute distance from larger towns and cities in the analysis area counties, such as Dubuque, Iowa; Platteville, Wisconsin; and Madison, Wisconsin. If construction workers were to rent temporary housing rather than stay in hotels or motels, there would likely be sufficient housing for the temporary employees in larger towns and cities in the analysis area counties. For example, the number of vacant housing units is approximately 1,634 in Dubuque, 218 in Platteville, 4,751 in Madison, and 17,148 in all analysis area counties combined (U.S. Census Bureau 2016a).

As described in the previous section, no more than two additional full-time employees would be required for operation and maintenance of the transmission line. These staff would likely be existing employees of the Utilities and would provide operation and maintenance support to other transmission lines and substations outside the analysis area. The operation and maintenance personnel would have no impact on housing in the analysis area.

3.12.2.3.3 Employment and Income

Employment

Under all action alternatives, the potential construction impact to employment in the analysis area counties is expected to be minor and short term. An estimated 170 temporary workers would be employed during the construction phase of the proposed project, representing approximately 0.04% of the analysis area's total labor force and approximately 0.6% of the analysis area's utilities and construction workforce. The employment of approximately 170 employees during the construction phase would be minor, positive, and temporary because construction is expected to take place over a 2-year period.

It is anticipated that no more than two full-time employees would be needed to operate the transmission line. Additional workers also could be temporarily hired on an as-needed basis to make any repairs to the transmission line during or following storm events. These workers would have no impact on employment levels during operation and maintenance in the analysis area counties.

Income

The Utilities plan to use regional union construction workers whose salaries are estimated to be approximately $70,000 to $150,000 annually, depending on the level of expertise and the number of hours worked per week. These annual salaries exceed the 2016 median annual household incomes of $54,610 for Wisconsin (with project counties ranging from $49,077 to $64,773) and $54,570 for Iowa (with project counties ranging from $48,482 to $56,154). As a result, project construction would have a minor, short-term positive impact on income levels.

The Utilities' operations or maintenance employees are estimated to earn about $82,000 to $104,000 annually. As stated above, these staff would likely be existing employees of the Utilities and would provide operation and maintenance support to other transmission lines and substations outside the analysis area. As a result, project operation and maintenance would have no impact on income levels within the analysis area.

Project Spending and Impact Fees

The total construction costs under the action alternatives would range between approximately $465.1 million and $548.4 million. The Utilities expect to spend approximately $28.5 million annually on construction wages during the construction period in Wisconsin and $5 million annually on construction wages during the construction period in Iowa.

Under Wisconsin Statutes 196.491(3g), operators of 345-kV or greater transmission lines are required to pay impact fees to each city, village, town, and county affected by the construction and operation of the transmission lines. There are two types of community income from high-voltage transmission impact fees: a one-time environmental impact fee and an annual impact fee. These impact fees are paid to each affected city, village, town, and county in Wisconsin. Impact fees would be paid under each action alternative and the amount paid would vary according to the route and the number of municipalities affected. The State of Iowa does not have a similar statute requiring impact fees. There would be minor and short term positive potential impacts from project impact fees because they would represent a small portion of all governmental jurisdictional spending in the analysis area.

It is estimated that $120.6 to $159.5 million will be spent on materials to construct the proposed project, depending upon the alternative. Under all action alternatives, potential fiscal impacts from the purchase of project construction materials and equipment would be minor, short term, and positive because the spending would represent a small portion of all spending within and outside the analysis area. Equipment and materials for construction of the proposed project would likely be obtained from suppliers in larger metropolitan areas such as Chicago, Milwaukee, or even Madison, but equipment and materials (e.g., gravel, concrete, culverts, erosion-control matting, and seeding) would likely be purchased locally in analysis area counties where available and convenient. These purchases would generate minor sales tax revenues within and outside the analysis area; the Wisconsin sales tax rate includes 5.0% for the state and also 0.10% to 0.60% for applicable cities, for a maximum total rate of 5.6% in certain cities.

Also, under all action alternatives, potential operation and maintenance impacts from impact fees and sales tax revenues would be minor, positive, and long term for the operational life of the project.

Agriculture

Studies by Gustafson et al. (1979) and Scott (1981) found that approximately 70% of the costs of transmission towers to farmers resulted from the nonproductive area created by the presence of the tower. Those studies also estimated that the remaining 30% of costs to farmers resulted from factors such as the time lost in working around towers and crop damage. Comprehensive studies of the estimated costs from farming around transmission structures based on Wisconsin- or Iowa-specific farm operations are not available. An environmental impact assessment conducted for a transmission project in Montana included estimates of costs to farming based on a model for typical Montana farming operations. Although the Montana model was based on different crops from those in Wisconsin and Iowa, the basic sequence of farm operations involved is similar to that found in Wisconsin and Iowa and included: pesticide use, fertilizer application, planting, in-crop spraying, harvesting, and post-harvest harrowing. The model also included an estimate for labor time and equipment. It adjusted for the presence of the structure in the field causing “overlap areas” where equipment passes through more than once. Based on 2007 prices, it was estimated that the annual cost of farming around a regular span mono-pole at the field edge ranged from $13 to $16 per structure; a similar amount for H-frames parallel to the field edge; $40 for H-frames perpendicular to the field edge; $150 for mono-poles in the field interior; and $177 for H-frames in the field interior (HydroSolutions, Inc., and Fehringer Agricultural Consulting Inc. 2007). It has also been estimated that the 2007 annual costs to farm around a small monopole, a large monopole, and an H-pole in the middle of a field planted with spring wheat are $105.09, $107.98 and $120.57, respectively (Thornton 2007).

Farming around transmission line poles can be difficult, particularly when larger farm equipment is used. Farmers may attempt to reduce the area that cannot be cropped around the pole by planting as close as possible to the transmission line structure. This increases the likelihood of hitting the pole with farm implements. It is unlikely that the transmission line structures proposed for the proposed project would be damaged. However, the farm implements may be damaged. Potential damage to farm implements would be especially troublesome if it occurred during planting or harvesting when time is especially crucial.

Wisconsin Statutes 182.017(7)(b) states: “In determining just compensation for the interest under [Wisconsin Statutes 32.09], damages shall include losses caused by placement of the line and associated facilities near fences or natural barriers such that lands not taken are rendered less readily accessible to vehicles, agricultural implements and aircraft used in crop work.”

IAC 478.17 provides operators of transmission lines reasonable access to the lines “for the purpose of constructing, reconstructing, enlarging, repairing, or locating the poles, wires, or construction and other devices used in or upon such line, but [the operator] shall pay to the owner of such lands and of crops thereon all damages to said lands or crops caused by entering, using, and occupying said lands for said purposes.”

Potential negative economic impacts to farming operations in the analysis area, including organic farming operations, would generally result from lost acreages of agricultural lands caused by placement of transmission line structures, associated facilities, and access roads, as well as an increase in the costs associated with working around transmission line structures. Under all action alternatives, given the relatively small acreage of agricultural lands that would be affected when compared to the total agricultural lands available in the analysis area, potential impacts to agriculture would be minor, negative, localized, and long term.

3.12.2.3.4 Tourism

Under all action alternatives, the potential negative impact to tourism in the analysis area counties as a whole is expected to be minor and short term during the construction phase of the proposed project. Impacts are expected to be minor because they would only occur in the specific parts of the analysis area that have tourist destinations that are crossed by the proposed transmission line and associated facilities. The presence of construction equipment, vehicles, and personnel, and the resulting noise, visual, and traffic impacts could result in negative impacts on tourism in the form of a diminished tourist experience and possibly reduced tourist visitation to areas near construction activities (relative to the tourism expenditures listed in Section 3.12.1.4). Potential negative impacts on tourism at specific tourist destinations overlapped by the project area would be moderate, localized, and short term during the construction phase because the transmission line would be constructed in segments over the course of 2 years and would not affect the specific destinations for the entire 2 years. As discussed in Section 3.12.1, tourism in the analysis area counties results in approximately $1.7 billion in direct visitor spending and approximately $197.5 million in state and local tax revenue annually. Construction activities associated with the proposed transmission line and associated facilities are expected to have a minor, short-term, and negative impact on tourism income in the analysis area counties as a whole, but a moderate, localized, short term, and negative impact on tourism income in the specific tourist destinations overlapped by the project area.

Under all action alternatives, the potential negative impacts to tourism during the operations phase of the proposed project would be minor, localized, and long term. Where the proposed transmission line crosses tourist destinations in rural and less developed landscapes, the potential impacts to tourism in these areas would be moderate and long term because the alteration of the landscape could deter visitation from tourists seeking a less developed setting (Stefansson et al. 2017). However, a New Hampshire study concluded that while factors such as transmission lines, wind turbines, and traffic delays could deter visitors from tourist destinations, the destinations’ benefits were much more important to visitors than these perceived deterrents (Nichols Tourism Group 2015). Where the proposed transmission line crosses tourist destinations in more developed landscapes, the potential impacts to tourism would be minor and long term because transmission lines would be less of a deterrent to tourists during the operations phase. For both the less developed and more developed landscapes that the proposed transmission line would cross, operations activities are expected to have a minor negative impact on the approximately $1.7 billion in direct visitor spending and approximately $197.5 million in state and local taxes that the analysis area counties receive annually from tourism income.

Because all action alternatives cross the Mississippi River, there is a potential for birdwatching tourism along the Great River Birding Trail and other spots along the river to be negatively impacted under all the action alternatives. Potential impacts to birdwatching tourism along the Mississippi River during the construction phase would be moderate, localized, and short term in the portions of the river overlapped by the project area because of the noise, visual, and traffic impacts associated with construction equipment and vehicles. Impacts to birdwatching tourism along the Mississippi River overlapped by the project area during the operations phase of the proposed project would be minor, negative, localized, and short term in any one location for the life of the project, because the noise, visual, and traffic caused by maintenance activities would be intermittent and less intensive than construction activities. Other popular birdwatching areas in the analysis area, such as Governor Dodge State Park and Festge County Park, are not expected to be affected by any of the action alternatives because of their distance from the proposed routes (approximately 1.7 miles).

There is a potential for negative impacts to tourism in the Driftless Area under all action alternatives because all action alternatives would overlap the Driftless Area. The potential for impacts would be greatest during the construction phase of the proposed project because of the noise, visual, and traffic associated with construction equipment and vehicles could deter visitation. The potential negative impacts on tourism during the construction phase would be moderate, localized, and short term in the portions of the Driftless Area overlapped by the project area. Potential negative impacts to tourism in the portions of the Driftless Area overlapped by the project area during the operations phase of the proposed project would be minor, localized, and short term for the life of the project, because the noise, visual, and traffic impacts resulting from maintenance activities would be intermittent and less intensive than construction activities.

Because all action alternatives intersect the Ice Age National Scenic Trail, there would be potential negative impacts on tourism at the portion of the Trail overlapped by the project area. The potential impacts on tourism at the portion of the Ice Age National Scenic Trail overlapped by the project area during the construction phase would be moderate, localized, and short term. Potential negative impacts to tourism at the portion of the Trail overlapped by the project area during the operations phase of the proposed project would be minor, localized, and short term for the life of the project because maintenance activities would be intermittent and less intensive than construction activities.

3.12.2.3.5 Property Values

An area of concern with transmission line projects has been the way that the market value of the property for resale could be affected, involving the right of the landowner to dispose of the property. Damages related to increased risk of economic loss associated with impairments to a property that exist or may occur are sometimes known as “stigma” damages (Mitchell 2000:162–163). In many cases, landowners have sought to demonstrate that the fear of adverse health effects from exposure to transmission line electric and magnetic fields (EMF) on their land contributes to reduced resale value for their parcel.

In general, claims of diminished property value through decreased marketability are based on the reported concern about hazards to human health and safety; and increased noise, traffic, and visual impacts associated with living in proximity to locally unwanted land uses such as power plants, freeways, high- voltage transmission lines, landfills, hazardous waste sites, etc. The issue of property value impacts associated with such industrial facilities has been given much attention over the past 20 years, and as a result, has been the subject of extensive study.

Studies of the effects of high-voltage transmission lines on property values have found wide-ranging results, from negative, to neutral, to positive impacts. A review summarized by the PSCW found that the presence of a power line on a property can reduce home values up to 14%, but that effects tend to decrease over time (PSCW 2000:214–215). Similar findings were seen in the Mountain States Transmission Initiative Review Project (2012:12–13).

Negative proximity effects on residential properties are not limited to properties actually crossed by a line (Colwell 1990:127). Other studies have shown negative impacts on property values for homes abutting transmission lines in various parts of the United States; these negative impacts have been shown to vary from 0% to in excess of 20% (Anderson et al. 2017; Bottemiller and Wolverton 2013; Cowger et al. 1996; Des Rosiers 2002; Pitts and Jackson 2007; Tatos et al. 2016). Studies have found that the most substantial impacts on property values generally occur to properties abutting transmission lines and that the potential negative impact from transmission lines decreases substantially the farther away the property (Jackson and Pitts 2010). One review of such studies found that, on average, property value decreases ranged between 2% and 7% for homes adjacent to transmission lines and between 0% and 5% for homes not directly adjacent to a transmission line but with a view of the transmission lines (Pitts and Jackson 2007). Another study found no evidence of systematic effects of either proximity or visibility of 345-kV transmission lines on residential real estate values (Chalmers and Voorvaart 2009). Jackson (2010) found that there were small (1.1% to 2.4%) discounts to rural land values in Wisconsin from the presence of high-voltage (345-kV) transmission lines. A literature review of property value studies done between 1964 and 2009 found that transmission line effects on property values ranged from approximately 2% to 9% (Jackson and Pitts 2010). Most studies reviewed by Jackson and Pitts (2010) found no effect on property values. One study concluded that homes abutting 345-kV corridors often experience an increase in property values because of the benefit of having an open space, compared to similar unavailable space to other homes (Tatos et al. 2016). For example, the transmission line ROW might include a greenway where no other homes can be built in the ROW (Tatos et al. 2016).

While there is a potential for property values to be affected beyond 150 feet from a high-voltage transmission line, in general, studies have found that those potential impacts are substantially decreased when compared to the potential impacts to property directly abutting high-voltage transmission lines. However, one study found potential negative impacts of up to 15% to property values for lots within 1,000 feet of a 500-kV transmission line in rural southwestern Montana, where the impact on value was a function of three variables: use, size, and availability of substitutes (Chalmers 2012). The study found that properties whose sole use is residential are more vulnerable to value impact than agricultural or recreational uses. The study also found that as properties get smaller, they come more vulnerable due to decreased flexibility in the siting of improvements. Finally, the study found that existence of close substitutes unaffected by transmission lines increases the likelihood of value impact (Chalmers 2012).

Based on the range of potential impacts to property values noted in the studies discussed above, potential negative impacts to property values in the analysis area counties would be moderate. Because impacts would likely lessen over time, according to the studies discussed above, the impacts would be short term.

3.12.2.3.6 Environmental Justice

Seven of the 19 census tracts overlapped by the C-HC Project alternatives include environmental justice communities, all of which are in Wisconsin (Figure 3.12-1). These census tracts include Dane County Census Tracts 128 and 109.4; Iowa County Census Tracts 9501 and 9505; and Grant County Census

Tracts 9601, 9605, and 9609. Identified environmental justice communities overlapped by the C-HC Project would likely experience negative impacts on a localized basis from construction, operation, and maintenance of the C-HC Project. These impacts would most commonly be associated with visual resources, property values, and traffic. These adverse effects are all expected to be minor to moderate. Because of environmental indicators and characteristics specific to each census tract identified as environmental justice communities, such as proximity to Superfund sites, proximity to hazardous waste facilities, and proximity to traffic, some environmental communities have the potential to experience potential disproportionate impacts related to traffic, property values, and visual resources. The potential impacts specific to each identified environmental justice community are described below under the applicable alternatives.

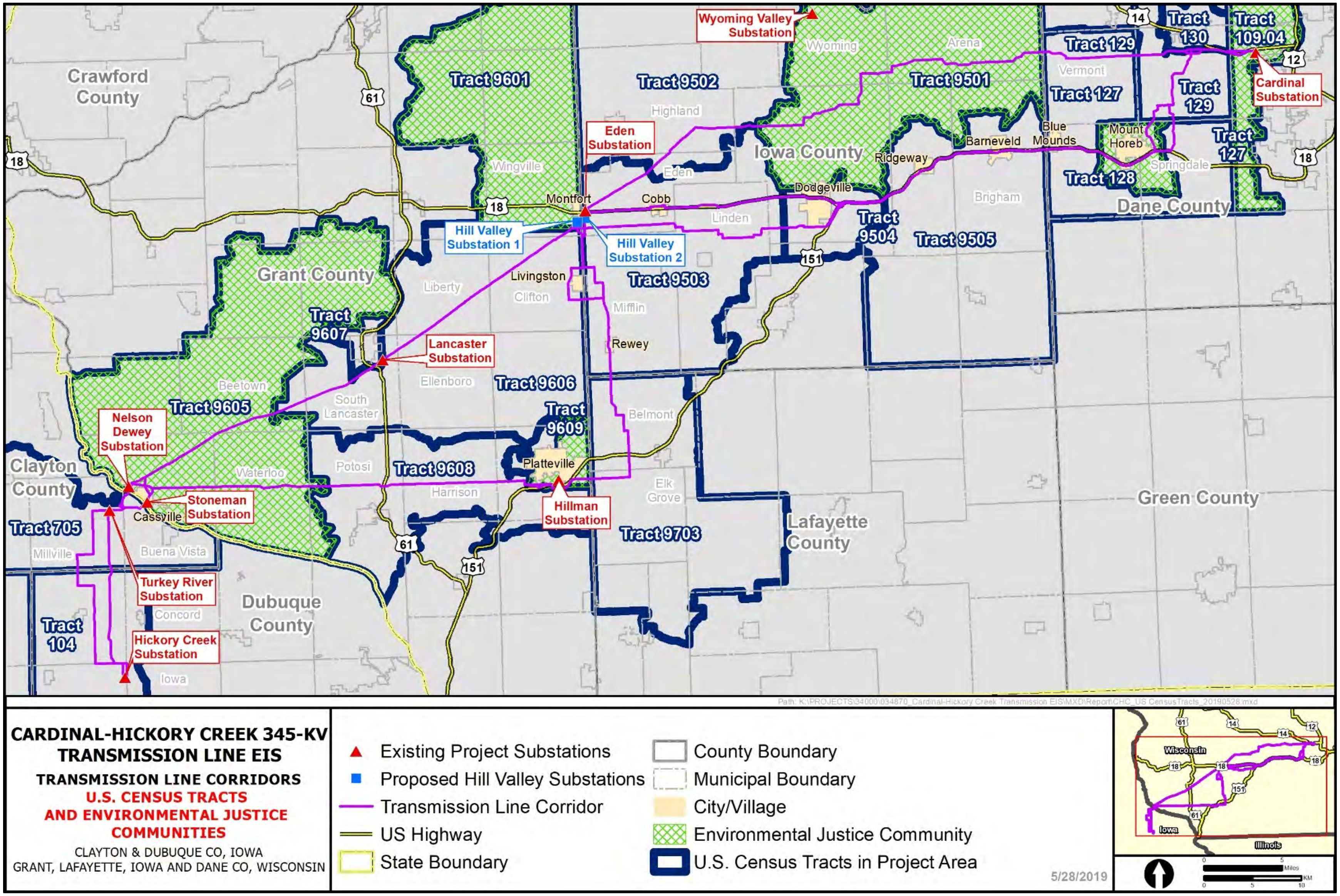

Figure 3.12-1. C-HC Project overlap with environmental justice communities within the analysis area.

3.12.2.4 ALTERNATIVE 1

3.12.2.4.1 Demographics

Under Alternative 1, potential impacts on demographics would be as described in Section 3.12.2.3 (Impacts Common to All Action Alternatives). Potential impacts would be minor and short term.

3.12.2.4.2 Housing

Under Alternative 1, potential impacts on housing would be as described in Section 3.12.2.3 (Impacts Common to All Action Alternatives). Potential negative impacts would be minor and short term.

3.12.2.4.3 Employment income

Employment

Under Alternative 1, potential impacts on employment would be as described in Section 3.12.2.3 (Impacts Common to All Action Alternatives). Potential positive impacts would be minor and short term.

Project Spending and Impact Fees

Under Alternative 1, the total construction costs would be approximately $465.1 million, including $120.6 million in materials, $210.8 million in labor, and $133.8 million in other costs. The estimated one-time environmental impact fee would be $15,801,754, and the estimated annual environmental impact fee would be $948,105 (American Transmission Company et al. 2018). Because the project spending and impact fees would represent a small fraction of the annual earnings for the construction industry in the analysis area (approximately $1.9 billion in 2016), potential positive impacts would be minor and long term.

Agriculture

Under Alternative 1, the general nature of the potential negative economic impacts on agriculture would be as described in Section 3.12.2.3 (Impacts Common to All Action Alternatives). However, the total acres of agricultural land affected would vary among the alternatives. Because the primary economic impact on agriculture would be the acres of land disturbed or taken out of production, the more acres that are affected, the larger the expected impact would be. Under Alternative 1, approximately 881 acres of agricultural lands, including 364 acres of prime farmland and 511 acres of farmland of statewide importance, would be within the ROW under this alternative. Under this alternative, there would be approximately 101 acres of agricultural land cover type affected by surface disturbances associated with proposed access roads, approximately 28 acres of which would be prime farmland. Approximately 22 acres of agricultural lands would be permanently disturbed by the transmission line structure and substation footprints, 11 acres of which would be prime farmland. Potential negative impacts would be minor, localized, and short term.

3.12.2.4.4 Tourism

Under Alternative 1, the general nature of the potential negative impacts on tourism would be as described in Section 3.12.2.3 (Impacts Common to All Action Alternatives), including potential impacts on tourism in the Driftless Area and at the Ice Age National Scenic Trail. Potential negative impacts during the construction phase would be minor and short term for the analysis area as a whole, but moderate, localized, and short term for the specific tourist destinations overlapped by the project area. Potential negative impacts during the operations phase would be minor and short term for the analysis area as a whole. However, potential negative impacts at tourist destinations in more rural, undeveloped landscapes would be moderate, localized, and long term, while potential impacts at tourist destinations in more developed areas would be minor, localized, and long term during the operations phase.

Under Alternative 1, the general nature of the potential negative impacts on birdwatching tourism along the Mississippi River during the construction phase would be as described in Section 3.12.2.3 (Impacts Common to All Action Alternatives). Because this alternative would create new disturbances within the Refuge, it would likely have a minor, long-term, negative impact on birdwatching tourism at this location during the operations phase.

No negative impacts to tourism at Military Ridge State Trail or Blue Mound State Park are expected to occur under Alternative 1 because of the distances between these sites and the proposed transmission line route (approximately 5.0 and 4.5 miles, respectively).

3.12.2.4.5 Property Values

Under Alternative 1, the general nature of the potential negative impacts to property values would be as described in Section 3.12.2.3 (Impacts Common to All Action Alternatives). Table 3.12-14 summarizes the residential buildings (houses/apartments) that would occur within the 150-foot ROW (within 75 feet of ROW centerline), and residential buildings that would occur outside the ROW but within 150 feet of the ROW centerline under Alternative 1.

Table 3.12-14. Residential Buildings within ROW and within 150 feet of ROW Centerline under Alternative 1

	Residential Buildings within 150-foot ROW	Residential Buildings Outside ROW but within 150 feet of ROW Centerline	Total
Alternative 1	2	19	**21**

Existing median home values in the analysis area counties are listed in Table 3.12-10. The majority of the property that would be affected by the proposed transmission line is agricultural, undeveloped, and forested land. The acres and values of agricultural, undeveloped, and forested lands in analysis area municipalities are listed in Table 3.12-9. As discussed in the analysis assumptions (Section 3.12.2.1), it is assumed that the proposed transmission line could reduce property values between 0% to 20% within 150 feet of the ROW centerline, but these impacts would likely decrease over time. Therefore, impacts to property values under Alternative 1 are expected to be moderate and localized in the short term, and minor and localized in the long term. As discussed in Section 3.12.2.3.5, while most studies suggest that properties abutting the transmission line would be the most likely to experience potential property value impacts, there is potential for properties outside 150 feet of the ROW centerline to experience property value impacts as well.

3.12.2.4.6 Environmental Justice

Under Alternative 1, Grant County Census Tract 9601 would experience potential greater negative property value impacts than those experienced by non-environmental justice communities overlapped by the C-HC Project because the Hill Valley Substation would introduce a new industrial use to the area. Because Dane County Census Tract 109.04 has one Superfund site and four hazardous waste facilities, the addition of another industrial use with the C-HC Project would result in potential greater negative impacts to property values. All other identified environmental justice communities would experience impacts that are the same in nature and intensity as non-environmental justice communities under Alternative 1.

3.12.2.5 ALTERNATIVE 2

3.12.2.5.1 Demographics

Under Alternative 2, potential impacts on demographics would be as described in Section 3.12.2.3 (Impacts Common to All Action Alternatives). Potential impacts would be minor and short term.

3.12.2.5.2 Housing

Under Alternative 2, potential impacts on housing would be as described in Section 3.12.2.3 (Impacts Common to All Action Alternatives). Potential negative impacts would be minor and short term.

3.12.2.5.3 Employment and Income

Employment

Under Alternative 2, potential impacts on employment would be as described in Section 3.12.2.3 (Impacts Common to All Action Alternatives). Potential positive impacts would be minor and short term.

Project Spending and Impact Fees

Under Alternative 2, the total construction costs would be approximately $478.8 million, including $126.4 million for materials, $215.4 million for labor, and $136.9 million for other costs. The estimated one-time environmental impact fee would be $15,909,022, and the estimated annual environmental impact fee would be $954,541 (American Transmission Company et al. 2018). Because the project spending and impact fees would represent a small fraction of the annual earnings for the construction industry in the analysis area (approximately $1.9 billion in 2016), potential positive impacts would be minor and long term.

Agriculture

Under Alternative 2, the general nature of the potential negative economic impacts on agriculture would be as described in Section 3.12.2.3 (Impacts Common to All Action Alternatives). However, the total acres of agricultural land affected would vary among the alternatives. Because the primary economic impact on agriculture would be the acres of land disturbed or taken out of production, the more acres that are affected, the larger the expected impact would be. Under Alternative 2, approximately 916 acres of agricultural lands, including approximately 349 acres of prime farmland and approximately 587 acres of farmland of statewide importance, would be within the ROW under this alternative. Under this alternative, there would be approximately 102 acres of agricultural land cover type affected by surface disturbances associated with proposed access roads, approximately 26 acres of which would be prime farmland. Approximately 22 acres of prime farmland would be permanently disturbed by the transmission line structure and substation footprints. Potential negative impacts would be minor, localized, and short term.

3.12.2.5.4 Tourism

Under Alternative 2, the general nature of the potential negative impacts on tourism would be as described in Section 3.12.2.3 (Impacts Common to All Action Alternatives), including potential impacts on tourism in the Driftless Area, at the Ice Age National Scenic Trail, and birdwatching areas at the proposed Mississippi River crossing. Impacts to birdwatching tourism along the portion of the Mississippi River overlapped by the project area during the operations phase of the proposed project would be minor, negative, localized, and short term because the noise, visual, and traffic caused by maintenance activities would be intermittent and would be similar to the maintenance activities that occur for the existing transmission line at this location. Because this alternative would replace an existing transmission line that crosses the Mississippi River within the Refuge, it would likely have a lesser negative impact on birdwatching tourism at this location than the alternatives that would create new disturbances across the Mississippi River (Alternatives 1, 5, and 6).

No impacts to tourism at Military Ridge State Trail or Blue Mound State Park are expected to occur under Alternative 2 because of the distances between these sites and the proposed transmission line route (approximately 5.0 and 4.5 miles, respectively).

3.12.2.5.5 Property Values

Under Alternative 2, the general nature of the potential negative impacts to property values would be as described in Section 3.12.2.3 (Impacts Common to All Action Alternatives). Table 3.12-15 summarizes the residential buildings (houses/apartments) that would occur within the 150-foot ROW (within 75 feet of ROW centerline), and residential buildings that would occur outside the ROW but within 150 feet of the ROW centerline under Alternative 2.

Table 3.12-15. Residential Buildings within ROW and within 150 feet of ROW Centerline under Alternative 2

	Residential Buildings within 150-foot ROW	Residential Buildings Outside ROW but within 150 feet of ROW Centerline	Total
Alternative 2	2	26	**28**

Existing median home values in the analysis area counties are listed in Table 3.12-10. The majority of the property that would be affected by the proposed transmission line is agricultural, undeveloped, and forested land. The acres and values of agricultural, undeveloped, and forested lands in analysis area municipalities are listed in Table 3.12-9. As discussed in the analysis assumptions (Section 3.12.2.1), it is assumed that the proposed transmission line could reduce property values between 0% to 20% within 150 feet of the ROW centerline, but these impacts would likely decrease over time. Therefore, impacts to property values under Alternative 2 are expected to be moderate and localized in the short term, and minor and localized in the long term. As discussed in Section 3.12.2.3.5, while most studies suggest that properties abutting the transmission line would be the most likely to experience potential property value impacts, there is potential for properties outside 150 feet of the ROW centerline to experience property value impacts as well.

3.12.2.5.6 Environmental Justice

Under Alternative 2, the addition of the C-HC Project in Dane County Census Tract 109.04 would result in potential greater negative impacts to property values than in non-environmental justice communities overlapped by the C-HC Project. This is because of the already existing Superfund site and four hazardous waste facilities in Dane County Census Tract 109.04. Potential impacts to other identified environmental justice communities would be the same in nature and intensity as the impacts experienced by non-environmental justice communities overlapped by the C-HC Project.

3.12.2.6 ALTERNATIVE 3

3.12.2.6.1 Demographics

Under Alternative 3, potential impacts on demographics would be as described in Section 3.12.2.3 (Impacts Common to All Action Alternatives). Potential impacts would be minor and short term.

3.12.2.6.2 Housing

Under Alternative 3, potential impacts on housing would be as described in Section 3.12.2.3 (Impacts Common to All Action Alternatives). Potential negative impacts would be minor and short term.

3.12.2.6.3 Employment and Income

Employment

Under Alternative 3, potential impacts on employment would be as described in Section 3.12.2.3 (Impacts Common to All Action Alternatives). Potential positive impacts would be minor and short term.

Project Spending and Impact Fees

Under Alternative 3, the total construction costs would be approximately $526.3 million, including $141.7 million for materials, $238.0 million for labor, and $146.6 million for other costs. The estimated one-time environmental impact fee would be $18,657,445, and the estimated annual environmental impact fee would be $1,119,447 (American Transmission Company et al. 2018). Because the project spending and impact fees would represent a small fraction of the annual earnings for the construction industry in the analysis area (approximately $1.9 billion in 2016), potential positive impacts would be minor and long term.

Agriculture

Under Alternative 3, the general nature of the potential negative economic impacts on agriculture would be as described in Section 3.12.2.3 (Impacts Common to All Action Alternatives). However, the total acres of agricultural land affected would vary among the alternatives. Because the primary economic impact on agriculture would be the acres of land disturbed or taken out of production, the more acres that are affected, the larger the expected impact would be. Under Alternative 3, approximately 1,098 acres of agricultural lands, approximately 614 acres of prime farmland and approximately 616 acres of farmland of statewide importance, would be within the ROW under this alternative. Under this alternative, there would be approximately 73 acres of agricultural land cover type affected by surface disturbances associated with proposed access roads, approximately 22 acres of which would be prime farmland. Approximately 22 acres of prime farmland would be permanently disturbed by the transmission line structure and substation footprints. Potential negative impacts would be minor, localized, and short term.

3.12.2.6.4 Tourism

Under Alternative 3, the general nature of the potential negative impacts on tourism would be the same as those described in Section 3.12.2.3 (Impacts Common to All Action Alternatives), including potential impacts on tourism in the Driftless Area, at the Ice Age National Scenic Trail, and birdwatching areas at the proposed Mississippi River crossing. Impacts to birdwatching tourism along the portion of the Mississippi River overlapped by the project area during the operations phase of the proposed project would be minor, negative, localized, and short term because the noise, visual, and traffic caused by maintenance activities would be intermittent and would be similar to the maintenance activities that occur for the existing transmission line at this location. Because this alternative would replace an existing transmission line that crosses the Mississippi River within the Refuge, it would likely have a lesser negative impact on birdwatching tourism at this location than the alternatives that would create new disturbances across the Mississippi River (Alternatives 1, 5, and 6).

No impacts to tourism at Military Ridge State Trail or Blue Mound State Park are expected to occur under Alternative 2 because of the distances between these sites and the proposed transmission line route (approximately 5.0 and 4.5 miles, respectively).

3.12.2.6.5 Property Values

Under Alternative 3, the general nature of the potential negative impacts to property values would be as described in Section 3.12.2.3 (Impacts Common to All Action Alternatives). Table 3.12-16 summarizes the residential buildings (houses/apartments) that would occur within the 150-foot ROW (within 75 feet of ROW centerline), and residential buildings that would occur outside the ROW but within 150 feet of the ROW centerline under Alternative 3.

Table 3.12-16. Residential Buildings within ROW and within 150 feet of ROW Centerline under Alternative 3

	Residential Buildings within 150-foot ROW	Residential Buildings Outside ROW but within 150 feet of ROW Centerline	Total
Alternative 3	3	34	37

Existing median home values in the analysis area counties are listed in Table 3.12-10. The majority of the property that would be affected by the proposed transmission line is agricultural, undeveloped, and forested land. The acres and values of agricultural, undeveloped, and forested lands in analysis area municipalities are listed in Table 3.12-9. As discussed in the analysis assumptions (Section 3.12.2.1), it is assumed that the proposed transmission line could reduce property values between 0% to 20% within 150 feet of the ROW centerline, but these impacts would likely decrease over time. Therefore, impacts to property values under Alternative 3 are expected to be moderate and localized in the short term, and minor and localized in the long term. As discussed in Section 3.12.2.3.5, while most studies suggest that properties abutting the transmission line would be the most likely to experience potential property value impacts, there is potential for properties outside 150 feet of the ROW centerline to experience property value impacts as well.

3.12.2.6.6 Environmental Justice

Under Alternative 3, Grant County Census Tract 9609 would experience greater impacts from increased traffic than non-environmental justice communities during construction of the C-HC Project because proximity to traffic is already an identified issue in this environmental justice community (USEPA 2019). Because Dane County Census Tract 109.04 has one Superfund site and four hazardous waste facilities, the addition of another industrial use with the C-HC Project would result in potential greater negative impacts to property values. All other identified environmental justice communities would experience impacts that are the same in nature and intensity as non-environmental justice communities under Alternative 3.

3.12.2.7 ALTERNATIVE 4

3.12.2.7.1 Demographics

Under Alternative 4, potential impacts on demographics would be as described in Section 3.12.2.3 (Impacts Common to All Action Alternatives). Potential impacts would be minor and short term.

3.12.2.7.2 Housing

Under Alternative 4, potential impacts on housing would be as described in Section 3.12.2.3 (Impacts Common to All Action Alternatives). Potential negative impacts would be minor and short term.

3.12.2.7.3 Employment and Income

Employment

Under Alternative 4, potential impacts on employment would be as described in Section 3.12.2.3 (Impacts Common to All Action Alternatives). Potential positive impacts would be minor and short term.

Project Spending and Impact Fees

Under Alternative 4, the total construction costs would be approximately $538.5 million, including $153.3 million for materials, $240.7 million for labor, and $144.4 million for other costs. The estimated one-time environmental impact fee would be $19,249,750, and the estimated annual environmental impact fee would be $1,154,985 (American Transmission Company et al. 2018). Because the project spending and impact fees would represent a small fraction of the annual earnings for the construction industry in the analysis area (approximately $1.9 billion in 2016), potential positive impacts would be minor and long term.

Agriculture

Under Alternative 4, the general nature of the potential negative economic impacts on agriculture would be as described in Section 3.12.2.3 (Impacts Common to All Action Alternatives). However, the total acres of agricultural land affected would vary among the alternatives. Because the primary economic impact on agriculture would be the acres of land disturbed or taken out of production, the more acres that are affected, the larger the expected impact would be. Under Alternative 4, approximately 1,175 acres of agricultural lands, including approximately 855 acres of prime farmland and approximately 685 acres of farmland of statewide importance, would be within the ROW under this alternative. Under this alternative, there would be approximately 58 acres of agricultural land cover type affected by surface disturbances associated with proposed access roads, approximately 17 acres of which would be prime farmland. Approximately 22 acres of prime farmland would be permanently disturbed by the transmission line structure and substation footprints. Potential negative impacts would be minor, localized, and short term.

3.12.2.7.4 Tourism

Under Alternative 4, the general nature of the potential negative impacts on tourism would be the same as those described in Section 3.12.2.3 (Impacts Common to All Action Alternatives), including potential impacts on tourism in the Driftless Area, at the Ice Age National Scenic Trail, and birdwatching areas at the proposed Mississippi River crossing. Impacts to birdwatching tourism along the portion of the Mississippi River overlapped by the project area during the operations phase of the proposed project would be minor, negative, localized, and short term because the noise, visual, and traffic caused by maintenance activities would be intermittent and would be similar to the maintenance activities that occur for the existing transmission line at this location. Because this alternative would replace an existing transmission line that crosses the Mississippi River within the Refuge, it would likely have a lesser negative impact on birdwatching tourism at this location than the alternatives that would create new disturbances across the Mississippi River (Alternatives 1, 5, and 6).

Tourism related to the Military Ridge State Trail could be negatively impacted under this alternative, as the proposed transmission line route would run parallel to Military Ridge State Trail for approximately 9 miles between Mount Horeb, Wisconsin and Dodgeville, Wisconsin. Potential negative impacts would be most likely during the construction phase because of the increased presence of construction equipment and vehicles and the associated noise. Impacts to tourism at the portion of Military Ridge State Trail paralleling the proposed transmission line during the construction phase would be moderate and short term. Negative impacts on tourism related to the Military Ridge State Trail would likely decrease following the construction phase, because disturbances associated with construction equipment and vehicles would cease and maintenance activities would only be intermittent; however, some tourists may be deterred by the visual impacts created by the transmission line. Negative impacts to tourism on the portion of the Military Ridge State Trail paralleling the proposed transmission line would be minor and long term during the operations phase. Impacts to tourism during the operations phase would primarily result from the intermittent maintenance activities that could cause noise and traffic impacts, as well as tourists that may be deterred from visiting the area because of the visual impact caused by the transmission line.

Blue Mound State Park is approximately 1 mile north of the proposed transmission line route under this alternative. There is a potential for negative impacts on tourism at Blue Mound State Park during the construction phase of the proposed project, because tourists traveling to and from the park may experience noise, visual, and traffic impacts associated with construction equipment and vehicles. However, because the construction activities would occur approximately 1 mile from the state park, these impacts are expected to be minor and short term.

3.12.2.7.5 Property Values

Under Alternative 4, the general nature of the potential negative impacts to property values would be as described in Section 3.12.2.3 (Impacts Common to All Action Alternatives). Table 3.12-17 summarizes the residential buildings (houses/apartments) that would occur within the 150-foot ROW (within 75 feet of ROW centerline), and residential buildings that would occur outside the ROW but within 150 feet of the ROW centerline under Alternative 4.

Table 3.12-17. Residential Buildings within ROW and within 150 feet of ROW Centerline under Alternative 4

	Residential Buildings within 150-foot ROW	Residential Buildings Outside ROW but within 150 feet of ROW Centerline	Total
Alternative 4	9	52	**61**

Existing median home values in the analysis area counties are listed in Table 3.12-10. The majority of the property that would be affected by the proposed transmission line is agricultural, undeveloped, and forested land. The acres and values of agricultural, undeveloped, and forested lands in analysis area municipalities are listed in Table 3.12-9. As discussed in the analysis assumptions (Section 3.12.2.1), it is assumed that the proposed transmission line could reduce property values between 0% to 20% within 150 feet of the ROW centerline, but these impacts would likely decrease over time. Therefore, impacts to property values under Alternative 4 are expected to be moderate and localized in the short term, and minor and localized in the long term. As discussed in Section 3.12.2.3.5, while most studies suggest that properties abutting the transmission line would be the most likely to experience potential property value impacts, there is potential for properties outside 150 feet of the ROW centerline to experience property value impacts as well.

3.12.2.7.6 Environmental Justice

Under Alternative 4, Dane County Census Tract 128 would experience greater impacts on visual resources and potential greater negative property value impacts than non-environmental justice communities overlapped by the C-HC Project because of the addition of a transmission line segment along a small county road. Dane County Census Tract 128 and Grant County Census Tract 9609 would experience greater impacts from increased traffic than non-environmental justice communities during construction of the C-HC Project because proximity to traffic is already an identified issue in these two environmental justice communities (USEPA 2019). Because Dane County Census Tract 109.04 has one Superfund site and four hazardous waste facilities, the addition of another industrial use with the C-HC Project would result in potential greater negative impacts to property values. All other identified environmental justice communities would experience impacts that are the same in nature and intensity as non-environmental justice communities under Alternative 4.

3.12.2.8 ALTERNATIVE 5

3.12.2.8.1 Demographics

Under Alternative 5, potential impacts on demographics would be as described in Section 3.12.2.3 (Impacts Common to All Action Alternatives). Potential impacts would be minor and short term.

3.12.2.8.2 Housing

Under Alternative 5, potential impacts on housing would be as described in Section 3.12.2.3 (Impacts Common to All Action Alternatives). Potential negative impacts would be minor and short term.

3.12.2.8.3 Employment and Income

Employment

Under Alternative 5, potential impacts on employment would be as described in Section 3.12.2.3 (Impacts Common to All Action Alternatives). Potential positive impacts would be minor and short term.

Project Spending and Impact Fees

Under Alternative 5, the total construction costs would be approximately $548.4 million, including $159.5 million for materials, $242.5 million for labor, and $146.4 million for other costs. The estimated one-time environmental impact fee would be $20,172,762, and the estimated annual environmental impact fee would be $1,210,366 (American Transmission Company et al. 2018). Because the project spending and impact fees would represent a small fraction of the annual earnings for the construction industry in the analysis area (approximately $1.9 billion in 2016), potential positive impacts would be minor and long term.

Agriculture

Under Alternative 5, the general nature of the potential negative economic impacts on agriculture would be as described in Section 3.12.2.3 (Impacts Common to All Action Alternatives). However, the total acres of agricultural land affected would vary among the alternatives. Because the primary economic impact on agriculture would be the acres of land disturbed or taken out of production, the more acres that are affected, the larger the expected impact would be. Under Alternative 5, approximately 1,355 acres of agricultural lands, including approximately 908 acres of prime farmland and approximately 774 acres of farmland of statewide importance, would be within the ROW under this alternative. Under this alternative, there would be approximately 65 acres of agricultural land cover type affected by surface disturbances associated with proposed access roads, approximately 20 acres of which would be prime farmland. Approximately 22 acres of agricultural lands would be permanently disturbed by the transmission line structure and substation footprints, 11 acres of which would be prime farmland. Potential negative impacts would be minor, localized, and short term.

3.12.2.8.4 Tourism

Under Alternative 5, the general nature of the potential negative impacts on tourism would be the same as those described in Section 3.12.2.3 (Impacts Common to All Action Alternatives), including impacts on tourism in the Driftless Area and at the Ice Age National Scenic Trail.

Under Alternative 5, the general nature of the potential negative impacts on birdwatching tourism along the Mississippi River during the construction phase would be as described in Section 3.12.2.3 (Impacts Common to All Action Alternatives). Because this alternative would create new disturbances within the Refuge, it would likely have a minor, long-term, negative impact on birdwatching tourism at this location during the operations phase.

Tourism related to the Military Ridge State Trail and Blue Mound State Park could potentially be negatively impacted under this alternative as well. These impacts would be the same as those described under Alternative 4.

3.12.2.8.5 Property Values

Under Alternative 5, the general nature of the potential negative impacts to property values would be as described in Section 3.12.2.3 (Impacts Common to All Action Alternatives). Table 3.12-18 summarizes the residential buildings (houses/apartments) that would occur within the 150-foot ROW (within 75 feet of ROW centerline), and residential buildings that would occur outside the ROW but within 150 feet of the ROW centerline under Alternative 5.

Table 3.12-18. Residential Buildings within ROW and within 150 feet of ROW Centerline under Alternative 5

	Residential Buildings within 150-foot ROW	Residential Buildings Outside ROW but within 150 feet of ROW Centerline	Total
Alternative 5	2	53	**55**

Existing median home values in the analysis area counties are listed in Table 3.12-10. The majority of the property that would be affected by the proposed transmission line is agricultural, undeveloped, and forested land. The acres and values of agricultural, undeveloped, and forested lands in analysis area municipalities are listed in Table 3.12-9. As discussed in the analysis assumptions (Section 3.12.2.1), it is assumed that the proposed transmission line could reduce property values between 0% to 20% within 150 feet of the ROW centerline, but these impacts would likely decrease over time. Therefore, impacts to property values under Alternative 5 are expected to be moderate and localized in the short term, and minor and localized in the long term. As discussed in Section 3.12.2.3.5, while most studies suggest that properties abutting the transmission line would be the most likely to experience potential property value impacts, there is potential for properties outside 150 feet of the ROW centerline to experience property value impacts as well.

3.12.2.8.6 Environmental Justice

Under Alternative 5, Grant County Census Tract 9601 would experience potential negative property value impacts greater than those experienced by non-environmental justice communities overlapped by the C- HC Project because the Hill Valley Substation would introduce a new industrial use to the area. Dane County Census Tract 128 would experience greater impacts on visual resources and potentially greater property value impacts than non-environmental justice communities overlapped by the C-HC Project because of the addition of a transmission line segment along a small county road. Dane County Census Tract 128 and Grant County Census Tract 9609 would experience greater impacts from increased traffic than non-environmental justice communities during construction of the C-HC Project because proximity to traffic is already an identified issue in these two environmental justice communities (USEPA 2019). Because Dane County Census Tract 109.04 has one Superfund site and four hazardous waste facilities, the addition of another industrial use with the C-HC Project would result in potential greater negative impacts to property values. All other identified environmental justice communities would experience impacts that are the same in nature and intensity as non-environmental justice communities under Alternative 5.

3.12.2.9 ALTERNATIVE 6

3.12.2.9.1 Demographics

Under Alternative 6, potential impacts on demographics would be as described in Section 3.12.2.3 (Impacts Common to All Action Alternatives). Potential impacts would be minor and short term.

3.12.2.9.2 Housing

Under Alternative 6, potential impacts on housing would be as described in Section 3.12.2.3 (Impacts Common to All Action Alternatives). Potential negative impacts would be minor and short term.

3.12.2.9.3 Employment and Income

Employment

Under Alternative 6, potential impacts on employment would be as described in Section 3.12.2.3 (Impacts Common to All Action Alternatives). Potential positive impacts would be minor and short term.

Project Spending and Impact Fees

Under Alternative 6, the total construction costs would be approximately $479.2 million, including $132.6 million for materials, $212.4 million for labor, and $131.2 million for other costs. The estimated one-time environmental impact fee would be $14,082,221, and the estimated annual environmental impact fee would be $844,933 (American Transmission Company et al. 2018). Because the project spending and impact fees would represent a small fraction of the annual earnings for the construction industry in the analysis area (approximately $1.9 billion in 2016), potential positive impacts would be minor and long term.

Agriculture

Under Alternative 6, the general nature of the potential negative economic impacts on agriculture would be as described in Section 3.12.2.3 (Impacts Common to All Action Alternatives). However, the total acres of agricultural land affected would vary among the alternatives. Because the primary economic impact on agriculture would be the acres of land disturbed or taken out of production, the more acres that are affected, the larger the expected impact would be. Under Alternative 6, approximately 968 acres of agricultural lands, including approximately 619 acres of prime farmland and approximately 576 acres of farmland of statewide importance, would be within the ROW under this alternative. Under this alternative, there would be approximately 85 acres of agricultural land cover type affected by surface disturbances associated with proposed access roads, approximately 24 acres of which would be prime farmland. Approximately 1 acre of prime farmland would be permanently disturbed by transmission line structures. Approximately 22 acres of agricultural lands would be permanently disturbed by the Hill Valley Substation, 11 acres of which would be prime farmland. Potential negative impacts would be minor, localized, and short term.

3.12.2.9.4 Tourism

Under Alternative 6, the general nature of the potential negative impacts on tourism would be the same as those described in Section 3.12.2.3 (Impacts Common to All Action Alternatives), including impacts on tourism in the Driftless Area and at the Ice Age National Scenic Trail.

Under Alternative 6, the general nature of the potential negative impacts on birdwatching tourism along the Mississippi River during the construction phase would be as described in Section 3.12.2.3 (Impacts Common to All Action Alternatives). Because this alternative would create new disturbances within the Refuge, it would likely have a minor, long-term, negative impact on birdwatching tourism at this location during the operations phase.

Tourism related to the Military Ridge State Trail and Blue Mound State Park could potentially be negatively impacted under this alternative as well. These impacts would be the same as those described under Alternative 4.

3.12.2.9.5 Property Values

Under Alternative 6, the general nature of the potential negative impacts to property values would be as described in Section 3.12.2.3 (Impacts Common to All Action Alternatives). Table 3.12-19 summarizes the residential buildings (houses/apartments) that would occur within the 150-foot ROW (within 75 feet of ROW centerline), and residential buildings that would occur outside the ROW but within 150 feet of the ROW centerline under Alternative 6. One residential house within the ROW would be purchased and removed during construction of the C-HC Project.

Table 3.12-19. Residential Buildings within ROW and within 150 feet of ROW Centerline under Alternative 6

	Residential Buildings within 150-foot ROW	Residential Buildings Outside ROW but within 150 feet of ROW Centerline	Total
Alternative 6	8	39	**47**

Existing median home values in the analysis area counties are listed in Table 3.12-10. The majority of the property that would be affected by the proposed transmission line is agricultural, undeveloped, and forested land. The acres and values of agricultural, undeveloped, and forested lands in analysis area municipalities are listed in Table 3.12-9. As discussed in the analysis assumptions (Section 3.12.2.1), it is assumed that the proposed transmission line could reduce property values between 0% to 20% within 150 feet of the ROW centerline, but these impacts would likely decrease over time. Therefore, impacts to property values under Alternative 6 are expected to be moderate and localized in the short term, and minor and localized in the long term. As discussed in Section 3.12.2.3.5, while most studies suggest that properties abutting the transmission line would be the most likely to experience potential property value impacts, there is potential for properties outside 150 feet of the ROW centerline to experience property value impacts as well.

3.12.2.9.6 Environmental Justice

Under Alternative 6, Grant County Census Tract 9601 would experience potentially negative property value impacts greater than those experienced by non-environmental justice communities overlapped by the C-HC Project because the Hill Valley Substation would introduce a new industrial use to the area. Dane County Census Tract 128 would experience greater impacts on visual resources and potentially greater property value impacts than non-environmental justice communities overlapped by the C-HC Project because of the addition of a transmission line segment along a small county road. Dane County Census Tract 128 would experience greater impacts from increased traffic than non-environmental justice communities during construction of the C-HC Project because proximity to traffic is already an identified issue in this environmental justice community (USEPA 2019). Because Dane County Census Tract 109.04 has one Superfund site and four hazardous waste facilities, the addition of another industrial use with the C-HC Project would result in potential greater negative impacts to property values. All other identified environmental justice communities would experience impacts that are the same in nature and intensity as non-environmental justice communities under Alternative 6.

3.12.3 *Summary of Impacts*

Table 3.12-20 summarizes the potential socioeconomic impacts by alternative. Potential impacts to demographics and housing would be the same for all action alternatives. Alternative 5 would result in the highest project spending and environmental impact fees, while Alternatives 1 and 6 would result in the lowest spending and environmental impact fees, respectively. Alternative 5 would result in the largest negative impact on agriculture, while Alternative 1 would result in the smallest impact on agriculture. Negative impacts on tourism would be highly site-specific across the alternatives, with potential impacts being generally similar between Alternatives 1, 2, and 3, and potential impacts being generally similar between Alternatives 4, 5, and 6. However, potential negative impacts to birdwatching tourism at proposed Mississippi River crossings would differ when comparing Alternatives 1, 5, and 6 to Alternatives 2, 3, and 4. Alternative 4 would have the highest potential for negatively affecting residential property values with 61 residential properties within 300 feet of the ROW centerline, while Alternative 1 would have the lowest potential for negatively affecting residential property values with 21 residential properties within 300 feet of the ROW centerline. None of the alternatives would result in environmental justice impacts.

Table 3.12-20. Socioeconomic Impact Summary

	Demographics and Housing	Employment and Income	Agriculture	Tourism	Property Values	Environmental Justice
Alternative 1	Potential impact to demographics and housing would be minor and short term. Up to 170 employees would find temporary housing in the analysis area during construction phase.	Potential positive impacts to employment would be minor and short term (170 employees during construction phase, up to 2 full-time employees during operations phase). Potential positive impacts from project spending would be minor and short term (approximately $465,135,500 million during construction phase). Environmental impact fees would include an estimated $15,801,754 one-time fee and an estimated $948,105 annual fee.	Potential negative impacts to agriculture would be minor, localized, and long term, affecting agricultural lands along Alternative 1 route. Approximately 881 acres of agricultural lands, including approximately 364 acres of prime farmland and 511 acres of farmland of statewide importance, would be within the ROW.	Potential negative impacts to tourism would be moderate, localized, and short term during the construction phase, and minor, localized, and long term during the operations phase. Examples of specific tourism sites that could experience negative impacts include birdwatching areas near the proposed crossing at the Mississippi River (Refuge) and the Ice Age National Scenic Trail. The Driftless Area is also a tourist destination and is a region that overlaps a large portion of the analysis area.	Potential negative impacts to property values within 150 feet of the ROW centerline would be moderate in the short term and minor in the long term. Property values could be reduced by between 0% and 20% in the short term, but those impacts would likely decrease over time. Two residential buildings would be within the ROW and 19 residential buildings would be outside the ROW but within 150 feet of the ROW centerline.	Potential for greater negative property value impacts in Grant County Census Tract 9601 and Dane County Census Tract 109.04. All other identified environmental justice communities would experience impacts that are the same in nature and intensity as non-environmental justice communities.
Alternative 2	Same as Alternative 1.	Same as Alternative 1. However, project spending would include approximately $478,766,500 in construction costs, and environmental impact fees would include an estimated $15,909,022 one-time fee and an estimated $954,541 annual fee.	Same as Alternative 1 but affecting agricultural lands along Alternative 2 route. Approximately 916 acres of agricultural lands, including approximately 349 acres of prime farmland and 587 acres of farmland of statewide importance, would be within the ROW.	Potential negative impacts to tourism would be moderate, localized, and short term during the construction phase, and minor, localized, and long term during the operations phase. Examples of specific tourism sites that could experience negative impacts include birdwatching areas near the proposed crossing at the Mississippi River and the Ice Age National Scenic Trail. Lesser potential negative impacts on tourism at birdwatching areas at proposed Mississippi River crossing than Alternatives 1, 5, and 6. The Driftless Area is also a tourist destination and is a region that overlaps a large portion of the analysis area.	Same as Alternative 1 but including 2 residential buildings within the ROW and 26 residential buildings outside ROW but within 150 feet of the ROW centerline.	Potential for greater negative property value impacts in Dane County Census Tract 109.04. All other identified environmental justice communities would experience impacts that are the same in nature and intensity as non-environmental justice communities.

	Demographics and Housing	Employment and Income	Agriculture	Tourism	Property Values	Environmental Justice
Alternative 3	Same as Alternative 1.	Same as Alternative 1. However, project spending would include approximately $526,291,500 in construction costs, and environmental impact fees would include an estimated $18,657,445 one-time fee and an estimated $1,119,447 annual fee.	Same as Alternative 1 but affecting negatively agricultural lands along Alternative 3 route. Approximately 1,098 acres of agricultural lands, including approximately 614 acres of prime farmland and 616 acres of farmland of statewide importance, would be within the ROW.	Potential negative impacts to tourism would be minor, localized, and short term during the construction phase, and minor, localized, and long term during the operations phase. Examples of specific tourism sites that could experience negative impacts would be the same as described under Alternative 2.	Same as Alternative 1 but including 3 residential buildings within the ROW and 34 residential buildings outside ROW but within 150 feet of the ROW centerline.	Potential for greater negative property value impacts in Dane County Census Tract 109.04. Potential for greater impacts from increased traffic in Grant County Census Tract 9609 during construction. All other identified environmental justice communities would experience impacts that are the same in nature and intensity as non-environmental justice communities.
Alternative 4	Same as Alternative 1.	Same as Alternative 1. However, project spending would include approximately $538,353,500 in construction costs, and environmental impact fees would include an estimated $19,249,750 one-time fee and an estimated $1,154,985 annual fee.	Same as Alternative 1 but negatively affecting agricultural lands along Alternative 4 route. Approximately 1,175 acres of agricultural lands, including approximately 855 acres of prime farmland and 685 acres of farmland of statewide importance, would be within the ROW.	Potential negative impacts to tourism would be moderate, localized, and short term during the construction phase, and minor, localized, and long term during the operations phase. Examples of specific tourism sites that could experience negative impacts would be the same as described under Alternative 2, as well as potential impacts on tourism at Military Ridge State Trail and Blue Mound State Park.	Same as Alternative 1 but including 9 residential buildings within the ROW and 52 residential buildings outside ROW but within 150 feet of the ROW centerline.	Potential for greater visual resources impacts and negative property value impacts in Dane County Census Tract 128. Potential for greater negative property value impacts in Dane County Census Tract 109.04. Potential for greater impacts from increased traffic in Grant County Census Tract 9609 and Dane County Census Tract 128 during construction. All other identified environmental justice communities would experience impacts that are the same in nature and intensity as non-environmental justice communities.
Alternative 5	Same as Alternative 1.	Same as Alternative 1. However, project spending would include approximately $548,500,00 in construction costs, and environmental impact fees would include an estimated $20,172,762 one-time fee and an estimated $1,210,366 annual fee.	Same as Alternative 1 but negatively affecting agricultural lands along Alternative 5 route. Approximately 1,355 acres of agricultural lands, including approximately 908 acres of prime farmland and 774 acres of farmland of statewide importance, would be within the ROW.	Potential negative impacts to tourism would be moderate, localized, and short term during the construction phase, and minor, localized, and long term during the operations phase. Examples of specific tourism sites that could experience negative impacts would be the same as described under Alternative 4, but could also have an impact on tourism at the Refuge because of new disturbance.	Same as Alternative 1 but including two residential buildings within the ROW and 53 residential buildings outside ROW but within 150 feet of the ROW centerline.	Same as Alternative 4, but Grant County Census Tract 9601 would experience potential greater negative property value impacts as well.

	Demographics and Housing	Employment and Income	Agriculture	Tourism	Property Values	Environmental Justice
Alternative 6	Same as Alternative 1.	Same as Alternative 1. However, project spending would include approximately $476,219,500 in construction costs, and environmental impact fees would include an estimated $14,082,221 one-time fee and an estimated $844,933 annual fee.	Same as Alternative 1 but negatively affecting agricultural lands along Alternative 6 route. Approximately 968 acres of agricultural lands, including approximately 619 acres of prime farmland and 576 acres of farmland of statewide importance, would be within the ROW.	Potential negative impacts to tourism would be moderate, localized, and short term during the construction phase, and minor, localized, and long term during the operations phase. Examples of specific tourism sites that could experience negative impacts would be the same as described under Alternative 1, as well as potential negative impacts on tourism at Military Ridge State Park and Blue Mound State Park.	Same as Alternative 1, but including 8 residential buildings within the ROW and 39 residential buildings outside ROW but within 150 feet of the ROW centerline.	Potential for greater visual resources impacts and negative property value impacts in Dane County Census Tract 128. Potential for greater negative property value impacts in Grant County Census Tract 9601 and Dane County Census Tract 109.04. Potential for greater impacts from increased traffic in Dane County Census Tract 128 during construction. All other identified environmental justice communities would experience impacts that are the same in nature and intensity as non-environmental justice communities.

Retirement of the N-9 Transmission Line and Construction of a New 69-kV Tap Line

There would be no impacts to socioeconomics from the decommissioning of the N-9 transmission line and construction of the tap line. The existing businesses and social services would be adequate to support the decommissioning the N-9 transmission line and construction of the 0.2-mile tap line because of the small size of the construction crew and short-term nature of activities. Given the small size of crew needed for the projects, no impacts to emergency health care facilities or law enforcement services are anticipated. There are no environmental justice populations present in this area; therefore, the N-9 decommissioning and tap line construction activities would not have disproportionate impacts on minority and low-income populations.

3.13 Public Health and Safety

This section analyzes issues raised by the public and agencies during public scoping and preparation of the EIS related to potentially significant effects on public health and safety. This section describes the existing environmental conditions that may affect human health and safety, including exposure to EMFs, risk of fire from severe weather, worker safety, and solid, hazardous, and toxic materials and waste.

3.13.1 *Affected Environment*

The analysis area for public health and safety includes the area in and adjacent to the proposed transmission line corridors, to include land extending 150 feet on either side of the transmission line (i.e., a 300-foot-wide area spanning the center of the transmission line). This 300-foot span area was identified to allow flexibility in where the ROW is ultimately sited.

3.13.1.1 ELECTRIC AND MAGNETIC FIELDS

EMFs are a combination of electric and magnetic fields that occur both naturally and as a result of human activity. Naturally occurring EMFs are caused by the weather and Earth's geomagnetic field. EMFs are also created by household appliances such as hair dryers, microwave ovens, power tools, and current flowing through power lines. The strength of the fields is determined mainly by line current and distance from the line. The EMFs from power lines occur mainly within the ROW and can extend for a short distance beyond. EMFs currently occur within the analysis area due to several existing operating transmission lines, including 69-kV, 138-kV, 161-kV, 345-kV lines, and associated distribution lines (see Figure 1.4-1 in Chapter 1).

Research on the potential influence of EMFs on organisms and human health has been conducted over many decades to understand basic interactions of EMFs with biological organisms and cells, and to investigate potential therapeutic applications. In the 1970s, questions arose about potential adverse health effects from EMFs because of epidemiology studies that had suggested statistical associations between exposure to EMFs and health conditions, including cancer. Over the past 40 years, considerable additional research has been conducted to address uncertainties in those studies and to determine if there was any consistent pattern of results from human, animal, and cell studies that would support such an association. The quantity and complexity of the research has led scientific and government health agencies to assemble multidisciplinary panels of scientists to conduct weight-of-evidence reviews and arrive at conclusions about the possible effects associated with EMFs. The listing of these agencies (in ascending, chronological order of their most recent publication) is provided below:

The National Institute of Environmental Health Sciences (NIEHS) assembled a 30-person Working Group to review the cumulative body of epidemiologic and experimental data and provide conclusions and recommendations to the U.S. government (NIEHS 1999).

The International Agency for Research on Cancer (IARC) completed a full carcinogenic evaluation of EMF in 2002 (IARC 2002).

The National Radiological Protection Board (NRPB) of the United Kingdom issued full evaluations of the research in 1992, 2001, and 2004 with supplemental updates and topic-specific reports published in the interim and subsequent to their last full evaluation in 2004 (NRPB 1992, 1994a, 1994b, 2001a, 2001b, 2004a).

The Health Council of the Netherlands, using other major scientific reviews as a starting point, evaluated recent studies in several periodic reports (Health Council of the Netherlands 2001, 2004, 2005, 2007, 2009).

The Scientific Committee on Emerging and Newly Identified Health Risks issued a report to the Health Directorate of the European Commission in March 2007 and March 2009 updating previous conclusions (Scientific Committee on Emerging and Newly Identified Health Risks 2007, 2009; Scientific Committee on Toxicity, Ecotoxicity and the Environment 2001; Scientific Steering Committee of the European Commission 1998). Their most recent report was issued in January 2015, which updated their 2009 report (Scientific Committee on Emerging and Newly Identified Health Risks 2015).

The European Commission also has funded the European Health Risk Assessment Network on Electromagnetic Fields Exposure (EFHRAN), a network of scientists convened to perform health risk assessments and provide scientifically based recommendations to the European Commission. EFHRAN consulted other major reviews and evaluated epidemiologic and experimental research published after August 2008 to provide an updated health assessment (EFHRAN 2010, 2012).

The International Commission on Non-Ionizing Radiation Protection (ICNIRP), the formally recognized organization for providing guidance on standards for non-ionizing radiation exposure for the World Health Organization, published a review of the cumulative body of epidemiologic and experimental data on EMF in 2003. The ICNIRP released exposure guidelines in 2010 that updated their 1998 exposure guidelines. For both guidelines, they relied heavily on previous reviews of the literature related to long-term exposure, but provided some relevant conclusions as part of their update process (ICNIRP 2010).

The Swedish Radiation Protection Authority (SSI), which became the Swedish Radiation Safety Authority (SSM) in 2009, evaluated current studies in several reports, using other major scientific reviews as a starting point (SSI 2007, 2008; SSM 2009, 2010, 2013, 2014, 2015, 2018).

Overall, the published conclusions of these scientific review panels have been consistent. None of the panels concluded that either electric fields or magnetic fields are a known or likely cause of any adverse health effect at the long-term, low exposure levels found in the environment. As a result, no standards or guidelines have been recommended to prevent this type of exposure; however, from all the research that has been conducted, it was confirmed that short-term exposure to higher intensities of EMF (above exposure levels of electrical and industrial workers) could produce adverse stimulation of nerves and muscles (World Health Organization 2018). Although electric and magnetic fields induce voltages and currents in the body, the induced currents directly beneath high-voltage transmission lines are very small compared to thresholds for producing shock and other harmful electrical effects (World Health Organization 2018). While no adverse health effects from low level, long-term exposure to radiofrequency or power frequency fields have been confirmed, scientists are continuing to research this topic (World Health Organization 2018). Impacts from EMF have also been analyzed in other projects in the analysis area, such as the Badger Coulee 345-kV Transmission Line Project, which is currently under construction (ATC and Xcel Energy 2014).

Some studies have suggested an elevated risk of childhood leukemia in cases of magnetic field levels greater or equal to 2 milliGauss (mG), and magnetic fields greater than or equal to 5 mG (Feychting et al. 1995; Kheifets et al. 2010). A study that was conducted in Japan noted that most of the leukemia cases in the highest exposure category had magnetic field levels far above 4 mG (Kabuto et al. 2006). The Japan study concluded that the results showing increased risk of leukemia with magnetic fields above 4 mG were not due to bias alone, but may be due to chance (Kabuto et al. 2006). However, while studies have shown increased risk of childhood leukemia with exposure to high levels of magnetic fields, researchers acknowledge that research on magnetic fields and childhood leukemia is limited and no firm conclusions can be drawn (Teepan and van Dijck 2012).

Neither the Wisconsin and Iowa governments, nor the United States government has regulations limiting EMF exposure from power transmission lines. Several public and industry organizations have developed nonbinding guidelines for EMF exposure. These non-binding guidelines include exposure limits for the general public and for occupational exposure recommended by the ICNIRP, the Institute of Electrical and Electronics Engineers (IEEE), and the American Conference of Governmental Industrial Hygienists (ACGIH) to address health and safety issues. These guidelines are described below.

- The ICNIRP electric field guideline for occupational exposure is 8.3 kilovolts per meter (kV/m), and for members of the public, 4.2 kV/m. The ICNIRP guideline for magnetic fields is 4,200 milliGauss (mG) for occupational exposure, and the guideline for exposure to members of the public is 833 mG (NIEHS 2002).
- The IEEE electric field guideline for occupational exposure is 20 kV/m, and for members of the public, 5 kV/m. The IEEE guideline for magnetic fields is 27,100 mG for occupational exposure, and the guideline for exposure to members of the public is 9,040 mG (IEEE 2002).
- The ACGIH electric field guideline for occupational exposure is 25 kV/m. The ACGIH guideline for the exposure of workers to magnetic fields is 10,000 mG and 1,000 mG for persons with cardiac pacemakers (ACGIH 2011).

Table 3.13-1 lists the typical 60-Hz electric and magnetic levels based on the distance from overhead power lines. Table 3.13-2 lists the estimated average magnetic field exposure of the U.S. population for various activities.

Table 3.13-1. Typical 60-Hz Electric and Magnetic Field Levels from Overhead Power Lines

Line Voltage	Centerline	50 feet from the Centerline	100 feet from Centerline	200 feet from Centerline	300 feet from Centerline
115 kV					
Electric field kV/m	1.0	0.5	0.07	0.01	0.003
Magnetic field mG	29.7	6.5	1.7	0.4	0.2
230 kV					
Electric field kV/m	2.0	1.5	0.3	0.05	0.01
Magnetic field mG	57.5	19.5	7.1	1.8	0.8
500 kV					
Electric field kV/m	7.0	3.0	1.0	0.3	0.1
Magnetic field mG	86.7	29.4	12.6	3.2	1.4

Source: NIEHS (2002)

Table 3.13-2. Estimated Average Magnetic Field Exposure of the U.S. Population for Various Activities

Average Field (mG)	Population Exposed (%)				
	Home	Bed	Work	School	Travel
> 0.5	69.0	48.0	81.0	63.0	87.0
> 1.0	38.0	30.0	49.0	25.0	48.0
> 2.0	14.0	14.0	20.0	3.5	13.0
> 3.0	7.8	7.2	13.0	1.6	4.1
> 4.0	4.7	4.7	8.0	< 1	1.5
> 5.0	3.5	3.7	4.6		1.0
> 7.5	1.2	1.6	2.5		0.5
> 10.0	0.9	0.8	1.3		< 0.2
> 15.0	0.1	0.1	0.9		

Source: NIEHS (2002)

3.13.1.2 RISKS FROM SEVERE WEATHER AND SECURITY BREACHES

Lightning strikes can cause fires and transmission outages. Lightning often strikes tall objects because it provides the easiest path for the lightning to take. In a rural region, transmission towers are often the tallest objects available. Severe weather, such as hail, high winds, and tornadoes, can also cause damage to power lines, potentially resulting in fires and transmission outages. A National Weather Service study has shown that a radar based in Milwaukee, Wisconsin, covering an area that includes the analysis area and surrounding areas[4] experienced 12,371 severe weather events between 1980 and 2006, including 762 significantly severe events[5] (NOAA 2007). Compared with the other 141 radar coverage areas in all states across the country that were studied, the area surrounding the analysis area ranked fifty-fifth in the number of severe weather events between 1980 and 2006, and forty-fifth in the number of significantly severe events during that period (NOAA 2007).

Severe weather events have the potential to damage transmission lines, causing outages or unsafe conditions from downed lines. For example, winds can cause transmission lines encased in ice to move up and down and potentially touch each other, resulting in a fault or subsequent outage. Increased movement of transmission lines can also cause cross-arms to break, bringing the lines to the ground. Building and electric codes along with the Utilities' internal standards dictate how to design for weather conditions. The C-HC Project would be designed in accordance with National Electrical Safety Code (NESC) requirements that take into account severe weather events in this region of the country, including high winds and ice. NESC standards include requirements for line clearances and sag due to ice loading, high-temperature loading, or high-speed winds; conductor tension addressing high wind speeds; strength and loading rules to address high winds; as well as other measures to address severe weather events. If severe weather causes a fault in the system, protective relaying equipment would automatically take these out of service when a fault is detected.

Security breaches, such as hacking, also present a risk to the transmission infrastructure and public safety. Security protection from acts of intentional destruction are prescribed by NERC standards, including but not limited to Critical Infrastructure Protection standards. NERC Critical Infrastructure Protection standards require utilities to develop cyber-security policies that address topics such as personnel and training, electronic security perimeters, physical security of cyber systems, incident reporting and response planning, and recovery plans. Each C-HC Project utility complies with these standards via their individual compliance programs.

3.13.1.3 WORKER SAFETY

Work-related fatalities, injuries, and illnesses associated with utility and construction workers can occur in and around utility construction sites. The U.S. Bureau of Labor Statistics and the BLS Injuries, Illnesses and Fatalities Program monitor and track statistics on these injury rates. According to the BLS, "an injury or illness is considered to be work-related if an event or exposure in the work environment either caused or contributed to the resulting condition or significantly aggravated a pre-existing condition" (BLS 2016). Table 3.13-3 provides information on the number of fatalities, and rate of injury and illness cases (per 100 full-time workers) in the construction field from 2013 to 2016 in the United States.

[4] The radar coverage area included southern Wisconsin, as well as small portions of eastern Iowa, northern Illinois, and western Michigan.

[5] Significantly severe events include tornadoes F2 or stronger, wind gusts of 65 knots or stronger, and hail of 2-inch diameter or larger.

Table 3.13-3. Work-Related Fatalities, Injuries, and Illnesses in Construction Field

Data Series	2016	2015	2014	2013
Fatalities				
• Number of fatalities (United States)	991	937	899	828
• Number of fatalities (Wisconsin)	12	10	14	11
• Number of fatalities (Iowa)	13	12	20	12
Rate of injury and illness cases per 100 full-time workers				
• Total recordable cases (United States)	3.2	3.5	3.6	3.8
• Total recordable cases (Wisconsin)	6.1	4.7	5.5	4.6
• Total recordable cases (Iowa)	4.1	4.2	4.5	3.8
• Cases involving days away from work, job restriction, or transfer (United States)	1.9	2.0	2.0	2.2
• Cases involving days away from work, job restriction, or transfer (Wisconsin)	3.3	2.2	2.8	2.5
• Cases involving days away from work, job restriction, or transfer (Iowa)	2.4	2.0	2.1	2.1
• Cases involving days away from work (United States)	1.3	1.3	1.3	1.5
• Cases involving days away from work (Wisconsin)	2.5	2.5	1.8	1.9
• Cases involving days away from work (Iowa)	1.7	1.6	1.3	1.3
• Cases involving days of job transfer or restriction (United States)	0.6	0.6	0.6	0.7
• Cases involving days of job transfer or restriction (Wisconsin)	0.8	0.6	1.0	0.6
• Cases involving days of job transfer or restriction (Iowa)	0.6	0.4	0.8	0.8

Source: BLS (2017, 2018c, 2018d)

With respect to Wisconsin and Iowa, the BLS found that the states' 2016 incidence rates among construction workers (at 6.1 incidents per 100 full-time workers for Wisconsin and 4.1 incidents for Iowa) were both higher overall than the national statistic for construction injuries and illnesses (3.2 incidents). In Wisconsin, incidence rates among utility system construction workers in 2016 was 5.3 incidents per 100 full-time workers, compared with a 2.6 national rate (BLS 2017, 2018d). A utility system construction incident rate is not available for the state of Iowa. Statistics for injuries and illnesses incurred during operations and maintenance activities for transmission lines is not available for Wisconsin or Iowa. The number of nonfatal injuries and illnesses of electrical power-line installers and repairers in the United States averaged 2,300 each year from 2011 to 2015, with 131 total fatalities over that same period (BLS 2018e). The number of nonfatal injuries, illnesses, and fatalities of electrical power-line installers and repairers is not available for Wisconsin or Iowa.

3.13.1.4 SOLID, HAZARDOUS, AND TOXIC MATERIALS AND WASTE

Federal laws addressing solid, hazardous, and toxic materials and waste include the Federal Toxic Substances Control Act (TOSCA) (1976) (15 U.S.C. 2601 et seq.), the Resource Conservation and Recovery Act of 1976, as amended (RCRA) (42 U.S.C. 6901 et seq.), and the Comprehensive Environmental Response, Compensation, and Liability Act, as amended (CERCLA) (42 U.S.C. 9601 et seq.), commonly known as Superfund. TOSCA and RCRA established a program administered by the

USEPA for the regulation of the generation, transportation, treatment, storage, and disposal of toxic substances and hazardous waste. CERCLA provides broad Federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment.

The IDNR and WDNR administer the states' solid waste programs, which includes regulation of solid waste handling and disposal facilities. There are at least five solid waste landfills in the counties intersected by the analysis area that are permitted or licensed by the IDNR and WDNR and could be used to dispose of solid waste generated under the action alternatives. These solid waste landfills include Pattison Brothers, Inc. (Clayton County), Dubuque Metropolitan Sanitary Landfill (Dubuque County), Dane County Landfill #2 Rodefeld (Dane County), WMWI – Madison Prairie Landfill (Dane County), and Dairyland Power Cooperative – Cassville (Grant County) (IDNR 2018e; WDNR 2018n).

Publicly available databases were searched to gather information regarding known sites of environmental concern in the analysis area. Sites of potential concern include, but are not limited to, Superfund sites (CERCLA sites), underground storage tanks, and USEPA-permitted hazardous waste facilities (RCRA sites). A search of the publicly available data identified no Superfund sites within the analysis area (USEPA 2018f). There are approximately 431 underground storage tanks in the towns and cities in the analysis area, which store substances such as diesel fuel, leaded and unleaded gasoline, fuel oil, aviation fuel, kerosene, gas/ethanol blend, and waste/used motor oil (IDNR and Public Safety State Fire Marshal Office 2018; Wisconsin Department of Agriculture, Trade and Consumer Protection 2018) There are six USEPA-permitted hazardous waste management facilities in the analysis area, including a farm supply store, an eye care clinic, a school district facility, General Telephone Company of Wisconsin, Inc., a crane service, and a Land's End store (USEPA 2018g). All of the USEPA-permitted hazardous waste management facilities in the analysis area are very small quantity generators, meaning that they may not accumulate more than 1,000 kilograms of hazardous waste at any time (USEPA 2017b).

3.13.2 *Environmental Consequences*

This section describes the potential impacts to public health and safety associated with the construction, operation, and maintenance of the transmission line, substations, and ancillary facilities. Impacts to public health and safety are discussed in terms of potential exposure to EMF, risk of fires, risks to worker safety, and potential for spills, releases, and disposal of solid, hazardous, and toxic materials and waste during construction, operations, and maintenance of the proposed project. The impacts described in this section are based on similar prior experience and analyses in other locations, as well as other resource assessments provided in this FEIS.

3.13.2.1 DATA SOURCES, METHODS, AND ANALYSIS ASSUMPTIONS

Data sources considered when analyzing impacts to public health and safety include studies of the potential public health concerns associated with EMF exposure, severe weather statistics from the National Weather Service, worker safety statistics from the BLS, applicable laws and regulations regarding solid, hazardous, and toxic wastes and materials, as well as previous EISs of similar transmission line projects.

The following impact indicators were considered when analyzing impacts to public health and safety:

- Amounts and types of hazardous materials and the potential for hazardous materials exposure.
- Number of workers and sensitive receptors within the analysis area.
- Project area severe weather, fire, and lightning strike statistics.

- Transmission line failure rate per mile.
- Amounts and types of potential fire-causing activities or equipment.
- Expected levels of electromagnetic fields within the analysis area.

The analysis assumes that all appropriate environmental commitments would be implemented.

Table 3.13-4 defines the impact thresholds for defining impacts to public health and safety. These thresholds are used below to characterize the intensity of impacts that are estimated for each alternative.

Table 3.13-4. Impact Thresholds and Descriptions for Public Health and Safety

	Minor Impact	Moderate Impact	Major Impact
Public Health and Safety	Construction of the C-HC Project would not result in: 1) exposure of contaminated media to construction workers, and/or 2) incidents associated with the installation of the transmission line and supporting infrastructure. Operation of the C-HC Project would not result in increased exposure to EMF levels, which would rise to a level of concern with regard to public health and safety.	Construction of the C-HC Project may result in exposure to contaminated media by construction workers either through the disturbance of hazardous materials and/or chemical spills. The potential for incidents associated with the installation of the transmission line and supporting infrastructure increases. Operation of the C-HC Project would increase exposure to EMF levels, but not to a level that would adversely affect public health and safety.	Construction of the C-HC Project would result in exposure to contaminated media by construction workers either through the disturbance of hazardous materials and/or chemical spills. Incidents associated with the installation of the transmission line and supporting infrastructure would likely result. Operation of the C-HC Project would increase exposure to EMF levels to a level high enough to adversely affect public health and safety.

During the DEIS public comment period, RUS received several public comments expressing concerns about the impact of stray voltage on farms and livestock from the C-HC Project. According to the USDA, stray voltage is defined as "small voltage (less than 10 volts) measured between two points that can be simultaneously contacted by an animal. Because animals respond to the current produced by a voltage and not to the voltage directly, the source of the voltage must be able to produce current flow greater than the threshold current needed to elicit a response from an animal when an animal, or an equivalent load, contacts both points" (Accel Wisconsin 2011). This is a natural phenomenon that can be found at low levels between two contact points at any property where electricity is grounded. Electrical systems are grounded to the earth to ensure safety and reliability. Inevitably, some current flows through the earth at each point where the electrical system is grounded and a small voltage develops. This voltage is called neutral-to-earth voltage, but is commonly referred to as stray voltage when referring to animal contact points.

Because stray voltage is normally related to very low voltage and current, it is not always detectable and therefore not a problem. This has become an issue with dairies and an important issue in states like Wisconsin (Pacific Gas and Electric Company 2007). Cows have been found to be more susceptible to stray voltage compared to humans due to cow's relatively lower body resistance (Lefcourt 1991).

Most research points to the fact that stray voltage is a natural phenomenon on farms powered by electricity. According to a report by the PSCW, "the occurrence of neutral-to-earth voltage and current flow on neutral and grounding conductors are unavoidable consequences of the use of electrical power. Complete elimination of these phenomena is an unreasonable and costly goal" (Cook et al. 1996, cited in Accel Wisconsin 2011). This issue has been studied in great detail by Federal and state agencies, universities, utilities, and scientists. Over the years there have been concerns that the location of the farm along the electric distribution line determines the probability that a farm is affected by stray voltage. Research by the PSCW and the University of Wisconsin–Madison shows that there is no significant relationship between cow contact current and distance from a substation (Dasho et al. 1995, cited in Accel Wisconsin 2011). Because occurrences of stray voltage would not be a result of the C-HC Project, this topic is not discussed in detail below in the impacts analysis section.

3.13.2.2 NO ACTION

Under the No Action Alternative, there would be no potential for increase in construction-related injuries or deaths resulting from the proposed project. There would also be no potential for an increase in EMFs or hazardous materials in the analysis area resulting from the proposed project. Existing trends for the risk of fire from severe weather would be expected to continue. Existing trends in worker health and safety, as well as public health and safety in the analysis area would be expected to continue.

3.13.2.3 IMPACTS COMMON TO ALL ACTION ALTERNATIVES

3.13.2.3.1 Electric and Magnetic Fields

Electric field levels beneath typical overhead transmission lines may vary from a few volts per meter for distribution lines to several thousands of volts per meter for extra-high-voltage power lines (NIEHS 2002). Peak magnetic field levels can vary significantly depending on the amount of current carried by the line. The estimated peak magnetic field levels for the proposed transmission line and the electric field levels associated with typical 230-kV to 500-kV transmission lines are listed in Table 3.13-5.

Table 3.13-5. Estimated Peak Magnetic Field Levels for the C-HC Project Transmission Line and Typical Electric Field Levels for 230-kV to 500-kV Transmission Lines

	Centerline	25 feet from the Centerline	50 feet from the Centerline	100 feet from the Centerline	150 feet from the Centerline	200 feet from the Centerline	300 feet from the Centerline
Magnetic field (mG)	133.0	211.0	70.0	26.0	15.0	9.8	5.7
Electric field (kV/m)	2.0 – 7.0	N/A	1.5 – 3.0	0.3 – 1.0	N/A	0.05 – 0.3	0.01 – 0.1

Source: American Transmission Company et al. (2018) and NIEHS (2002)

Note: N/A = not available

Under all action alternatives, there would be no exposure to EMF during construction because the proposed transmission lines and associated facilities would not yet be energized. Workers would not typically be exposed to EMFs during construction of the proposed transmission line and associated facilities due to precautions during construction that would keep them from working directly under or parallel to the existing facilities for extended periods of time. If work were being performed near existing transmission line facilities that posed a safety threat due to a potential for induced voltage, then either work being performed would be modified to reduce impacts from induced voltages or an outage on the existing transmission facilities would be required, which would reduce or eliminate the potential for induced voltages at the location where the work is being performed.

Once the proposed transmission line is in operation, a potential for increased public exposure to EMFs would occur under all action alternatives. Portions of the proposed transmission line route would be built in areas where no current transmission lines exist in Iowa and Wisconsin. However, other portions of the proposed transmission line route would be built where 69-kV, 138-kV and 161-kV transmission lines already exist in Wisconsin (see Figure 1.4-1 in Chapter 1). As discussed above, the estimated peak magnetic fields for the proposed transmission line are well below the health-based guidelines for EMF exposure both within the ROW and at a distance of 300 feet. As discussed in Section 3.13.1, the guidelines for public exposure to magnetic field levels range from 833 mG to 9,040 mG, and from 4,200 mG to 27,100 mG for occupational exposure. The typical electric fields for 230-kV to 500-kV lines have the potential to exceed the health-based guidelines for electric field exposure directly below the transmission lines at the ROW centerline, but the electric field levels fall below the health-based guidelines less than 50 feet from the centerline. As discussed in Section 3.13.1, the guidelines for public exposure to electric field levels range from 4.2 kV/m to 5.0 kV/m, and from 8.3 kV/m to 25.0 kV/m for occupational exposure. Therefore, under the all action alternatives, the potential for increased exposure to EMFs during the operations phase would be minor and long term for any residences or other occupied buildings within the ROW and negligible for any residences or other occupied buildings at the edge of the ROW and beyond. The potential for workers to be exposed to EMF levels during the operations phase would be minor and periodic because of the intermittent nature of maintenance activities.

Another concern regarding EMF is the potential impacts to livestock. Several studies have shown no effects on estrous cycle, fertility, and grown performance in cattle near transmission lines (Algers and Hennichs 1985; Algers and Hultgren 1987; Angell et al. 1990; HydroQuebec 1999). Other studies have shown that several weeks of extremely low-frequency EMF exposure did not result in adverse health effects concerning growth behavior in calves or bovine reproduction; however, there was a reported decrease in milk yield and calving intervals (Broucek et al. 2001; Broucek et al. 2002). Studies suggest a range of potential effects of EMP exposure in livestock, from non-existent to relatively small to positive, and it is currently not possible to link the observed effects to livestock health directly to the presence of EMF (Fedrowitz 2014; Golder Associates 2009).

Corona effects could also occur under all action alternatives. Corona effects occur when the air is ionized by strong electric fields produced by high-voltage transmission lines. The corona appears as a faint discharge radiating outwards from its source and is the cause of the faint crackling noise sometimes heard in the vicinity of transmission lines. The corona ions produced by the transmission line are carried by the wind and disappear with distance from the line as the charged particles recombine or are deposited out. These airborne pollutants can enter the body through inhalation and be deposited in the respiratory system. The effect that corona ions may have on health depends on the extent of the increase in exposure to pollutants and the numbers and types of individuals who are exposed to the pollutants. The likelihood of corona effects is reduced by using fittings with rounded corners and by using larger-diameter conductors. Bundled conductor arrangements also reduces the voltage gradient for high-voltage transmission lines. Moist atmospheric conditions, such as fog or rain, can increase temporarily the conductor surface voltage gradient and the likelihood of corona discharges occurring (Energy Networks Association 2009).

One study calculated that people downwind of power lines might have 20% to 60% more particles deposited in their lungs than those upwind (Energy Networks Association 2009). The National Radiological Protection Board Study in the United Kingdom supported an independent review and concluded that any increased charge on pollutant particles in the atmosphere resulting from the presence of transmission lines is unlikely to have more than a slight influence, if any, on the health of the general population (NRPB 2004b). The independent report supported by the NRPB concluded that it is “unlikely that corona ions would have more than a small effect on the long-term health risks associated with particulate air pollutants, even in the individuals who are most affected” (NRPB 2004b:48). However, the independent report suggested that further studies would provide additional information on the charge distribution on atmospheric particulate materials and its effect on deposition in the body. The World Health Organization has also concluded that it is “unlikely that corona ions will have more than a small effect, if any, on long-term health risks, even in the individuals who are most exposed” (WHO 2007).

There would be no exposure to EMF introduced from the decommissioning of the N-9 line and tap line construction. Sources of EMF in the proximity to the existing N-9 transmission line include the Turkey River Substation and other transmission infrastructure in the area. While the decommissioning of approximately 2 miles of the N-9 transmission line would remove EMF from the area, the new proposed 0.2-mile tap line would introduce EMF in the vicinity of the Turkey River Substation. The decommissioning and construction of the new tap line would result in a slight relocation of EMF sources and no change in EMF levels.

3.13.2.3.2 Risk of Fires

Under all action alternatives, potential fire-causing activities (such as welding or the use of combustion engines) would occur during construction of the proposed transmission line and associated facilities in areas known for extreme fire danger during the dry season. All action alternatives would increase the reliability of the overall transmission system in the analysis area vicinity during severe weather events, because if an existing transmission line experiences a forced outage, then the proposed transmission line would provide another connection to support local load and generation. Also, if the proposed transmission line has a temporary outage, possibly caused by a lightning strike, the line protection would attempt to automatically reclose the line so the outage duration could be limited to less than a second.
The implementation of best management practices would reduce the potential for health and safety impacts that could result from fires associated with construction and/or operation and maintenance of the proposed project. Trees and other vegetation in the ROW would be trimmed and managed as required by the Electric Reliability Standard FAC-0003-4 to decrease the risk of fire due to flashovers or lines being damaged by falling trees (FERC 2016). Therefore, potential impacts on public and worker health and safety from severe weather hazards and potential fire-causing activities during construction, operations, and maintenance would be minor and long term.

The potential risk of accidental fire from decommissioning of the N-9 line and construction of the tap line would be similar to the C-HC Project. Decommissioning of the N-9 line would occur during the winter months, when there is snow cover on the ground, which would greatly reduce wildlife risk.

3.13.2.3.3 Worker Safety

Under all action alternatives, potential risks associated with construction activities include, but are not limited to, electrocution, exposure to extreme weather, falling, exposure to hazardous materials, and injury from equipment and materials. Site-specific risks such as difficult or remote terrain or highway crossings would exist. Construction requirements, including workers and types of equipment and materials, are described in Section 2.4.3. The construction of the proposed project would be temporary and would be confined to the footprint of the facilities, access roads, and staging areas. Construction safety requirements would meet the OSHA standards and site-specific occupational safety measures (such as a smoking ban in fire prone areas) would be developed as appropriate. Because construction safety requirements would meet OSHA standards, and additional site-specific safety measures would be developed as appropriate, potential impacts to worker safety during construction, operations, and maintenance activities would be minor and long term.

Potential worker safety hazards associated with the retirement of a portion of the N-9 transmission line and construction of the tap line to the Turkey River Substation would be the same as discussed above for the larger C-HC Project.

3.13.2.3.4 Solid, Hazardous, and Toxic Materials and Waste

Under all action alternatives, the handling, storage, and disposal of all solid, hazardous, and toxic materials and waste would be done in compliance with applicable state and Federal laws and regulations, such as the RCRA (42 U.S.C. 6901 et seq.), Wisconsin Statutes Chapter 291, and Iowa Code 455B.411–433. The types of solid, hazardous, and toxic materials and waste that would be used during construction and operations under all action alternatives are listed below. No toxic materials or hazardous wastes are expected to be generated or stored under any of the action alternatives.

- Gasoline, diesel fuel, grease (solid wastes) and antifreeze (hazardous substance): Standard construction, operation and maintenance vehicles may contain gasoline/diesel fuel, hydraulic oil, grease, and antifreeze. Antifreeze, grease and hydraulic oil would be contained within the vehicle, unless there is a spill or on-site vehicle maintenance.
    - During construction, one 500-gallon diesel fuel tank would be located in whatever laydown yard is active for refilling construction vehicles. For any potential spills, this tank would have a mobile containment pit underneath it.
    - During construction, the Utilities would use approximately 10 pickup trucks, each of which has a 50-gallon diesel bulk tank.
    - During construction, the Utilities' vegetation-maintenance crews would use approximately 1,000 gallons of diesel fuel, using 10 pieces of equipment and a 1,000-gallon diesel fuel truck.
    - During operation of the line, the Utilities' vegetation-maintenance crews would only use what the truck carries in their tank and refill at a local gas station. No additional tanks or pickup trucks with tanks would be used for this work.
- Oil (solid waste) and SF_6 (hazardous substance) would be located at the new Montfort Substation and would be added to the Cardinal Substation because of the proposed project.
    - Approximately 39,167 gallons of oil would be located at the Montfort Substation, and approximately 128 gallons of oil would be added at the Cardinal Substation. Permanent and secondary containment would be installed for the oil at the Montfort Substation, and the oil at the Cardinal Substation would be placed within the existing secondary containment.
    - Approximately 3,325 pounds of SF_6 would be at the new Montfort Substation, and approximately 621 pounds of SF_6 would be added to the existing Cardinal Substation.
- Herbicides (hazardous substance): where landowner consent is provided, herbicides would be used as follows, and the person applying herbicides would have USEPA certification.
- Herbicides are one of the effective tools the Utilities use to manage vegetation within the ROW. Landowners are informed about the use of herbicides on specific parcels through the easement acquisition process.
- During construction, all herbicide applications would be conducted in accordance with Federal, state, and local laws, regulations, and labels.

- Herbicide application methods can include high-volume foliar, cut stubble, low-volume foliar, cut stump, and basal applications. The herbicide type, mix, and application method used within the ROW would depend on the following:
    - The vegetation density, size, and location
    - Time of year
    - Control method implemented
    - Environmental conditions
    - Property owner or easement restrictions
- After construction, the Utilities would continue to monitor the ROW for vegetation growth and determine which vegetation management methods are to be used at each location or area along the ROW. The Utilities may determine the need for herbicide application as an effective method for vegetation maintenance. If used, follow-up herbicide applications would be based on herbicide growth conditions. Application methods and herbicides would be determined prior to its use.

Solid wastes generated under the action alternatives may also include paper, wood, metal, and general trash. For example, it is expected that solid waste generated from clearing and grading of the construction sites would go to a landfill that accepts biodegradable yard waste. It is also expected that solid waste generated during the revamping of the substations, which might include metals, could go to a landfill that accepts sorted metals for recycling. Any solid wastes generated by construction workers such as food and beverage containers would be captured at the point of use and collected for off-site disposal at a local landfill, such as those listed in Section 3.13.1.4.

The Utilities would require all contractors to have spill prevention and response plans for the construction phase and a Spill Prevention, Control and Countermeasure Plan (SPCC) for the operations and maintenance phase, where applicable. An SPCC is not typically required because few, if any, sites have the regulated amount of stored oil. An SPCC is required to prevent discharge of oil or other petroleum products into WUS, and is required if the aboveground storage capacity for the substance is greater than 1,320 gallons and there is a potential of a discharge into navigable WUS. The Utilities would update and develop its SPCC plans for the Hickory Creek or Turkey River Substation if they meet the criteria per 40 CFR 112. Any onsite storage for construction would have the necessary containment measures and spill response resources available onsite, as appropriate. The Utilities would follow its spill response plan in the event of a release.

No fueling or maintenance of vehicles or application of herbicides would occur within 100 feet of streams, ditches, and waterways to protect against introduction of these materials into surface or groundwater systems. Materials such as fuels, lubricants, paints, and solvents required for construction would be stored away from surface water resources according to appropriate regulatory standards. Any spills or leaks would be cleaned up immediately and leaking equipment removed from the area for proper maintenance.

For vegetation removal and maintenance of ROWs spanning organic farms, the Utilities would avoid spraying any herbicides at least 50 feet from the posted organic crop ground.

Because all action alternatives would comply with applicable solid, hazardous, and toxic materials and waste handling, storage, and disposal requirements under Federal and state laws and regulations, the potential for public and worker health and safety impacts from spills, releases, or disposal of these materials would be minor and long term.

3.13.2.4 ALTERNATIVE 1

3.13.2.4.1 Electric and Magnetic Fields

Under Alternative 1, the general nature of the potential exposure to EMF that could affect public health and safety would be the same as discussed in Section 3.13.2.3 (Impacts Common to All Action Alternatives). Table 3.13-6 lists the number of residences, hospitals/nursing homes, daycares, and schools within the proposed ROW, or not within the ROW but within 300-foot analysis area. The potential exposure to EMF during the operations phase would be minor and long term for any residences or other occupied buildings within the ROW, and negligible for any residences or other occupied buildings at the edge of the ROW and beyond. The potential exposure to EMF for workers during the operations phase would be minor and periodic because of the intermittent nature of maintenance activities.

Table 3.13-6. Numbers of Residences, Hospitals/Nursing Homes, Daycares, and Schools within the ROW or within the 300-foot Analysis Area under Alternative 1

Alternative	Residences (Homes/Apartments)		Hospitals/Nursing Homes		Daycares		Schools	
	Within ROW	Outside ROW but within 300-foot analysis area	Within ROW	Outside ROW but within 300-foot analysis area	Within ROW	Outside ROW but within 300-foot analysis area	Within ROW	Outside ROW but within 300-foot analysis area
Alternative 1	2	19	0	0	0	0	0	0

3.13.2.4.2 Risk of Fire

Under Alternative 1, the potential risk of fire during construction, operations, and maintenance would be the same as those discussed in Section 3.13.2.3 (Impacts Common to All Action Alternatives).

3.13.2.4.3 Worker Safety

Under Alternative 1, the potential impacts to worker safety during construction, operations, and maintenance would be the same as those discussed in Section 3.13.2.3 (Impacts Common to All Action Alternatives).

3.13.2.4.4 Solid, Hazardous, and Toxic Materials and Waste

Under Alternative 1, the potential impacts to public health and safety from the spill, release, or disposal of solid, hazardous, or toxic materials and waste during construction, operations, and maintenance would be the same as those discussed in Section 3.13.2.3 (Impacts Common to All Action Alternatives).

3.13.2.5 ALTERNATIVE 2

3.13.2.5.1 Electric and Magnetic Fields

Under Alternative 2, the general nature of the potential exposure to EMF that could affect public health and safety would be the same as those discussed in Section 3.13.2.3 (Impacts Common to All Action Alternatives). Table 3.13-7 lists the number of residences, hospitals/nursing homes, daycares, and schools within the ROW, or not within the ROW but within the 300-foot analysis area. The potential exposure during the operations phase would be minor and long term for any residences or other occupied buildings within the ROW, and negligible for any residences or other occupied buildings at the edge of the ROW and beyond. The potential exposure to EMF for workers during the operations phase would be minor and periodic because of the intermittent nature of maintenance activities.

Table 3.13-7. Numbers of Residences, Hospitals/Nursing Homes, Daycares, and Schools within the ROW or within the 300-foot Analysis Area under Alternative 2

Alternative	Residences (Homes/Apartments)		Hospitals/Nursing Homes		Daycares		Schools	
	Within ROW	Outside ROW but within 300-foot analysis area	Within ROW	Outside ROW but within 300-foot analysis area	Within ROW	Outside ROW but within 300-foot analysis area	Within ROW	Outside ROW but within 300-foot ROW
Alternative 2	2	26	0	0	0	1	1	1

3.13.2.5.2 Risk of Fire

Under Alternative 2, the potential risk of fire during construction, operations, and maintenance would be the same as those discussed in Section 3.13.2.3 (Impacts Common to All Action Alternatives).

3.13.2.5.3 Worker Safety

Under Alternative 2, the potential impacts to worker safety during construction, operations, and maintenance would be the same as those discussed in Section 3.13.2.3 (Impacts Common to All Action Alternatives).

3.13.2.5.4 Solid, Hazardous, and Toxic Materials and Waste

Under Alternative 2, the potential impacts to public health and safety from the spill, release, or disposal of solid, hazardous, or toxic materials and waste during construction, operations, and maintenance would be the same as those discussed in Section 3.13.2.3 (Impacts Common to All Action Alternatives).

3.13.2.6 ALTERNATIVE 3

3.13.2.6.1 Electric and Magnetic Fields

Under Alternative 3, the general nature of the potential exposure to EMF that could affect public health and safety would be the same as those discussed in Section 3.13.2.3 (Impacts Common to All Action Alternatives). Table 3.13-8 lists the number of residences, hospitals/nursing homes, daycares, and schools within the ROW, or not within the ROW but within the 300-foot analysis area. The potential exposure during the operations phase would be minor and long term for any residences or other occupied buildings within the, and negligible for any residences or other occupied buildings at the edge of the ROW and beyond. The potential exposure to EMF for workers during the operations phase would be minor and periodic because of the intermittent nature of maintenance activities.

Table 3.13-8. Numbers of Residences, Hospitals/Nursing Homes, Daycares, and Schools within the ROW or within the 300-foot Analysis Area under Alternative 3

Alternative	Residences (homes/apartments)		Hospitals/Nursing Homes		Daycares		Schools	
	Within ROW	Outside ROW but within 300-foot analysis area	Within ROW	Outside ROW but within 300-foot analysis area	Within ROW	Outside ROW but within 300-foot analysis area	Within ROW	Outside ROW but within 300-foot analysis area
Alternative 3	3	34	0	0	0	1	1	2

3.13.2.6.2 Risk of Fire

Under Alternative 3, the potential risk of fire during construction, operations, and maintenance would be the same as those discussed in Section 3.13.2.3 (Impacts Common to All Action Alternatives).

3.13.2.6.3 Worker Safety

Under Alternative 3, the potential impacts to worker safety during construction, operations, and maintenance would be the same as those discussed in Section 3.13.2.3 (Impacts Common to All Action Alternatives).

3.13.2.6.4 Solid, Hazardous and Toxic Materials and Waste

Under Alternative 3, the potential impacts to public health and safety from the spill, release, or disposal of solid, hazardous, or toxic materials and waste during construction, operations, and maintenance would be the same as those discussed in Section 3.13.2.3 (Impacts Common to All Action Alternatives).

3.13.2.7 ALTERNATIVE 4

3.13.2.7.1 Electric and Magnetic Fields

Under Alternative 4, the general nature of the potential exposure to EMF that could affect public health and safety would be the same as those discussed in Section 3.13.2.3 (Impacts Common to All Action Alternatives). Table 3.13-9 lists the number of residences, hospitals/nursing homes, daycares, and schools within the ROW, or not within the ROW but within the 300-foot analysis area. The potential exposure during the operations phase would be minor and long term for any residences or other occupied buildings within the ROW, and negligible for any residences or other occupied buildings at the edge of the ROW and beyond. The potential exposure to EMF for workers during the operations phase would be minor and periodic because of the intermittent nature of maintenance activities.

Table 3.13-9. Numbers of Residences, Hospitals/Nursing Homes, Daycares, and Schools within the ROW or within the 300-foot Analysis Area under Alternative 4

Alternative	Residences (homes/apartments)		Hospitals/Nursing Homes		Daycares		Schools	
	Within ROW	Outside ROW but within 300-foot analysis area	Within ROW	Outside ROW but within 300-foot analysis area	Within ROW	Outside ROW but within 300-foot analysis area	Within ROW	Outside ROW but within 300-foot analysis area
Alternative 4	9	52	0	0	0	1	1	2

3.13.2.7.2 Risk of Fire

Under Alternative 4, the potential risk of fire during construction, operations, and maintenance would be the same as those discussed in Section 3.13.2.3 (Impacts Common to All Action Alternatives).

3.13.2.7.3 Worker Safety

Under Alternative 4, the potential impacts to worker safety during construction, operations, and maintenance would be the same as those discussed in Section 3.13.2.3 (Impacts Common to All Action Alternatives).

3.13.2.7.4 Solid, Hazardous, and Toxic Materials and Waste

Under Alternative 4, the potential impacts to public health and safety from the spill, release, or disposal of solid, hazardous, or toxic materials and waste during construction, operations, and maintenance would be the same as those discussed in Section 3.13.2.3 (Impacts Common to All Action Alternatives).

3.13.2.8 ALTERNATIVE 5

3.13.2.8.1 Electric and Magnetic Fields

Under Alternative 5, the general nature of the potential exposure to EMF that could affect public health and safety resulting from EMFs would be the same as those discussed in Section 3.13.2.3 (Impacts Common to All Action Alternatives). Table 3.13-10 lists the number of residences, hospitals/nursing homes, daycares, and schools within the ROW, or not within the ROW but within the 300-foot analysis area. The potential exposure during the operations phase would be minor and long term for any residences or other occupied buildings within the ROW, and negligible for any residences or other occupied buildings at the ROW's edge and beyond. The potential exposure to EMF for workers during the operations phase would be minor and periodic because of the intermittent nature of maintenance activities.

Table 3.13-10. Numbers of Residences, Hospitals/Nursing Homes, Daycares, and Schools within the ROW or within the 300-foot Analysis Area under Alternative 5

Alternative	Residences (homes/apartments)		Hospitals/Nursing Homes		Daycares		Schools	
	Within ROW	Outside ROW but within 300-foot analysis area	Within ROW	Outside ROW but within 300-foot analysis area	Within ROW	Outside ROW but within 300-foot analysis area	Within ROW	Outside ROW but within 300-foot analysis area
Alternative 5	2	53	0	0	0	0	0	1

3.13.2.8.2 Risk of Fire

Under Alternative 5, the potential risk of fire during construction, operations, and maintenance would be the same as those discussed in Section 3.13.2.3 (Impacts Common to All Action Alternatives).

3.13.2.8.3 Worker Safety

Under Alternative 5, the potential impacts to worker safety during construction, operations, and maintenance would be the same as those discussed in Section 3.13.2.3 (Impacts Common to All Action Alternatives).

3.13.2.8.4 Solid, Hazardous, and Toxic Materials and Waste

Under Alternative 5, the potential impacts to public health and safety from the spill, release, or disposal of solid, hazardous, or toxic materials and waste during construction, operations, and maintenance would be the same as those discussed in Section 3.13.2.3 (Impacts Common to All Action Alternatives).

3.13.2.9 ALTERNATIVE 6

3.13.2.9.1 Electric and Magnetic Fields

Under Alternative 6, the general nature of the potential exposure to EMF that could affect public health and safety resulting from EMFs would be the same as those discussed in Section 3.13.2.3 (Impacts Common to All Action Alternatives). Table 3.13-11 lists the number of residences, hospitals/nursing homes, daycares, and schools within the ROW, or not within the ROW but within the 300-foot analysis area. The potential exposure during the operations phase would be minor and long term for any residences or other occupied buildings within the ROW, and negligible for any residences or other occupied buildings at the edge of the ROW and beyond. The potential exposure to EMF for workers during the operations phase would be minor and periodic because of the intermittent nature of maintenance activities.

Table 3.13-11. Numbers of Residences, Hospitals/Nursing Homes, Daycares, and Schools within the ROW or within the 300-foot Analysis Area under Alternative 6

Alternative	Residences (homes/apartments)		Hospitals/Nursing Homes		Daycares		Schools	
	Within ROW	Outside ROW but within 300-foot analysis area	Within ROW	Outside ROW but within 300-foot analysis area	Within ROW	Outside ROW but within 300-foot analysis area	Within ROW	Outside ROW but within 300-foot analysis area
Alternative 6	8	35	0	0	0	0	0	0

3.13.2.9.2 Risk of Fire

Under Alternative 6, the potential risk of fire during construction, operations, and maintenance would be the same as those discussed in Section 3.13.2.3 (Impacts Common to All Action Alternatives).

3.13.2.9.3 Worker Safety

Under Alternative 6, the potential impacts to worker safety during construction, operations, and maintenance would be the same as those discussed in Section 3.13.2.3 (Impacts Common to All Action Alternatives).

3.13.2.9.4 Solid, Hazardous, and Toxic Materials and Waste

Under Alternative 6, the potential impacts to public health and safety from the spill, release, or disposal of solid, hazardous, or toxic materials and waste during construction, operations, and maintenance would be the same as those discussed in Section 3.13.2.3 (Impacts Common to All Action Alternatives).

3.13.3 *Summary of Impacts*

Table 3.13-12 includes a summary of impacts for each action alternative.

Table 3.13-12. Impact Summary Table for Public Health and Safety

	EMF	Risk of Fire	Worker Safety	Solid, Hazardous, and Toxic Materials and Waste
Alternative 1	Potential exposure to EMF that could affect public health and safety would be minor and long term for occupied buildings within the ROW and negligible for occupied buildings at the ROW's edge and beyond. Alternative 1 would include 2 residences within the ROW and 19 residences outside the ROW but within 300-foot analysis area. Because the line would not be in operation yet, there would be no potential for exposure to workers during the construction phase. Potential exposure to workers during the operations and maintenance phase would be minor and periodic because of the intermittent nature of the exposure.	BMPs and environmental commitments would reduce the potential for fires from construction, operations, and maintenance activities and potential impacts to public and worker health and safety would be minor and long term.	Construction of the proposed transmission line and associated facilities would not be expected to generate injury or fatality rates that are higher than industry averages. Therefore, potential impacts to worker safety during construction, operations, and maintenance activities would be minor and long term.	Because all action alternatives would comply with applicable solid, hazardous, and toxic materials and waste handling, storage, and disposal requirements under Federal and state laws and regulations, the potential for public and worker health and safety impacts from spills, releases, or disposal of these materials would be minor and long term.

	EMF	Risk of Fire	Worker Safety	Solid, Hazardous, and Toxic Materials and Waste
Alternative 2	Same as Alternative 1 but including 2 residences and 1 school within the ROW; and 26 residences, 1 daycare, and 1 school outside the ROW but within 300-foot analysis area.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Alternative 3	Same as Alternative 1 but including 3 residences and 1 school within the ROW; and 34 residences, 1 daycare, and 2 schools outside the ROW but within 300-foot analysis area.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Alternative 4	Same as Alternative 1 but including 9 residences and 1 school within the ROW; and 52 residences, 1 daycare, and 2 schools outside the ROW but within 300-foot analysis area.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Alternative 5	Same as Alternative 1 but including 2 residences within the ROW; and 53 residences and 1 school outside the ROW but within 300-foot analysis area.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Alternative 6	Same as Alternative 1 but including 8 residences within the ROW and 35 residences outside the ROW but within 300-foot analysis area.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.

Retirement of the N-9 Transmission Line and Construction of a New 69-kV Tap Line

There would be no impacts to public health and safety from the decommissioning of the N-9 transmission line and construction of the 0.2-mile tap line as Federal and state occupational safety and health standards as well as adherence to applicable National Electrical Safety Code would occur.

3.14 Upper Mississippi River National Wildlife and Fish Refuge

3.14.1 *Affected Environment*

The Refuge was established by an Act of Congress on June 7, 1924, as a refuge and breeding place for migratory birds, fish, other wildlife, and plants. The Refuge is managed and administered as part of the NWRS and encompasses one of the largest blocks of floodplain habitat in the continental United States. Bordered by steep wooded bluffs that rise 100 to 600 feet above the river valley, the Mississippi River corridor and Refuge offer scenic beauty, a wild character, and productive fish and wildlife habitat unmatched in mid-America. The Refuge covers 240,220 acres and extends 261 river-miles from north to south at the confluence of the Chippewa River in Wisconsin to near Rock Island, Illinois.

The Refuge is administered by the USFWS and Refuge management actions are coordinated with other Federal, state, tribal, local, and private entities. The USFWS has specific trust responsibilities for migratory birds, threatened and endangered species, certain interjurisdictional fish and marine mammals, and the NWRS.

No use for which the USFWS has authority to regulate may be allowed on a unit of the NWRS unless it is determined by USFWS to be compatible. A compatible use is a use that, in the sound professional judgment of the Refuge manager, will not materially interfere with or detract from the fulfillment of the NWRS mission or the purposes of the Refuge. USFWS managers must complete a written compatibility determination for proposed use in the NWRS. Therefore, the proposed C-HC Project would be subject to a USFWS compatibility determination (USFWS 2006a).

The USACE, Department of the Army, has played an active role in the physical and environmental changes on the Mississippi River, and thus the Refuge, for more than 100 years. Cooperative agreements between USFWS and USACE, with some limitations, grant to the USFWS the rights to manage fish and wildlife and its habitat on those lands acquired by the USACE. These lands are managed by the USFWS as a part of the Refuge and the NWRS. The USACE retained the rights to manage, as needed, for the navigation project, forestry, and USACE-managed recreation areas, and all other rights not specifically granted to the USFWS (USFWS 2006a).

As described in the Refuge's Comprehensive Conservation Plan (USFWS 2006a), the Refuge is an invaluable natural legacy in a complex geopolitical landscape:

- A national scenic treasure—river, backwaters, islands, and forest framed by 500-foot high bluffs
- Interface with four states, 70 communities, and two USACE districts
- A series of 11 navigation locks and dams within overall boundary
- Represented by eight U.S. Senators and six U.S. Representatives
- National Scenic Byways, designated by the U.S. Secretary of Transportation, on both sides
- 3.7 million annual visits, the most of any national wildlife refuge
- Diverse wildlife: 306 species of birds, 119 species of fish, 51 species of mammals, and 42 species of mussels
- Designated a Globally Important Bird Area by the American Bird Conservancy in 1997
- Up to 40% of the North American continent's waterfowl use the river flyway during migration
- Up to 50% of the world's canvasback ducks stop in the Refuge during fall migration
- Up to 20% of the eastern United States population of tundra swans stop in the Refuge during fall migration
- 167 active bald eagle nests have been identified in the Refuge in recent years
- A peak of 2,700 bald eagles stop in the Refuge during spring migration
- Approximately 5,000 heron and egret nests in up to 15 colonies

The Refuge is divided into four districts for management, administrative, and public service effectiveness and efficiency. The Refuge is further divided geographically by river pools that correspond with the navigation pools created by the series of locks and dams on the Upper Mississippi River. The district office in Prairie Du Chien, Wisconsin, manages Pool 11, which is where the C-HC Project would cross the Mississippi River. The area of river between two dams is called a "pool," each numbered according to the dam that creates it. Pools are river-like in nature, having various flow velocities extending laterally from the navigation channel to the backwaters.

3.14.1.1 RESOURCES WITHIN THE REFUGE

The C-HC Project would cross Pool 11, in the McGregor District. Pool 11 is approximately 31 river miles long. The pool is bounded by Lock and Dam 10 (upstream) and Lock and Dam 11 (downstream). In the vicinity of the C-HC Project, between river-miles 606 and 608, the community of Cassville, Wisconsin serves as an access point to the Mississippi River, and the community sits directly across from refuge lands in Iowa (Figure 3.14-1).

The following discussion summarizes the primary resources that occur within the Refuge between river miles 606 and 608, referred to as the resource evaluation area. This discussion is informed by the detailed resource topics presented elsewhere in this Chapter 3.

3.14.1.1.1 Geology and Soils

The Refuge lies within the Mississippi River floodplain, an ancient river valley filled with alluvial material (mud, sand, and gravel) carried and deposited by surface water. The river and its tributaries traverse sedimentary rock formations (dolomite, sandstone, and shale) that accumulated under inland seas during the early Paleozoic Era about 400 to 600 million years ago (USFWS 2006a).

Bedrock in the resource evaluation area (Witzke et al. 2010a, 2010b) is mostly buried beneath deep alluvial deposits in the Mississippi River valley bottomlands. Along the valley walls and on the bluff tops, bedrock is partly buried in residual soils or remnants of glacial till, which is itself capped by a thin layer of loess.

As discussed in Section 3.2, sensitive soils can be rated based on a capability classification system, which has eight classes and four subclasses (USDA 1962, 1966, 1978, 1982, 1985). For the Refuge resource evaluation area, soils meeting the capability class of 3 or greater may be a concern for the following reasons (USDA 1962, 1966, 1978, 1982, 1985):

Erosion (e): While the silt loam soils that dominate the analysis area are ideal for agricultural production, they are also prone to higher rates of erosion. Silt loam soils are typically the most erodible of all soils. The soil particles are easily detached; tend to crust and produce high rates of runoff. The K values (the soil erodibility factor which represents both susceptibility of soil to erosion and the rate of runoff) for these soils tend to be greater than 0.4. Therefore, the primary management concern for soils in the analysis area is erosion. Approximately 30% of the soils in the analysis area have an erosion capability classification greater than 3.

Wetness (w): Wet soils typically have poor drainage. These soils often either reflect compacted soil conditions that restrict drainage, or they are hydric soils resulting from a high or perched water table that can then be classified as wetland. Wet soils are a concern in that they are also easily damaged may be difficult to repair. Approximately 60% of the soils in the analysis area have a wet capability classification of 3 or greater. Many of these soils are associated with wetlands and are considered hydric soils.

Shallow (s): Shallow soils have limitations from the limited rooting depth they provide plants. None of the soils in the analysis area have a shallow classification of 3 or greater.

As discussed in Section 3.3 Vegetation, two algific talus slope sites have been recorded within the resource evaluation area within the Refuge. The Mississippi River floodplain is present where the two algific talus slope recorded sites are said to occur. At both locations, the relatively level floodplain of the Mississippi River consists of an emergent wetland dominated by reed canary grass with scattered black willow and eastern cottonwood trees. These areas are affected by the Mississippi River water level and are seasonally flooded (RUS 2018).

See Section 3.2 for more information about geology and soils that may be present within the C-HC Project, both within and outside the Refuge.

3.14.1.1.2 Vegetation

Much of the resource evaluation area within the Refuge consists of non-forested wetlands, with some patches of forested wetlands. In 2010, the Refuge was designated as a Wetland of International Importance in accordance with the 1971 Ramsar Convention, which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources (Ramsar Sites Information Service 2010). Vegetation within the resource evaluation area within the Refuge consists of reed canary grass, swamp milkweed, beggartick (*Bidens laevis*), barnyard grass (*Echinochloa crus-galli*), smartweeds (*Polygonaceae* spp.), and dense thickets of willows and cottonwoods, as well as a variety of other tree species.

The USFWS has aggressively pursued reforestation of much of the Turkey River floodplain, including where proposed Segment B-IA1 or B-IA2 would cross the Refuge (see Figure 3.14-1). Reforestation efforts have involved planting of a variety of bottomland hardwood species, including swamp white oak (*Quercus bicolor*), hackberry (*Celtis occidentalis*), black walnut (*Juglans nigra*), river birch (*Betula nigra*), and disease-resistant American elm (*Ulmus americana*). Currently, the vegetation in this area could best be characterized as young forest, as most of the trees present are less than 15 years old. Natural succession of forest species such as willows and dogwoods is also occurring in the Turkey River floodplain. Reforestation efforts, working in concert with natural forest regeneration and succession, would result in much of the Turkey River floodplains' growing into bottomland forest within 100 years (Yager 2018a).

See Section 3.3 for more information about vegetation that may be present within the analysis area both within and outside the Refuge.

3.14.1.1.3 Wildlife

The Refuge is home to unique habitat types that support a variety of wildlife species, including many of those described above. There are 51 mammal species known to occupy the Refuge, including many described in Section 3.4. Mammal species that are more common within the Refuge than the rest of the analysis are species typically dependent on wetland and open water habitat such as: muskrat, mink, beaver, and river otters (USFWS 2006a).

Owing to its location in the heart of the Mississippi Flyway, many species of bird migrate through or occupy habitat within the Refuge. This includes species dependent on wetland and open water habitat such as the wood duck, mallard, blue-winged teal, American wigeon, gadwall, northern pintail, green-winged teal, canvasback, lesser scaup, common goldeneye, ringed-necked duck, bufflehead, ruddy duck, merganser, belted kingfisher, Canada goose, and Tundra swan (USFWS 2006a).

Wetland and open water dependent colonial nesters common to the Refuge include black tern, great blue herons, double-crested cormorants, great egrets, and green herons (USFWS 2006a).

More than 160 species of songbird have been documented within the Refuge. Species that rely on forested areas and grasslands that are commonly found nesting within the Refuge include the American robin, downy woodpecker, great-crested flycatcher, prothonotary warbler, tree swallow, yellow-headed blackbird, northern cardinal, and the brown creeper (USFWS 2006a). Neo-tropical migrants are of particular interest to the Refuge, as many of these birds rely upon the ribbon of unbroken forest that stretches from north to south for approximately 260 miles. The USFWS has identified and is implementing reforestation efforts on the floodplain of the Turkey River to reduce fragmentation of the forest community, thus improving conditions for resident and migrating songbirds. Early successional forests, such as the one being regenerated on the Turkey River floodplain, are a missing habitat type throughout much of the Driftless Area and provide critical habitat for a variety of bird and wildlife species that favor this habitat type (Yager 2018a).

The Refuge also supports nesting pairs of red-shouldered hawks (common to forested areas) and osprey (who nest near and hunt in the Mississippi River and other large bodies of water), among other raptors that migrate through (USFWS 2006a). More than 300 bald eagle nests have been recorded within the Refuge. Two eagle nests have been identified between the two proposed Mississippi River crossings; however, neither of the nests has been active in recent years.

Eleven species of turtle occupy the Refuge, using habitats that range from quiet backwaters (e.g., Blanding's, painted, snapping, and common map turtles) to the faster flowing waters of the larger channels (e.g., smooth and spiny softshells, Ouachita and false map turtles). There are nine species of frog and one toad species known from the Refuge. Bullfrogs, chorus frogs, and spring peepers are commonly found in and near wetland and open water habitat (USFWS 2006a).

One-hundred nineteen fish species are known to use the Refuge. These include common sport fish such as walleye, sauger, white bass, large and smallmouth bass, channel catfish, northern pike, bluegill, and crappies, as well as non-sport fish such as sturgeon and paddlefish. There are 39 species of mussel considered present within the Refuge, with pink papershell and giant floater commonly observed species (USFWS 2006a).

See Section 3.4 for more information about wildlife, including special status species, that may be present within the C-HC Project both within and outside the Refuge.

3.14.1.1.4 Water Resources

Within the resource evaluation area, the Refuge is drained by a dendritic pattern of first- and second-order intermittent streams that flow into the third-order permanent streams including Bluebell Creek. These streams both drain into the Turkey River. The Turkey River flows eastward into the Mississippi River, which flows northwest-to-southeast in this area. The confluence of Turkey River and Mississippi River is approximately 0.5 mile just west of the closest alternative identified for C-HC Project to cross the Mississippi River. This area also includes a series of shallow swales that extend southeast from the alluvial fan and appear to be old Mississippi River channels (or overflow channels) that have become partially silted-in (Kullen 2017, 2018).

3.14.1.1.5 Cultural Resources

No previously recorded archaeological sites are reported on Refuge lands in the vicinity of the C-HC Project (Kullen 2017, 2018). The cultural resources survey completed July 24–26 and August 28–September 1, 2017, and in July through August 2018, surveyed the proposed locations of the transmission line structures along the two alternate transmission line routes. Shovel tests and combination shovel test/hand auger cores were excavated. No evidence for archaeological sites or for buried topsoil horizons that might represent potential former living surfaces were encountered during the survey (Kullen 2017, 2018).

See Section 3.9 for more information about cultural and historic resources that may be present within the C-HC Project outside the Refuge.

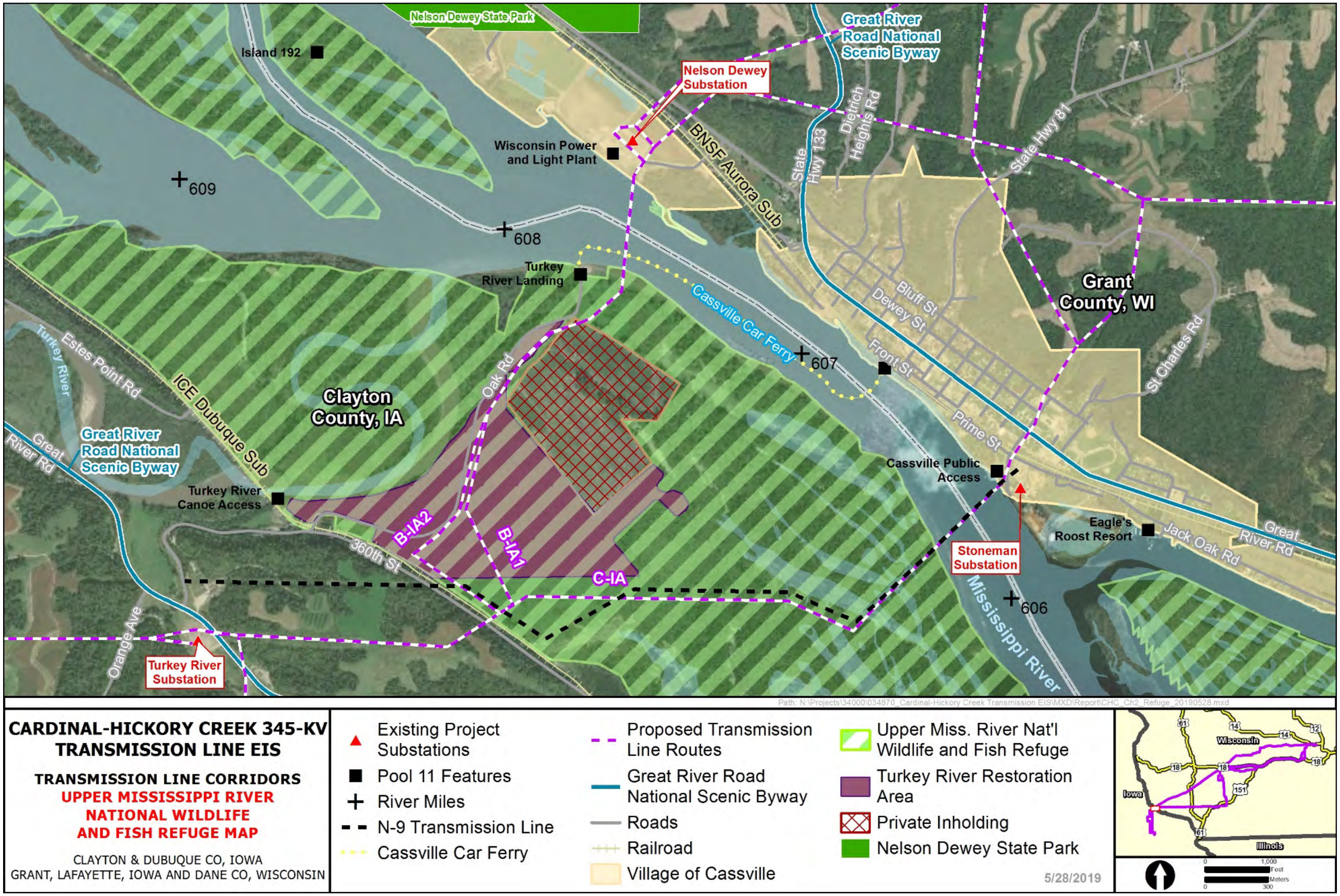

Figure 3.14-1. C-HC Project vicinity with the Upper Mississippi River National Wildlife and Fish Refuge.

3.14.1.1.6 Land Use

Land use in the Refuge resource evaluation area has been primarily agricultural for the last 170 years. Since the Refuge was established, much of the land has gone out of cultivation. While vegetation is actively managed in some parts of the Refuge, including the Turkey River bottoms, in the resource evaluation area, the vegetation communities represent those species that have grown in long fallow farm fields. Early successional forest species, including cottonwood and willow, are present, in addition to tree species that have been planted by the USFWS, such as swamp white oak, hackberry, black walnut, river birch, and disease-resistant American elm. There is a private inholding within this portion of the Refuge, which is used for agricultural production when conditions allow. The inholding is in the floodplains of both the Mississippi River and Turkey River and is subject to flooding on a regular basis (Yager 2018b).

There are human disturbances within this portion of the Refuge as well as directly across the Mississippi River near Cassville, Wisconsin. Oak Road is the unpaved access road within the Refuge used to connect Iowa County road C9Y (the Great River Road) with the Cassville Car Ferry landing on the Iowa bank of the Mississippi River. The Cassville Car Ferry operates seasonally with daily service between Memorial Day and Labor Day and limited weekend service in May, September, and October (Cassville Tourism 2016).

Directly across the river from the Turkey River landing is the Nelson Dewey Substation, which sits adjacent to the demolished Nelson Dewey generation facility.

There is also an existing electric transmission line that crosses the Refuge and Mississippi River to connect with the Stoneman Substation, which is immediately adjacent to the unused Stoneman generation facility in Cassville. Woody vegetation has been suppressed within the existing transmission line ROW, and a barely visible dirt track runs between the support structures.

Recreational uses within the Refuge include hunting, fishing, wildlife observation and photography, interpretation and environmental education, recreational boating, camping, and other shoreline uses. The Cassville car ferry landing is also used as a river access point, named the Turkey River landing. Other nearby river access points include Cassville Public Access launch and the Wisconsin Power and Light launch on the Wisconsin side of the Mississippi River. The public park in Cassville also serves as a Refuge overlook. Commercial navigation passes through the Refuge.

See Section 3.10 for more information about land uses that may be present within the C-HC Project both within and outside the Refuge.

3.14.1.1.7 Visual Quality and Aesthetics

The viewshed within the Refuge from the position of a human observer standing in the Refuge, looking west to Wisconsin, can be characterized as having native vegetation in the foreground and middle ground, with some human disturbances, such as Oak Road and the existing transmission line in the middle ground, and the Village of Cassville and the demolished Nelson Dewey generation plant site in the background. Due to the sensitivity of the Refuge's viewshed, RUS and USFWS completed extensive visual resource analysis from multiple observation points within and outside the Refuge. Section 3.11 provides the detailed discussion of the visual resource analysis conducted for the Refuge.

3.14.2 *Environmental Consequences*

This section describes impacts to resources within the Refuge associated with construction, operation, and maintenance of the C-HC Project. Impacts to the Refuge are presented for geology and soils, vegetation, wildlife, water resources, cultural resources, land use, and visual quality and aesthetics. These resource topics are also discussed in standalone sections of Chapter 3, as follows:

- Geology and soils: Section 3.2
- Vegetation: Section 3.3
- Wildlife: Section 3.4
- Water resources: Section 3.5
- Cultural resources: Section 3.9
- Land use: Section 3.10
- Visual quality and aesthetics: Section 3.11

3.14.2.1 DATA SOURCES, METHODS, AND ANALYSIS ASSUMPTIONS

Table 3.14-1 summarizes the impact indicators that were considered when analyzing potential impacts to resources within the Refuge.

Table 3.14-1. Impact Indicators for Refuge Resources

Resource	Impact Indicator
Geology and Soils	• Acres of surface disturbance o Temporary – construction activities o Permanent – structure locations • Acres of disturbance to sensitive soils • Acres of disturbance to steep slopes
Vegetation	• Acres, both permanent and temporary, of disturbance resulting from construction and maintenance activities
Wildlife, Including Special Status Species	• Acres of habitat to be modified/removed by construction and maintenance activities • For non-listed species, a qualitative description of potential direct and indirect impacts to individuals
Water Resources	• Number of potential jurisdictional waterways to be crossed by the C-HC Project. Provides a measure of potential direct and indirect impact to surface waters. • Acres of disturbance within potential jurisdictional drainages • Potential changes in surface water contaminants of concern, including increases in sediment from erosion, compared with applicable state surface water standards and concentrations of groundwater contaminants of concern compared to applicable state groundwater standards. • Potential impacts to floodplains measured as expected changes in surface flow capacities, velocities, and stages due to temporary or permanent disturbances; and expected changes in downstream channel morphology.
Cultural and Historic Resources	• Number of NRHP-eligible cultural resources/historic properties (historic and prehistoric) to be directly or indirectly affected and acres to be disturbed at each historic property. • Qualitative descriptions of changes in skylines or other visual settings in relation to cultural sites.
Land Use	• Acres of disturbance, by land cover class

Resource	Impact Indicator

Geology and Soils	• Acres of surface disturbance
	  o Temporary – construction activities
	  o Permanent – structure locations
	• Acres of disturbance to sensitive soils
	• Acres of disturbance to steep slopes

Vegetation	• Acres, both permanent and temporary, of disturbance resulting from construction and maintenance activities
Wildlife, Including Special Status Species	• Acres of habitat to be modified/removed by construction and maintenance activities • For non-listed species, a qualitative description of potential direct and indirect impacts to individuals
Water Resources	• Number of potential jurisdictional waterways to be crossed by the C-HC Project. Provides a measure of potential direct and indirect impact to surface waters. • Acres of disturbance within potential jurisdictional drainages • Potential changes in surface water contaminants of concern, including increases in sediment from erosion, compared with applicable state surface water standards and concentrations of groundwater contaminants of concern compared to applicable state groundwater standards. • Potential impacts to floodplains measured as expected changes in surface flow capacities, velocities, and stages due to temporary or permanent disturbances; and expected changes in downstream channel morphology.
Cultural and Historic Resources	• Number of NRHP-eligible cultural resources/historic properties (historic and prehistoric) to be directly or indirectly affected and acres to be disturbed at each historic property. • Qualitative descriptions of changes in skylines or other visual settings in relation to cultural sites.
Visual Resources	• Visual simulations from KOPs within and looking into the Refuge

The following field investigations have occurred in the Refuge for the C-HC Project and are used to inform impact analysis presented below:

- The Utilities completed wetland delineations from May through July 2017, and in July through August 2018, using methods outlined in the U.S. Army Corps of Engineers Wetland Delineation Manual (USACE 1987) and the Midwest Region and Northcentral and Northeast Region Supplements (USACE 2010, 2012).

- An archaeological survey of the portion of the action alternatives within the Upper Mississippi River National Wildlife and Fish Refuge was conducted by Burns and McDonnell (Kullen 2017, 2018). The cultural resources survey completed July 24–26 and August 28–September 1, 2017, and in July through August 2018. No evidence for archaeological sites or for buried topsoil horizons that might represent potential former living surfaces were encountered during the survey (Kullen 2017, 2018).

- The Utilities collected photographs from several locations within the Refuge and in Cassville, Wisconsin looking across the Mississippi River into the Refuge. These photographs were used to create the photo simulations presented in Section 3.11 and summarized below.

The same methods for calculating and assessing impacts to resources across the C-HC Project area were used to assess impacts to resources within the Refuge. For a detailed description of methods and assumptions for the resources analyzed within the Refuge, refer to those corresponding sections of Chapter 3.

The following sections provide an effects evaluation by alternative based on the above impact indicators. An overall classification (minor, moderate, major) of impacts is assigned to each alternative. Definitions of the impact threshold for each classification are provided in Table 3.14-2 below.

Table 3.14-2. Impact Thresholds and Descriptions for Resources within the Refuge

	Minor Impact	Moderate Impact	Major Impact
Geology and Soils	Disturbances to geology or soils from construction and operation would be detectable but localized and discountable. Erosion and/or compaction would occur from construction and operation in localized areas and be quickly repaired.	Disturbances would occur over a relatively wide area from construction and operation of the C-HC Project or with sufficient impairment in localized areas that could result in wider areas if not repaired. Impacts to geology or soils would be readily apparent and result in short-term changes to the soil character or local geologic characteristics. Erosion and compaction impacts would occur over a wide area.	Disturbances would occur over a large area from construction and operation of the C-HC Project. Impacts to geology or soils would be readily apparent and would result in short- and long-term changes to the characteristics of the geology or soils over a large area, both in and out of the project boundaries or within limited areas of sensitive environments that would affect vegetation, wildlife, and geological processes. Erosion and compaction would occur over a large area.
Vegetation, Including Wetlands and Special Status Plants	Impacts on native vegetation would be detectable but discountable and would not alter natural conditions measurably. Infrequent disturbances to individual plants could be expected, but without affecting local or range-wide population stability. Infrequent or insignificant one-time disturbances to local populations could occur, but sufficient habitat would remain functional at both the local and regional scales to maintain the viability of the species. Opportunities for the increased spread of noxious weeds would be detectable but discountable. There would be some minor potential for an increased spread of noxious weeds.	Impacts on native vegetation would be detectable and/or measurable. Occasional disturbances to individual plants could be expected. These disturbances could affect local populations negatively but would not be expected to affect regional population stability. Some impacts might occur in key habitats, but sufficient local habitat would remain functional to maintain the viability of the species both locally and throughout its range. Opportunities for increased spread of noxious weeds would be detectable and/or measurable. There would be some moderate potential for the increased spread of noxious weeds.	Impacts on native vegetation would be measurable and extensive. Frequent disturbances of individual plants would be expected, with negative impacts to both local and regional population levels. These disturbances could negatively affect local populations and could affect range-wide population stability. Some impacts might occur in key habitats, and habitat impacts could negatively affect the viability of the species both locally and throughout its range. Opportunities for the increased spread of noxious weeds would be measurable and extensive. There would be a major potential for the increased spread of noxious weeds.
Wildlife, Including Special Status Species	Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, but discountable and would not measurably alter natural conditions. Infrequent responses to disturbances by some individuals could be expected, but without interference to feeding, breeding, sheltering, or other factors affecting population levels. Small changes to local population numbers, population structure, and other demographic factors could occur. Sufficient habitat would remain functional at both the local and range-wide scales to maintain the viability of the species.	Impacts on native species, their habitats, or the natural processes sustaining them would be detectable and/or measurable. Occasional responses to disturbance by some individuals could be expected, with some negative impacts to feeding, reproduction, resting, migrating, or other factors affecting local population levels. Sufficient population numbers or habitat would retain function to maintain the viability of the species both locally and throughout its range.	Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, and would be extensive. Frequent responses to disturbances by some individuals would be expected, with negative impacts to feeding, reproduction, or other factors resulting in a decrease in both local and range-wide population levels and habitat type. Impacts would occur during critical periods of reproduction and would result in mortality of individuals or loss of habitat that might affect the viability of a species. Local population numbers, population structure, and other demographic factors might experience large changes or declines.

	Minor Impact	Moderate Impact	Major Impact
Water Resources	The effect on surface waters would be measurable or perceptible, but small and localized. The effect would not alter the physical or chemical characteristics of the surface water or aquatic influence zone resource.	The effect on surface waters would be measurable or perceptible and could alter the physical or chemical characteristics of the surface water resources in a localized area, but not to large areas. The functions typically provided by the surface water or aquatic influence zone would not be substantially altered.	The impact would cause a measurable effect on surface waters and would modify physical or chemical characteristics of the groundwater or surface waters. The impacts would be substantial and highly noticeable. The character of the surface water or aquatic influence zone would be changed so that the functions typically provided by the surface water or aquatic influence zone would be substantially altered.
Cultural and Historical Resources	Impacts would occur, but cultural resources would retain existing characteristics that make them eligible for the NRHP.	Impacts and alterations would occur, but overall, cultural resources would partially retain characteristics that make them eligible for the NRHP or impacts would alter the characteristics that make them eligible for the NRHP.	Impacts would occur, that overall, would substantially alter or destroy characteristics of cultural resources that make them eligible for the NRHP.
Land Use, Including Agriculture and Recreation	Other than at the footprint of project features (e.g., transmission structures, substations, access roads), previous land uses would continue without interruption. Existing land uses such as agriculture, grazing, and special use areas might experience temporary construction-related disturbances and intermittent, infrequent interruptions from operation and maintenance. There would be no conflicts with local zoning. For recreation, the same site capacity and visitor experience would remain unchanged after construction.	Previous land uses (e.g., agriculture, grazing, and special use areas) would be diminished or required to change on a portion of the project area, to be compatible with the C-HC Project. Only a few parcels within the project area would require zoning changes to be consistent with local plans. Some parcels within the project area (e.g., transmission ROW, substation, access roads) might require a change in land ownership through purchases or condemnation. For recreation, the visitor experience would be slightly changed but would still be available.	More than 25% of the project area (e.g., transmission ROW, substations, access roads) would require a change in land ownership through purchases or condemnation. All land use (e.g., agriculture, grazing, and special use areas) on these parcels would be discontinued. Most parcels of land within the project area would require zoning changes to be consistent with local plans. For recreation, visitors would be displaced to facilities at other regional or local locations and the visitor experience would no longer be available at this location.
Visual Quality and Aesthetics	Proposed changes could attract attention but would not dominate the view or detract from current user activities.	Proposed changes would attract attention and contribute to the landscape, but would not dominate the landscape. User activities would remain unaffected.	Changes to the characteristic landscape would be considered significant when those changes dominate the landscape and detract from current user activities.

3.14.2.2 NO ACTION

Under the No Action Alternative, the proposed Project would not be built. Therefore, the existing transmission line ROW within the Refuge would remain. No new impacts to resources within the Refuge would occur. The USFWS would continue to pursue reforestation on the Turkey River floodplain through a combination of forest planting and natural forest succession.

3.14.2.3 IMPACTS COMMON TO ALL ACTION ALTERNATIVES

3.14.2.3.1 Geology and Soils

Clearing of vegetation as well as grading would disturb topsoil, which would result in newly exposed, disturbed soils that could be subject to accelerated soil erosion by wind and water. Access roads and use of heavy equipment in the ROW would cause soil compaction. Impacts to soils could range from short-term to long-term depending on the amount of ground disturbance at a particular location. Some areas may be able to revegetate quickly, and impacts to soils would be short-term. In areas with more intense equipment use and construction activities, soil compaction and erosion could have longer impacts. Any soil removal associated with the development of the structure foundations would be permanent.

Use of construction equipment in wet soils could result in greater compaction and rutting, affecting the wetland hydrology and connection to groundwater as well as affecting wetland plant growth. Compaction to soil impairs the ability for water to infiltrate and percolate into the soil while also reducing the ability for plant roots to grow. Impacts to wet soils would likely be localized to the relatively small areas in which they occur. The use of timber matting and temporary bridges over wet areas and streams would help minimize impacts to wet soils.

The potential for erosion is likely with disturbance of any soil in the analysis area, including resulting from other soil sensitivities such as wet soils. Erosion potential is less in well-vegetated areas, but in cultivated soils and on slopes, the potential for erosion is greatly increased. Erosion, if and where it occurs, also may migrate beyond the area of immediate impact and could impair wide areas, damaging not only soils beyond the analysis area, but other environmental resources. The Utilities would develop an erosion control plan that provides detailed information and response actions that would be necessary to prevent and minimize erosion within the C-HC Project area.

Indirect impacts to soils would include loss of soil structure and stability, loss of plant productivity or health due to reduction in nutrient availability, a reduction in oxygen in the soil reducing plant function, and increased stormwater runoff emanating from compacted soils. The potential for soil erosion increases not only in the affected area, but erosion could increase in area as rills and gullies are formed and stormwater runoff is channelized across broad areas of land. Expansive erosion will substantially reduce soil productivity and could result in extensive repairs necessary to restore soil condition for agricultural production and native habitat. Erosion will also ultimately impact water quality in streams with increased sediment loads.

The potential direct impacts to geology from construction include drilling, blasting, excavation, equipment movement/hauling, and other ground-disturbing activities during construction. It should be noted, that based on preliminary geotechnical information, the Utilities do not anticipate the need to blast. However, if unanticipated geotechnical conditions are discovered, blasting may be the best method for excavation. Under all action alternatives, geologic resources would be impacted by the displacement of soil and rock during construction of structure foundations.

Borings for transmission line structure foundations would displace soil and rock. Some excavated soil and rock would be used for backfilling around structure foundations with excess material removed from the site to locations directed by landowner or disposed of at another location. The use of heavy-duty vehicles and earth moving equipment required for structure foundations and structure placement would result in short-term moderate impacts on local surface geology (soils) as a result of compaction, rutting, and the potential for localized rill erosion near unimproved roadbeds and on sensitive landscapes.

Under all alternatives, the decommissioning of the N-9 line would involve the removal of 21 transmission line structures in the Refuge. As shown in Table 3.14-3, there would be approximately 17.2 acres of impacts to wet soils from the decommissioning of the N-9 line in the Refuge. Construction mats and temporary bridges would be used in areas in which soils are classified as unstable soils and wet soils to help minimize impacts. There are approximately 7 acres of soils with a prime farmland classification within the Refuge. However, since this land in the Refuge is not used for farming and would not be used as such in the future, there would be no impacts to prime farmlands. This soil classification and impact analysis would limit soil impacts to minor, short-term impacts.

Table 3.14-3. Temporary Sensitive Soil Impacts from the N-9 Decommissioning and Tap Line

	Refuge (acres)
Total Analysis Area	**21.5**
Sensitive Soil Type*	
Prime farmland	6.6
Farmland of Statewide Importance	0.0
Steep Slopes	0.0
Severe Erosion Potential	0.0
Shallow Soils	0.2
Wet Soils	17.2

* Sensitive soil types may add up to more than the total analysis area because there may be overlap among different types of sensitive soils.

3.14.2.3.2 Vegetation

The primary direct and indirect impacts to vegetation during construction and operation and maintenance of the proposed Project associated with all action alternatives would be associated with:

- removal and/or crushing of natural, native species–dominated vegetation communities or associations;
- increased non-native, invasive plants;
- decreased plant productivity as a result of fugitive dust; and
- plant community fragmentation.

All action alternatives would involve the removal of vegetation during construction activities resulting in the direct loss of plant communities. Forest and shrub vegetation would be cleared within the ROW and in areas where access roads are required. Permanent impacts on vegetation would result from the conversion of forested cover to non-forest cover within the ROW, as well as from the loss of vegetation resulting from permanent conversion of undeveloped areas to develop areas around the transmission line structures. Any permanent impacts on vegetation through loss and/or conversion of vegetation communities would be mitigated through acquisition and restoration of similar habitats in locations acceptable to the Refuge.

Vegetation removal could affect vegetation communities by changing community structure and composition and altering soil moisture or nutrient regimes. The degree of impact depends on the type and amount of vegetation affected, and, for short-term impacts, the rate at which vegetation would regenerate following construction. These direct and indirect effects would reduce or change the functional qualities of vegetation, including as wildlife habitat.

Temporary impacts on vegetation would include the removal of non-forested vegetation that would be restored upon completion of construction. The degree of these impacts depends on the type and amount of vegetation affected, and the rate at which vegetation would regenerate following construction. Fugitive dust resulting from construction and maintenance traffic has the potential to affect photosynthetic rates and decrease plant productivity.

Potential impacts to wetlands from the C-HC Project would include fill activities from transmission line structure construction, tree clearing within the ROW, and construction of access roads and staging areas.

Wetland fill activities due to the placement of transmission line structures within wetlands, and associated grading and construction activities, are considered permanent impacts resulting in wetland loss.

Forested wetlands crossed by the alternatives would require trees to be removed during construction and maintained in a non-forested state for the life of the C-HC Project. Tree clearing within forested wetlands would generally not be considered a wetland fill activity; however, conversion of a forested wetland to a non-forested wetland type (shrub/scrub or emergent) would be considered a permanent wetland impact as the wetland type and wetland function would be permanently altered.

Wetland impacts may result from temporary wetland crossings for construction equipment and/or materials along the proposed ROW and adjacent areas. Timber mats and other impact minimization techniques and BMPs would be used to prevent soil compaction and earth disturbance at temporary crossings. Wetlands temporarily impacted by construction access, staging areas, and access roads would be restored to original contours and reseeded with a site-appropriate mix of native wetland species.

Wetland areas both within the ROW and adjacent areas may be indirectly impacted by project construction, operation, and maintenance activities. These activities have the potential to increase sediment deposition in nearby wetlands and fragment wetland habitats that span the ROW and adjacent areas. These indirect impacts may decrease overall wetland habitat quality. Noxious weeds and other invasive species would also potentially be introduced and spread through ground disturbances and transfer by equipment. Precautions would be implemented during construction and reclamation to prevent the introduction and spread of noxious weeds, such as revegetation of disturbed areas using certified seed and mulch that contains no viable noxious weed seeds, as well as the use of standard BMPs during construction and revegetation practices within disturbed areas as discussed in Section 3.1, Table 3.1-4.

Under all alternatives, approximately 19 acres within the Refuge would be disturbed from the decommissioning of the N-9 line, of which approximately 17 acres are classified as wetlands (Table 3.14-4). Once the structures are removed and the ROW easements are retired, there would be long-term beneficial impacts to vegetation because the retired ROW within the Refuge would be revegetated according to a revegetation plan approved by USFWS and USACE.

Table 3.14-4. Acreages of Impacts to Vegetation from the N-9 Decommissioning and Tap Line

Land Cover Class	Refuge (acres)
Total Analysis Area	**21.5**
Grassland	1.6
Forest	0.0*
Shrubland	0.1
Wetland	17.2

* The lack of forested landcover presented in this table is indicative of the maintained transmission line ROW. Within the Refuge, the area surrounding the ROW is primarily forested.

Temporary direct disturbance to wetlands is expected during decommissioning to provide access to the 21 structures within the Refuge. Nineteen of the 21 structures within the Refuge would be removed at the ground level to avoid permanent impacts to wetlands. Two structures within the Refuge are steel lattice with cement foundations. The foundations for the two lattice structures would be removed to 4 feet below the ground surface. It is estimated the removal of the structure foundations would require no more than 450 square feet (0.01 acre) of surface area and 1,800 cubic feet of permanent fill within wetlands.

The decommissioning activities would occur in the winter months so that ice bridges would be used to cross any wetlands along the construction area. If the wetland soils are not frozen, decommissioning activities would be performed in these areas using construction mats to prevent soil compaction and earth disturbance at temporary crossings. All of the wooden structures within the Refuge would be cut at ground level to minimize impacts to the wetlands. Two construction pads would be temporarily installed within the Refuge to minimize impacts to wetlands during the removal of the steel lattice structures at the Mississippi River crossing. Upon completion of decommissioning, disturbed areas within the Refuge would be revegetated according to a revegetation plan developed by the Utilities in coordination with the USACE and USFWS.

Operation and maintenance activities are expected to result in moderate impacts to vegetation resources, primarily through the process of maintaining converted vegetation communities, as described above. These long-term impacts would be most evident in forested areas where the transmission line ROW would be maintained as a grassland vegetative community. Minimal vegetation management activities would be required to maintain the operating transmission line. Operation and maintenance activities would include vegetation trimming within the ROW, aerial inspections, ground inspections, and repairs. Vegetation trimming would result in the removal of limited, target vegetation, including non-native species. Aerial inspections would not affect vegetation. Ground inspections, where vehicles are confined to existing roadways, are unlikely to have any additional direct or indirect impacts on vegetation. Repairs to the transmission structures and conductors could have minor direct and indirect impacts on vegetation resources within areas disturbed by this activity. Impacts would be reduced by implementing BMPs.

Potential impacts to wetlands are assumed to be minimized by a number of environmental commitments as previously discussed in Section 3.1, Table 3.1-4. Any unavoidable impacts to wetlands, whether temporary or permanent, will be discussed with the USACE and USFWS prior to construction to determine the permitting requirements, mitigation, and conditions necessary for construction activities involving wetland impacts.

3.14.2.3.3 Wildlife

Potential construction-related impacts from the C-HC Project common to all wildlife groups would include the loss, degradation, and/or fragmentation of breeding, rearing, foraging, and dispersal habitats; collisions with and crushing by construction vehicles; loss of burrowing animals and burrows in areas where grading would occur; increased invasive species establishment and spread; and increased noise/vibration levels. These construction-related impacts would be moderate and short-term.

Impacts associated with clearing the ROW would include habitat loss, fragmentation, and degradation; and changes to species movement. Fragmentation could result in a shift in species composition, especially in continuous blocks forest habitat, where forest-obligate species are likely to occur. Habitat generalists use a range of habitat types and therefore would be less impacted by habitat fragmentation. In contrast, species that have poor dispersal abilities that are area-sensitive, or that are forest-interior species can be intolerant of disturbance associated with clearing the ROW in forested areas. The shift in species composition can be a concern where rare, unique, or specialized species exist because they are more likely to be adversely impacted from fragmentation (Brittingham 2018). Although some wildlife species would be temporarily displaced during construction of the transmission line, permanent displacement of these species is not anticipated, except potentially in cleared forest areas that provide habitat for forest obligate species and in areas of permanent conversion to utility ROW. Forest habitat would be available in other areas near or adjacent to the ROW, with adjacent woodland areas still available along the route for refuge during construction and as habitat during project operation.

The presence of transmission structures would provide perches as well as nesting habitat for some species. This would allow some species to use areas that would otherwise be unsuitable. The increased amount of edge habitat created by the proposed C-HC Project would allow for an increase in species that use edge habitats. This would change the species composition of the ROW area and impact species that use larger blocks of habitat, as they would be subject to increased predation. Other species that use edge habitats or have more general habitat requirements would benefit from the increased amount of edge habitat.

Noise and vibration associated with construction activities would change habitat use patterns for some species. Some individuals would move away from the source(s) of the noise/vibration to adjacent or nearby habitats, which may increase competition for resources within these areas. Noise/vibration and other disturbances may also lead to increased stress on individuals, which could decrease their overall fitness due to increased metabolic expenditures. These effects would be temporary and would cease with the completion of construction activities.

Two inactive bald eagle nests occur within the Refuge between the two proposed Mississippi River crossings for the C-HC Project. Adverse impacts to nesting eagles are not anticipated because the nests have not been used for the past several years. If eagles were to begin using either of these nests, impacts would be avoided by following the USFWS restrictions on when construction activities are allowed. Construction on the Refuge would only be permitted outside the nesting season (typically January 15 to June 15) or outside a 660-foot exclusion zone to avoid disturbance to nesting adults, chicks, and fledglings. Eagle nest surveys would be conducted prior to construction activities, and the Utilities would coordinate with the USFWS to minimize the impacts to nearby nesting eagles.

The design of the C-HC Project within the Refuge is intended to reduce the likelihood of avian collisions using low-profile, horizonal-symmetrical H-frame structures where the 345-kV and 161-kV transmission lines would be placed on the same set of structures (Figure 3.14-2 and Figure 3.14-3). A horizontal transmission line configuration is believed to be more beneficial to avian species, as the configuration reduces the height of the collision zone, compared with a vertical configuration (see Figure 3.14-2) (APLIC 2012:71). Furthermore, by collocating the transmission lines on one set of structures, the wires on the transmission structures would be confined to a smaller area, which increases the visibility of the transmission lines and allows birds to make one ascent and descent to cross the lines (see Figure 3.14-3; APLIC 2012:70). APLIC also recommends siting new transmission lines below the existing tree line so that birds are forced to gain enough altitude to clear the more-visible tree line and thereby avoid the transmission line (APLIC 2012:59). The C-HC Project would use low-profile structures that are 75 feet tall within the Refuge, which is below the estimated height of the tree line in this area. As a result of these three practices—1) using a horizontal configuration of wires, 2) collocating two transmission lines on one set of structures, and 3) constructing low-profile structures, the number of avian collisions with the C-HC Project is expected to be reduced within the Refuge under all action alternatives.

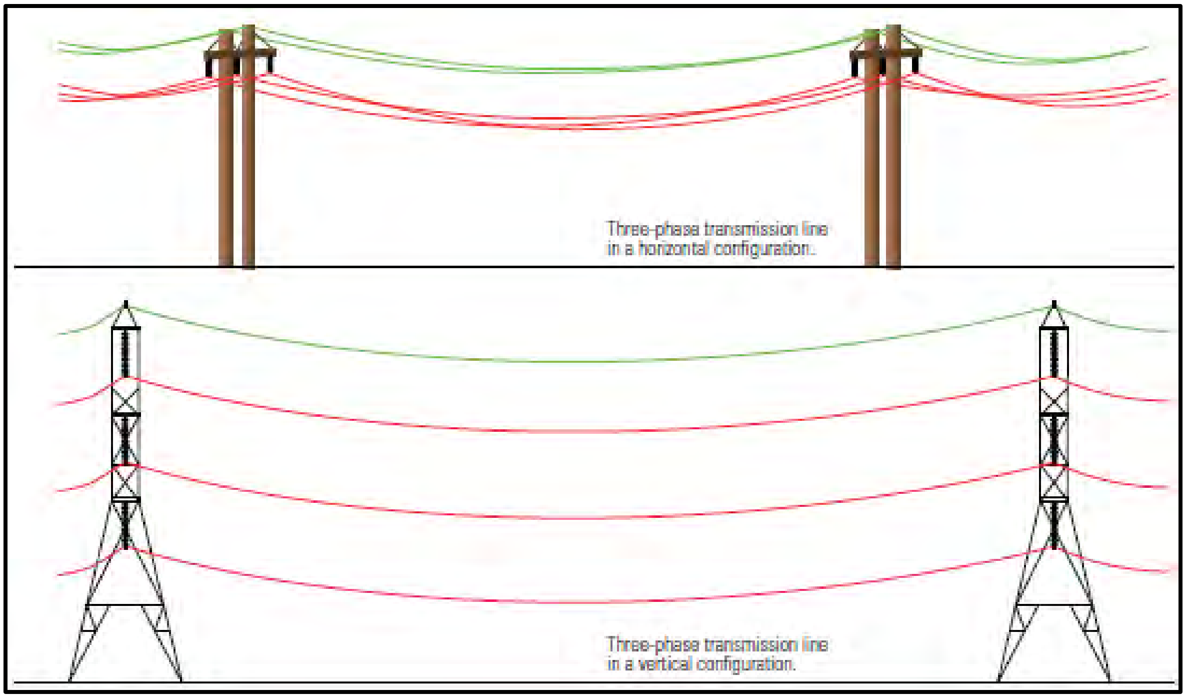

Figure 3.14-2. Horizontal and vertical configuration, modified from *Reducing Avian Collisions with Power Lines: The State of the Art in 2012* (APLIC 2012:71).

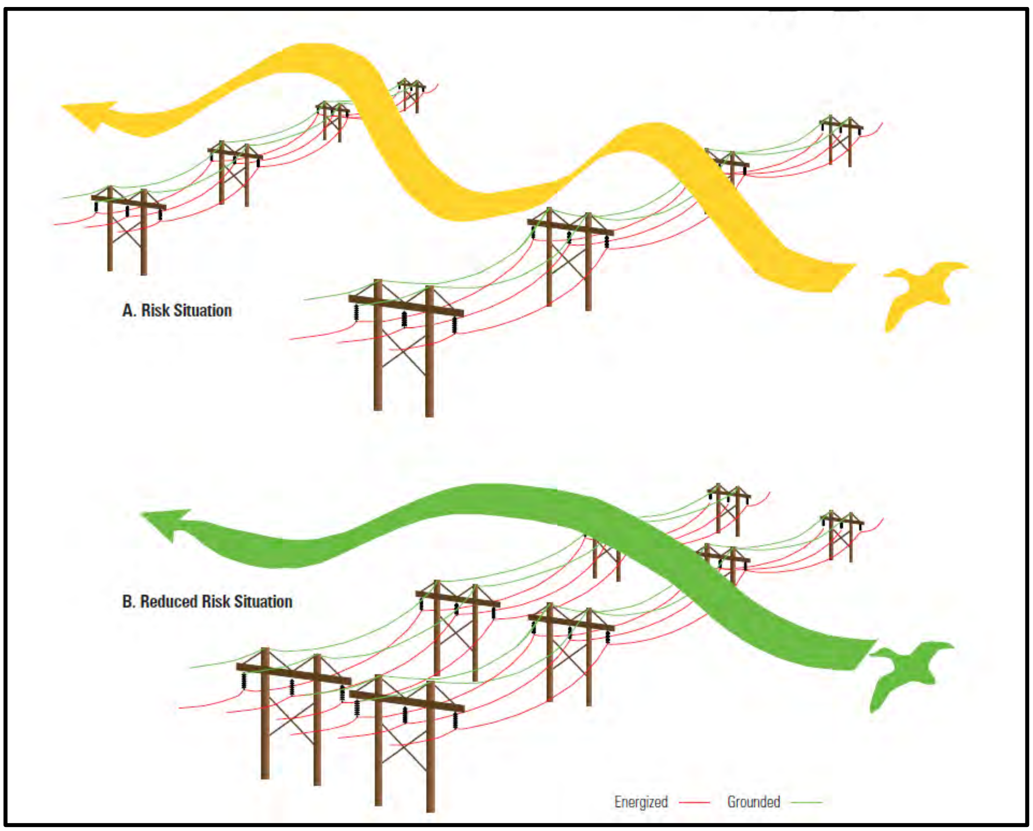

Figure 3.14-3. Reducing collisions by clustering lines in one ROW, modified from *Reducing Avian Collisions with Power Lines: The State of the Art in 2012* (APLIC 2012:70).

Potential adverse impacts to wildlife from the retirement of the N-9 transmission line in the Refuge are the same as those discussed above for the larger C-HC Project. Decommissioning-related impacts would be moderate and short term.

Potential impacts from maintenance activities would be similar in nature to those previously discussed above for construction activities. However, the scope of maintenance impacts would be lower in magnitude than those for construction as there would be less equipment and fewer people working. Maintenance impacts would be temporary and would occur sporadically over the life of the C-HC Project. After construction, a mid-year cycle application of herbicide would be conducted in 2 to 3 years. Thereafter, the vegetation management cycle would occur every 5 years.

3.14.2.3.4 Water Resources

All action alternatives would cross the Mississippi River and the associated floodplain that occurs within the Refuge. Transmission line structures would be placed outside the Mississippi River OHWM, but within the floodway. The support structures for the transmission line would be small when compared to the Mississippi River floodway dimensions, as would be the grading required at the base of the structures. Neither the structures nor the grading at the base would be significant obstructions to the flood flows in the Mississippi River floodway. “No rise” conditions would likely be met for the proposed project, regardless of proposed Mississippi River crossing location. Modeling would be performed to demonstrate “no rise” conditions are met.

The Mississippi River is a Meandered Sovereign River and a Sovereign Lands Construction Permit would be required for proposed construction activities that may impact the Mississippi River (IAC 571 Chapter 13). Taller (approximately 196 feet), tubular steel, H-frame support structures may be required at the channel crossings, so the transmission line can span the channel and still provide adequate clearance for river-going vessels. At either crossing location, the transmission line would need to have a free span of approximately 1,600 feet in order to span the channel. With the support structures outside the channel and the transmission line elevated according to U.S. Coast Guard standards, the impacts to the Mississippi River would be temporary and minor.

The most common contaminant from construction activity is the movement of sediment by stormwater into nearby surface waters, due to ground disturbance. The C-HC Project includes minimization measures and BMPs that are intended to stabilize disturbed ground, control erosion from disturbed areas, and prevent sediment from entering surface waters. The SWPPP(s) required to be prepared for the construction activities would identify the specific structural control measures and BMPs to be implemented. When implemented properly, as required under Section 402 of the CWA, these activities minimize the risk for erosion and movement of sediment in stormwater. Once the areas disturbed by construction activities are revegetated, runoff from the ROW and the substation areas would contain minimal sediment, and would not be likely to impact surface water quality. Minor adverse impacts from sedimentation is expected to be short-term for all alternatives.

Decommissioning of the N-9 transmission line would result in removal of the N-9 line within approximately 18.8 acres of 100-year floodplain in the Refuge. Disturbance in the floodplain would be limited to the decommissioning period within the ROW. During decommissioning, ground cover and soils would be temporarily disturbed. This would result in a temporary minor impact. Upon completion of decommissioning, existing transmission structures would be removed from the 100-year floodplain. This would result in a long-term beneficial impact as the floodplain acreage would be restored to a more natural state, benefitting the floodplain function and regaining a small amount of floodplain storage.

Impacts to groundwater and surface waters are not anticipated from the decommissioning of the N-9 transmission line. Construction-related liquids (e.g., equipment lubricants) would be managed to avoid spills and vehicle fueling would occur off-site.

3.14.2.3.5 Cultural Resources

No cultural resources have been identified within the analysis area; therefore, no impacts to cultural resources within the Refuge are expected to occur under any of the six action alternatives.

Specific to the retirement of the N-9 transmission line in the Refuge, RUS reviewed cultural resource information provided for the upgrade of the N-9 line in 2000 and the location of the proposed retirement activities. RUS determined the N-9 line does not cross any identified mounds and the action would include cutting the structures at ground level when the ground is frozen. RUS, USACE, and USFWS determined the retirement of the N-9 transmission line would result in no historic properties affected (RUS 2019).

3.14.2.3.6 Land Use, Including Agriculture and Recreation

Construction activities for the C-HC Project and decommissioning of the N-9 transmission line would temporarily impact both land cover and recreational users by limiting access to a small portion of the Refuge and the Mississippi River, including public access points to the river, generating noise associated with construction equipment, changing the land use of the ROW area, and altering the visual environment. Most of these adverse impacts would last the duration of C-HC project construction and N- transmission line decommissioning. Recreation activities are expected to return to preconstruction levels after construction ends. The C-HC Project would not exclude existing land uses or recreation activities currently enjoyed within the Refuge.

All current land uses along the decommissioned N-9 transmission line would return to their original land uses after the structures and conductors are removed. Once the structures are removed and the ROW easements are retired, there would be long-term beneficial impacts to vegetation because the retired ROW would be allowed to naturally revegetate outside of the Refuge and would be revegetated within the Refuge through a coordinated planning effort with the USFWS and USACE. Over the long term, the vegetation communities would be consistent with surrounding land uses.

3.14.2.3.7 Visual Quality and Aesthetics

All action alternatives would result in short-term and long-term adverse impacts to visual quality and aesthetics within the Refuge. Construction of the C-HC Project would introduce elements to the landscape that would not be typical of Refuge activities. The presence of construction vehicles, equipment, and ground disturbance would disrupt the viewshed in an otherwise vegetated and undeveloped area. Once constructed, the C-HC Project would require maintained vegetation within the 260-foot-wide ROW. The edge of the ROW would introduce lines on the landscape that are inconsistent with other nearby vegetated areas of the Refuge. To help convey the types of impacts to scenic resources within the Refuge, visual simulations are presented for each action alternative in Section 3.11. Refer to Figure 3.11-23 through Figure 3.11-30, and Figure 3.11-33 through Figure 3.11-34 for representations of how the alternatives would modify the existing viewshed within the Refuge.

Retirement of Dairyland's N-9 transmission line would create direct short-term effects to visual resources within the Refuge by introducing vehicles, equipment, materials, and a workforce during the construction period. Viewers would temporarily witness the decommissioning activities resulting in moderate temporary visual impacts to the natural landscape. Visual effects from construction activities and decommissioning would be short-term, anticipated to last 2 months, and these effects would be minor.

The removal of the N-9 transmission line would result in a long-term beneficial impact to visual quality and aesthetics in the Refuge due to the removal of transmission line structures and the natural revegetation of the previously maintained ROW, which is consistent with the natural rural character of the area.

3.14.2.4 ALTERNATIVE 1

Under Alternative 1, the C-HC Project would cross the Refuge via a new ROW, directly across the Mississippi River from the Nelson Dewey Substation. Either Segment B-IA1 or B-IA2 could be used to cross the Refuge under Alternative 1. Low-profile H-frame structures with a height of 75 feet would be used to cross the Refuge. Taller (approximately 196 feet), tubular steel, H-frame support structures would be placed near the Mississippi River crossing, so the transmission line can span the channel and still provide adequate clearance for river-going vessels. Due to the low-profile structures, the ROW would be 260 feet wide. Under Alternative 1, the existing transmission line ROW in the Refuge, which crosses the Mississippi River at the Stoneman Substation, would be decommissioned and revegetated.

3.14.2.4.1 Geology and Soils

Under Alternative 1, the adverse impacts to sensitive soils within the Refuge would be moderate and long term if not immediately repaired. With repair, adverse impacts would be moderate, short term, and generally limited to the construction limits. Table 3.14-5 summarizes the acres of impact to sensitive soils within the Refuge under Alternative 1, for both Segment B-IA1 and Segment B-IA2.

Table 3.14-5. Alternative 1 Temporary Sensitive Soil Impacts within the Refuge

	Segment B-IA1 Within ROW (acres)	Segment B-IA1 Outside ROW within 300-foot Corridor (acres)	Segment B-IA2 Within ROW (acres)	Segment B-IA2 Outside ROW within 300-foot Corridor (acres)
Refuge Analysis Area	39	6	44	6
Sensitive Soil Type				
Severe Erosion Potential	0	0	0	0
Shallow Soils	0	0	0	0
Wet Soils	39	6	43	6
Steep Slopes	0	0	0	0

3.14.2.4.2 Vegetation, Including Wetlands and Special Status Plants

Alternative 1 would result in the temporary or permanent removal, degradation, or alteration of vegetation within the Refuge as shown in Table 3.14-6. The primary land cover class within the Refuge along Alternative 1 is wetland. This vegetation class would be directly impacted by construction and maintenance of the C-HC Project within the ROW. Within these acres, effects described Impacts Common to All Action Alternatives would be expected to occur.

Alternative 1 would cross a total of 12 identified wetlands within the Refuge along Segment B-IA1, including 38 acres of wetland within the ROW, and approximately 6 acres of wetland outside the ROW but within the analysis area (see Table 3.14-6). A total of approximately <0.1 acre of wetland would be permanently impacted within the Refuge due to tree clearing, with an additional <0.1 acre of wetland permanently impacted by fill activities associated with transmission line structures. Temporary impacts to wetlands within the Refuge are estimated to be 38 acres under Segment B-IA1. Indirect impacts to wetlands within the Refuge are estimated to be 6 acres under Segment B-IA1.

Alternative 1 would cross a total of 15 identified wetlands within the Refuge along Segment B-IA2, including 41 acres of wetland within the ROW, and <1 acre of wetland outside the ROW but within the analysis area (see Table 3.14-6). A total of approximately 1 acre of wetland would be permanently impacted within the Refuge due to tree clearing, with an additional <0.1 acre of wetland permanently impacted by fill activities associated with transmission line structures. Temporary impacts to wetlands within the Refuge are estimated to be 40 acres under Segment B-IA2. Indirect impacts to wetlands within the Refuge are estimated to be <1 acre under Segment B-IA2.

Table 3.14-6. Alternative 1 Refuge Wetland Impacts

Permanent Impacts	**B-IA1 Wetland Acres**	**B-IA2 Wetland Acres**
Forested Wetlands Cleared within ROW	<0.1	1
Wetland Filled due to Placement of Structures	<0.1	<0.1
Total Permanent Impacts	**0.1**	**1**
Temporary or Indirect Impacts	**Wetland Acres**	**Wetland Acres**
Non-Forested Wetlands within ROW (Temporary)	38	40
Wetlands Outside ROW, within Analysis Area (Indirect)	6	<1

Impacts to wetlands would be considered moderate under either Segment B-IA1 or B-IA2. The alteration or removal of vegetation would be measurable and would affect individual plants and local populations. Fragmentation of the young forest community would adversely alter the functions of vegetation. Effects would not be expected to affect regional populations, as they would be limited to discrete footprints within the Refuge.

It is important to note that both Segment B-IA1 and Segment B-IA2 would cross the Turkey River restoration area (see Figure 3.14-1). Segment B-IA1 would cross approximately 23 acres of the restoration area in a diagonal pattern, resulting in habitat fragmentation of the restoration area. Segment B-IA2 would cross approximately 27 acres of the restoration area while following along the edges of the restoration area, reducing the amount of fragmentation within the restoration area. Currently, the vegetation in this area could best be characterized as young forest, as most of the trees present are less than 15 years old. The USFWS intends to manage this restoration area so that natural forest regeneration and succession results in much of the Turkey River floodplains' growing into bottomland forest within 100 years. Due to this management objective, it is estimated that Segment B-IA1 would result in future fragmentation of 23 acres of mature forested wetland in a diagonal pattern across the Turkey River restoration area. It is estimated that Segment B-IA2 would result in future fragmentation impacts of 27 acres of mature forested wetland along the edges of the Turkey River restoration area.

Beneficial impacts to vegetation would occur within the Refuge under Alternative 1 because the existing 161-kV transmission line ROW (approximately 14 acres) would be retired, and the Utilities would restore the abandoned ROW with native vegetation in accordance with USACE and USFWS requirements. Revegetation of the existing utility ROW would result in long-term beneficial impacts to the forested wetland community, as the area would return to surrounding vegetative conditions over the next 25 to 50 years.

No special status plants have been identified within proposed ROW through the Refuge for Alternative 1.

3.14.2.4.3 Wildlife, Including Special Status Species

There are 38 acres of wetland and 1 acre of open water habitat within the proposed permanent ROW of Segment B-IA1, and 40 acres of wetland and 4 acres of open water habitat within the proposed permanent ROW of Segment B-IA2. Non-forested wetland habitat would experience temporary disturbance during construction, though these impacts would be minimized through the measures described in Section 3.1, Table 3.1-4. Permanent impacts to non-forested wetlands would also occur under Alternative 1, where transmission line structures are placed. As discussed above under Vegetation, both Segment B-IA1 and Segment B-IA2 would cross the Turkey River restoration area (see Figure 3.14-), resulting in 23 acres and 27 acres, respectively, of habitat fragmentation within an area managed for mature bottomland forest within 100 years. Due to this management objective, it is estimated that Segment B-IA1 would result in future fragmentation of 23 acres of mature forested wetland in a diagonal pattern across the Turkey River restoration area. It is estimated that Segment B-IA2 would result in future fragmentation impacts of 27 acres of mature forested wetland along the edges of the Turkey River restoration area. Habitat fragmentation would adversely impact forest interior species that need large contiguous tracts of forest to complete their life cycles.

Construction of Segment B-IA1 would result in 1.2 miles of new transmission line through the Refuge, and construction of Segment B-IA2 would result in 1.4 miles of new transmission line through the Refuge. Both segments could pose a new collision risk to raptors and other large birds, although low-profile structures are intended to minimize the risk of bird collisions in the Refuge. Other environmental commitments to avoid or minimize impacts to wildlife within the Refuge are listed in Table 3.1-4.

Two inactive bald eagle nests are known to occur within close proximity of Alternative 1, the closest of which is approximately 45 feet from Segments B-IA1 and B-IA2. The second inactive next is approximately 985 feet from Segments B-IA1 and B-IA2. No adverse impacts to nesting bald eagles are expected since these nests have been inactive for the past several years. If eagles were to begin using these nests, Refuge-imposed restrictions on construction would be required. Those restrictions would minimize impacts on nesting eagles through a 660-foot exclusion zone requirement around the nests and limiting construction within the Refuge to periods outside the eagle nesting season (typically January 15 to June 15).

Beneficial impacts to wildlife would occur within the Refuge under Alternative 1 because the existing 161-kV transmission line ROW (approximately 14 acres) would be retired, and the Utilities would restore the abandoned ROW with native vegetation in accordance with USACE and USFWS requirements. Revegetation of the existing utility ROW would result in long-term beneficial impacts to the forest-dependent wildlife species, as the area would return to forested conditions over the next 25 to 50 years.

The retirement of the N-9 transmission line would result in a permanent beneficial impact to wildlife within the Refuge under Alternative 1. After the removal of the structures and transmission line, the ROW would be abandoned, and no transmission line infrastructure would remain in this location. Abandonment and restoration of the ROW in the retired N-9 ROW would reduce habitat fragmentation over the long term as the ROW is gradually revegetated through active habitat restoration efforts and/or natural succession. In the short term, the effects of habitat fragmentation on wildlife uses would remain.

3.14.2.4.4 Land Use, Including Agriculture and Recreation

Temporary moderate impacts would occur to land use within the Refuge during construction. Approximately 39 acres of new ROW for Segment B-IA1 and 44 acres of new ROW for Segment B-IA2 would be constructed through the Refuge under Alternative 1. Alternative 1 would adversely impact recreational users, especially car ferry customers, during construction by limiting access to a portion of the Refuge and the Mississippi River, introducing noise from construction equipment and contractors, changing the land use of the ROW area, and altering the visual environment from an undeveloped landscape to a developed landscape. Most of these adverse impacts would last the duration of construction. Recreation activities are expected to return to preconstruction levels after construction ends. Permanent moderate impacts would occur in the Refuge from the C-HC Project as the character of the area near Oak Road would be changed and user experience would be impacted.

Beneficial impacts would also occur to the Refuge under Alternative 1. The existing transmission line ROW near the Mississippi River at the Stoneman Substation would be removed and reclaimed. Decommissioning and removing the existing utility line would limit users access and recreational opportunities to this area during reclamation activities. Reclamation of this area to pre-transmission line conditions would enhance user experiences in this area by providing an undeveloped landscape over the long term.

There are no Refuge lands under agricultural production within the analysis area; therefore, impacts to Refuge agricultural programs would not occur under Alternative 1. One private inholding within the Refuge continues to be actively farmed; however, the inholding would not be impacted by either Segment B-IA1 or Segment B-IA2.

3.14.2.4.5 Visual Quality and Aesthetics

Detailed analysis and visual simulations for the Refuge are presented in Section 3.11, and the following paragraphs summarize the analysis in that section.

Under Alternative 1 (for both Segment B-IA1 and Segment B-IA2), long-term, major adverse impacts to scenic resources within the Refuge would occur from the C-HC Project. Viewers traveling along Oak Road would see new transmission line structures and conductors in the middle-ground, and these changes to the characteristic landscape would dominate the landscape and detract from current user activities. At the Mississippi River, where the C-HC Project would cross the Refuge and connect to the Nelson Dewey Substation, the C-HC Project would result in additional visual impacts to visitors, fishermen, and wildlife photographers as well as car ferry users in this area, particularly on the south side of the river. Due to the amount of development already occurring within this viewshed, the visual resource impacts to the Refuge from the C-HC Project would be long term and moderate. Proposed changes would attract attention, but would not dominate the landscape. User activities would remain unaffected.

Under Alternative 1, the Utilities would remove the existing transmission lines that cross the Mississippi River at the Stoneman Substation because the ROW would be shifted north on the river to the Mississippi River crossing at the Nelson Dewey Substation. The existing ROW would no longer be used as a utility ROW, and the Utilities would restore the abandoned ROW with native vegetation in accordance with USACE and USFWS requirements. The revegetation of the existing ROW would be a beneficial long-term visual impact to the Refuge as well as the observers looking into the Refuge from Cassville, Wisconsin.

3.14.2.5 ALTERNATIVE 2

Under Alternative 2, the C-HC Project would cross the Refuge within the existing transmission ROW, which is 150 feet wide and approximately 14 acres across the Refuge. As with Alternative 1, low-profile H-frame structures with a height of 75 feet would be used to cross the Refuge. Taller (approximately 196 feet), tubular steel, H-frame support structures would be placed near the Mississippi River crossing, so the transmission line can span the channel and still provide adequate clearance for river-going vessels. Due to the low-profile structures, the existing ROW would be widened to 260 feet.

3.14.2.5.1 Geology and Soils

Under Alternative 2, the adverse impacts to sensitive soils within the Refuge would be moderate and long-term if not immediately repaired. With repair, adverse impacts would be moderate, short term, and generally limited to the impact area. Table 3.14-7 summarizes the acres of impact to sensitive soils within the Refuge under Alternative 2.

Table 3.14-7. Alternative 2 Temporary Sensitive Soil Impacts within the Refuge

	Within ROW (acres)	Outside ROW within 300-foot Corridor (acres)
Total Area	46	7
Sensitive Soil Type		
Severe Erosion Potential	0	0
Shallow Soils	0	0
Wet Soils	44	6
Steep Slopes	0	0

3.14.2.5.2 Vegetation, Including Wetlands and Special Status Plants

Alternative 2 would result in the temporary or permanent removal, degradation, or alteration of vegetation within the Refuge, as shown in Table 3.14-8. The primary land cover class within the Refuge along Alternative 2 is wetland, and approximately 14 acres have been maintained as a utility ROW for several decades. The vegetation communities within the existing ROW would continue to be managed as non-forested wetlands through maintenance activities. Approximately 33 acres of additional wetland (both forested and non-forested) would be crossed by the C-HC Project, which would have a wider 260-foot-wide ROW to accommodate the low-profile structures in the Refuge. Within these acres, effects described under Impacts Common to All Action Alternatives would be expected to occur.

Alternative 2 would cross a total of 20 identified wetlands within the Refuge along Segment C-IA, including 46 acres of wetland within the ROW, and <1 acre of wetland outside the ROW but within the analysis area (see Table 3.14-8). A total of approximately 12 acres of wetland would be permanently impacted within the Refuge due to tree clearing, with an additional <0.1 acre of wetland permanently impacted by fill activities associated with transmission line structures. Temporary impacts to wetlands within the Refuge are estimated to be 46 acres. Indirect impacts to wetlands within the Refuge are estimated to be <1 acre.

Table 3.14-8. Alternative 2 Refuge Wetland Impacts

Permanent Impacts	Wetland Acres
Forested Wetlands Cleared within ROW	12
Wetland Filled due to Placement of Structures	<0.1
Total Permanent Impacts	**12**
Temporary or Indirect Impacts	Wetland Acres
Non-Forested Wetlands within ROW (Temporary)	46
Wetlands Outside ROW, within Analysis Area (Indirect)	<1

Impacts to wetlands would be considered moderate. The alteration or removal of vegetation would be measurable and would affect individual plants and local populations. Fragmentation of the mature forest community would continue along the utility ROW and expanded from the existing 150-foot-wide ROW corridor to 260-foot-wide corridor. Effects would not be expected to affect regional populations, as they would be limited to discrete footprints within the Refuge.

No special status plants have been identified within proposed ROW through the Refuge for Alternative 2.

3.14.2.5.3 Wildlife, Including Special Status Species

There are 46 acres of wetland habitat within the proposed permanent ROW of Alternative 2, along Segment C-IA. The current transmission line ROW is approximately 14 acres within the Refuge. Therefore, Segment C-IA would expand the amount of transmission line ROW by approximately 33 acres through the Refuge. Non-forested wetland habitat would experience temporary disturbance during construction, though these impacts would be minimized through the measures described in Section 3.1, Table 3.1-4. The permanent conversion of approximately 12 acres of forested wetland habitat would occur under Alternative 2, which would result in an adverse impact to wildlife that depend on forested habitat. Under Alternative 2, habitat fragmentation of the forested wetland surrounding Segment C-IA would continue for the life of the C-HC Project, thereby resulting in long-term adverse effects on forest-obligate species. Fragmentation would alter the functions of this habitat type in providing migratory habitat for neo-tropical bird species as well as nesting habitat for a variety of resident bird species.

Construction of Alternative 2 would result in approximately 1.5 miles of transmission line through the Refuge, within an existing transmission line corridor. The additional conductors could pose a new collision risk to raptors and other large birds, although low profile structures are intended to minimize the risk of bird collisions in the Refuge. Other wildlife impact minimization measures applicable to the Refuge are listed in Table 3.1-4.

Two inactive bald eagle nests are known to occur within close proximity of Alternative 2, the closest of which is approximately 4,450 feet from Segment C-IA. The second inactive next is approximately 4,940 feet from Segment C-IA. Adverse impacts to nesting bald eagles are not expected to occur under Alternative 2 due to the distance between the nests and the C-HC Project.

3.14.2.5.4 Land Use, Including Agriculture and Recreation

Temporary minor impacts would occur to land use within the Refuge during construction. Approximately 46 acres of ROW would be constructed through the Refuge under Alternative 2, following the existing transmission line ROW. Construction activities would temporarily impact both land cover and recreational users by limiting access to a small portion of the Refuge and the Mississippi River, generating noise associated with construction equipment, changing the land use of the ROW area, and altering the visual environment. Most of these adverse impacts would last the duration of construction. Recreation activities are expected to return to preconstruction levels after construction ends and land use with the transmission line ROW would not change since Alternative 2 follows an existing transmission line ROW. No permanent impacts would occur as the new power line would occur in an existing power line ROW.

There are no Refuge lands under agricultural production within the analysis area; therefore, impacts to Refuge-managed agricultural practices would not occur under Alternative 2.

3.14.2.5.5 Visual Quality and Aesthetics

Detailed analysis and visual simulations for the Refuge are presented in Section 3.11, and the following paragraph summarizes the analysis in that section.

Under Alternative 2, the existing transmission line that crosses the river at the Stoneman Substation would be replaced with a low-profile H-frame structure resulting in a minor impact to viewers and recreational users at this location from the C-HC Project. Minor changes in the existing transmission ROW due to vegetation maintenance and the low-profile structures could attract attention but would not dominate the view or detract from current user activities.

3.14.2.6 ALTERNATIVE 3

Under Alternative 3, impacts to resources within the Refuge would be the same as Alternative 2.

3.14.2.7 ALTERNATIVE 4

Under Alternative 4, impacts to resources within the Refuge would be the same as Alternative 2.

3.14.2.8 ALTERNATIVE 5

Under Alternative 5, impacts to resources within the Refuge would be the same as Alternative 1.

3.14.2.9 ALTERNATIVE 6

Under Alternative 6, impacts to resources within the Refuge would be the same as Alternative 1.

3.14.3 *Summary of Impacts*

Table 3.14-9 summarizes the impacts to sensitive soils, vegetation, wetlands, and their associated habitats within the Refuge from the action alternatives. Because Alternatives 1, 5, and 6 would cross the Refuge in the same location (either Segment B-IA1 or B-IA2), along the new ROW near the Nelson Dewey Substation, their impacts are the same. Alternatives 2, 3, and 4 would cross the Refuge in the same location (Segment C-IA), along the existing transmission line ROW, and would have the same impacts.

Table 3.14-9. Impact Summary Table for the Upper Mississippi River National Wildlife and Fish Refuge

	ROW within Refuge (acres)	Temporary Impacts to Sensitive Soils within ROW (acres)	Permanent Forest Removal within ROW (acres)*	Temporary Wetland Impacts within ROW (acres)	Permanent Wetland Impacts within ROW (acres)	Permanent ROW in restoration area (acres)	Associated Action Alternative
Segment B-IA1	39	39	0	38	0.1	23	1, 5, 6
Segment B-IA2	44	44	1	40	1	27	1, 5, 6
C-IA	46	44	12	46	12	0	2, 3, 4

* Permanent impacts to forested wetlands are defined based on the existing vegetation conditions within the proposed ROW. Permanent forest removal impacts and wetland Impacts presented for C-IA are the same 12 acres.

Under Alternatives 1, 5, and 6, Segment B-IA1 and Segment B-IA2 would result in future fragmentation of 23 acres and 27 acres, respectively, of mature forested wetland within the Turkey River restoration area. In addition, under Alternatives 1, 5, and 6, approximately 14 acres of the existing 161-kV transmission line ROW would be revegetated, resulting in a long-term beneficial impact to Refuge lands.

Under Alternatives 2, 3, and 4, the C-HC Project would expand the amount of transmission line ROW by approximately 33 acres through the Refuge.

3.14.3.1.1 Cultural and Historic Resources

No cultural resources have been identified within the analysis area; therefore, no impacts to cultural resources within the Refuge are expected to occur under any of the six action alternatives.

3.14.3.1.2 Land Use, Including Agriculture and Recreation

All action alternatives would result in short-term adverse impacts to land use and recreation during construction. Under Alternatives 1, 5, and 6, long-term moderate impacts would occur in the Refuge from the C-HC Project as the character of the Refuge near Oak Road would be changed, and user experience would be impacted. Beneficial impacts would occur under these alternatives as a result of removing and revegetation the existing transmission line ROW through the Refuge. Reclamation of this area to pre-transmission line conditions would enhance user experiences in this area by providing an undeveloped landscape over the long-term.

Under Alternatives 2, 3, and 4, long-term minor impacts would occur in the Refuge because the C-HC Project would be located along an existing transmission line ROW.

Construction activities for N-9 transmission line would temporarily impact land cover and recreational uses for the duration of the N-9 decommissioning. All current land uses along the N-9 transmission line would return to their original land uses and result in long-term beneficial impacts to vegetation, and eventually the vegetation communities would be consistent with surrounding land uses in the long term.

3.14.3.1.3 Visual Quality and Aesthetics

Under Alternatives 1, 5, and 6, major adverse impacts to scenic resources within the Refuge would occur from the C-HC Project at the Mississippi River crossing and along Oak Road. Beneficial impacts to viewers would occur from the Stoneman river crossing at the Cassville public landing KOP due to the removal of the existing transmission line and revegetation of the ROW.

Under Alternatives 2, 3, and 4, minor impacts to scenic resources within the Refuge would occur from the C-HC Project.

Retirement of Dairyland’s N-9 transmission line would create short-term visual effects during the 2 months of decommissioning activities and would result in a long-term beneficial impact to visual quality and aesthetics.

3.14.3.2 ADDITIONAL ENVIRONMENTAL COMMITMENTS

At this time, no additional environmental commitments for the Refuge have been identified beyond what is provided in Section 3.1, Table 3.1-4. Ongoing coordination with USFWS and USACE would result in the identification of additional mitigation measures, including measures to offset the loss of floodplain forest acreage and functionality, which would result under all action alternatives. Issuance of a ROW permit and/or easement to cross the Refuge would require complete mitigation of any unavoidable impacts. Acceptable mitigation in an approved location and manner would need to be included with any request for use of Federal lands.