Appendix D: Briggs Road-Marshland 161 kV Rebuild Transmission Study

Briggs Road-Marshland 161 kV Rebuild Study

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1.0 Background and Purpose

Dairyland Power Cooperative's (DPC) Q-1 line is a 161 kV line that was constructed in 1951. The Q-1D currently connects Xcel Energy's (XEL) Marshland substation to La Crosse Tap where the line goes to XEL La Crosse and the DPC Genoa substation. In the future the line will terminate at the XEL Briggs Road substation on the north side of La Crosse, Wisconsin.

The CapX2020 Hampton-Rochester-La Crosse Line (HRL) is an approved 345 kV line from Hampton, Minnesota to a new Briggs Road substation on the north side of La Crosse, Wisconsin. The Q-1D has been a known candidate for replacement by DPC; however, during the HRL routing process, utilizing the Q-1D right-of-way (ROW) was an option for routing the line into the La Crosse, Wisconsin area. The Wisconsin Public Service Commission (WPSC) has decided on a final route for the HRL line. The line will follow DPC ROW in several locations in Minnesota and Wisconsin. For the Q-1D, the line will turn east on new ROW after utilizing 1.6 miles of the DPC Q-1D south of Marshland. That final HRL routing leaves DPC with 13.4 miles of Q-1D that is in need of replacement.

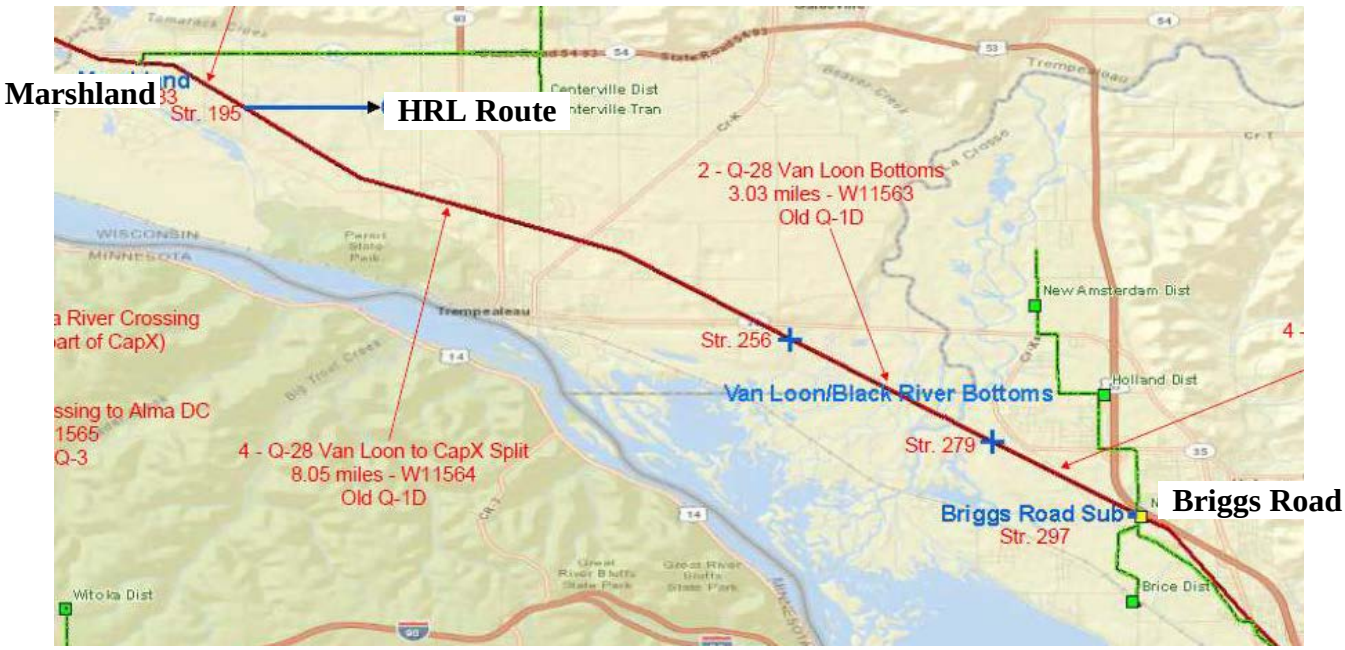


Figure 1 – Marshland-Briggs Road Area

2.0 Existing Facilities and Reliability History

The existing 161 kV line is summarized in Table 1. The line is 15.0 miles of H-frame construction with 336 ACSR conductor. In 1988, this line was uprated from 120 to 212 degrees F design temperature primarily by raising cross arms and installing extensions for the static wires. The summer rating is 162 MVA and the winter rating is 211 MVA. Both ratings are the full rating of the existing conductor. This line has been in service for 62 years and is in poor

condition. In recent years there has been an increase in the amount of maintenance required on this line.

Marshland-Briggs Road 161 kV Line			
Facilities	**Conductor Size**	**Miles**	**Year Installed**
Marshland-Briggs Road	336 ACSR	15.0	1951

Table 1 - Existing Marshland-Briggs Road

The Q-1D has had some recent history of reliability issues. The ROW is typically not along road ROW, making some pole locations difficult to access during an outage. In 2002 a structure failed in the Van Loon Wildlife area. At the time temporary upgrades were made, with the knowledge that the HRL line could possibly utilize this DPC ROW. More recently, DPC had a structure fail in 2012, also in the Van Loon Wildlife Area. Once again, a temporary upgrade was done to get by until a complete rebuild can be scheduled. The most recent event in 2013 occurred when burn marks on three separate structures were identified by the maintenance crews in the area. These three structures were maintained and reinforced as a temporary measure until the final line upgrade is complete.

3.0 Load Serving Need and Alternatives

Three alternatives were reviewed for replacing the Marshland-Briggs Road 161 kV line. Alternative 1 is to rebuild the line on existing ROW. The existing line would be upgraded with a new 161 kV conductor, 795 ACSS, and structures would be replaced with steel structures. This alternative is estimated at $12,888,000. Because access through the Black River bottoms is difficult, a detailed study was done by DPC to review Q-1 routing options in this area. The Dairyland Power Cooperative Q-1 Rebuild Comparison Alternatives document from September 2011 documented and compared several routing alternatives for this line through the Black River bottoms. The study found that the least cost option for routing the Marshland-Briggs Road line is on the existing ROW. An option to bring the line closer to Highway 53 cost $17,200,000, approximately $4,500,000 more than a rebuild on the existing centerline. A summary of the reviewed options is in Appendix A. Note that a rebuild on existing ROW in the 2011 study estimated the cost to be $10,500,000.

Alternative 2 reviewed the possibility of DPC retiring this Marshland-Briggs Road 161 kV line. The Marshland end of the Marshland-Briggs Road 161 kV line is a 161/69 kV substation that primarily serves the load of Winona and Goodview, Minnesota. Xcel Energy's HRL justification filings estimated this load at 99.5 MW during the 2011 summer peak. Although a new 345 kV line is being built in the area, retiring Marshland-Briggs Road is not an option. That alternative would leave only a single 161 kV line from Alma serving Marshland. Loss of the 161 kV line would result in the Winona area being served from the 69 kV transmission system via remote sources at Tremval, Alma, and La Crosse. During summer peak loads, voltages in the area under this contingency are below acceptable levels and are in the 82.6% range, below

DPC's minimum voltage level of 90%. Note that the Winona area is already highly compensated with 69 kV capacitors.

A third alternative was reviewed. Alternative 3 includes adding a 345/161 kV transformer at Marshland. This option would provide a second source at Marshland and allow DPC to retire the Marshland-Briggs Road 161 kV line. Several hurdles prevent this option from being a viable plan. The existing Q-1D carries fiber in one of the static wires for a communications company. DPC is required to keep this fiber in-service into the future, preventing a retirement. In addition, if DPC were to install a new 345/161 kV transformer and interconnect to XEL Marshland, due to NERC standards, DPC would be required to have a spare transformer on hand, or study the system as-if this equipment is out-of-service due to it being a long lead time piece of equipment. The cost estimate to build the 345/161 kV interconnection at Marshland and retain a backup 345/161 kV transformer is $16,700,000.

Marshland-Briggs Road Alternative Costs	
Alternative	**Cost in 2013 Dollars**
Alternative 1	$12,888,000
Alternative 2	Not Viable
Alternative 3	$16,700,000

Table 2 – Marshland-Briggs Road Alternative Costs

4.0 Recommended Plan to Replace Marshland-Briggs Road

The Q-1D line is one of the oldest 161 kV lines on the DPC system. The HRL line routing has been completed and will not be utilizing the DPC ROW for 13.4 miles between Marshland and Briggs Road. Recent reliability issues have supported the claim that this line is in poor condition and is in need of replacement.

Three options were reviewed as alternatives to replace this 161 kV line. Retiring the line is not a viable option because the remaining system in the area would not be able to serve the local load. A new 345/161 kV transformer and interconnection with XEL could potentially allow DPC's line to be retired, but this option has several issues, including the fact that it is a higher cost option.

The recommended plan is to replace Marshland-Briggs Road 161 kV line on the existing ROW between Marshland and Briggs Road. The rebuild should include an upgrade in conductor to 795 ACSS, which would match the line capacity for the 161 kV line that is being replaced as part of the HRL project. Replacing this line with new poles and larger conductor will ensure reliable service to the Winona load and La Crosse area load both during HRL construction outages and in the long term future. The new line number for this line will be the Q-28. A one-line of the project is in Appendix B.

For construction timing, DPC should plan to utilize the approval from the U.S. Fish and Wildlife Service to replace this line across their property (the Van Loon Wildlife Area) in fall of 2014 as it fits into the proposed HRL scheduled outages in Wisconsin. The remaining sections of this line will be coordinated with the HRL outage schedule and is scheduled to be replaced in 2015.

Marshland-Briggs Road Recommended Plan			
Facilities	**Conductor Size**	**Miles**	**Year Installed**
Marshland-Briggs Road	795 ACSS	13.4	2014/2015

Table 3 – Marshland-Briggs Road Recommended Plan

Appendix A – Q-1 Routing Alternatives from Q-1 Technical Memorandum

As shown in **Table 1**, Section B of the Q-1 Rebuild on the existing alignment would occur if the CapX Project is constructed on any of the following routes:

- Arcadia Route
- Arcadia–Ettrick Route

3.3 Section C – Trempealeau to Holmen

Section C is the southernmost section of the Q-1 line and includes a crossing of the Black River floodplain. At the request of RUS and the US Fish & Wildlife Service (USFWS), four alternatives have been studied for this section of the Q-1 Rebuild (Table 4). These alternatives represent the only available alternatives for re-routing of the Q-1 line that comply with Wisconsin's Siting Statutes that prioritize the use of existing corridors.

Table 4: Q-1 Rebuild Options – Section C – Trempealeau to Holmen

Q-1 Rebuild Alternative Name	Length (Miles)	Cost	Existing Infrastructure at Black River
Existing Q-1 Alignment	13.2	$ 10,500,000	Q-1 161 kV line
Highway 35 Route	15.0	$ 12,200,000	WI-35
Seven Bridges Route	16.2	$ 15,800,000	Xcel Energy 69 kV line
Galesville Route (double-circuit with CapX Project)	19.9	$ 14,900,000	WI-53/93
Galesville Route (single-circuit)	19.9	$ 17,200,000	WI-53/93

As shown in Table 1, the Section C rebuild on one of the four identified routes would occur if the CapX Project is constructed on any of the following routes:

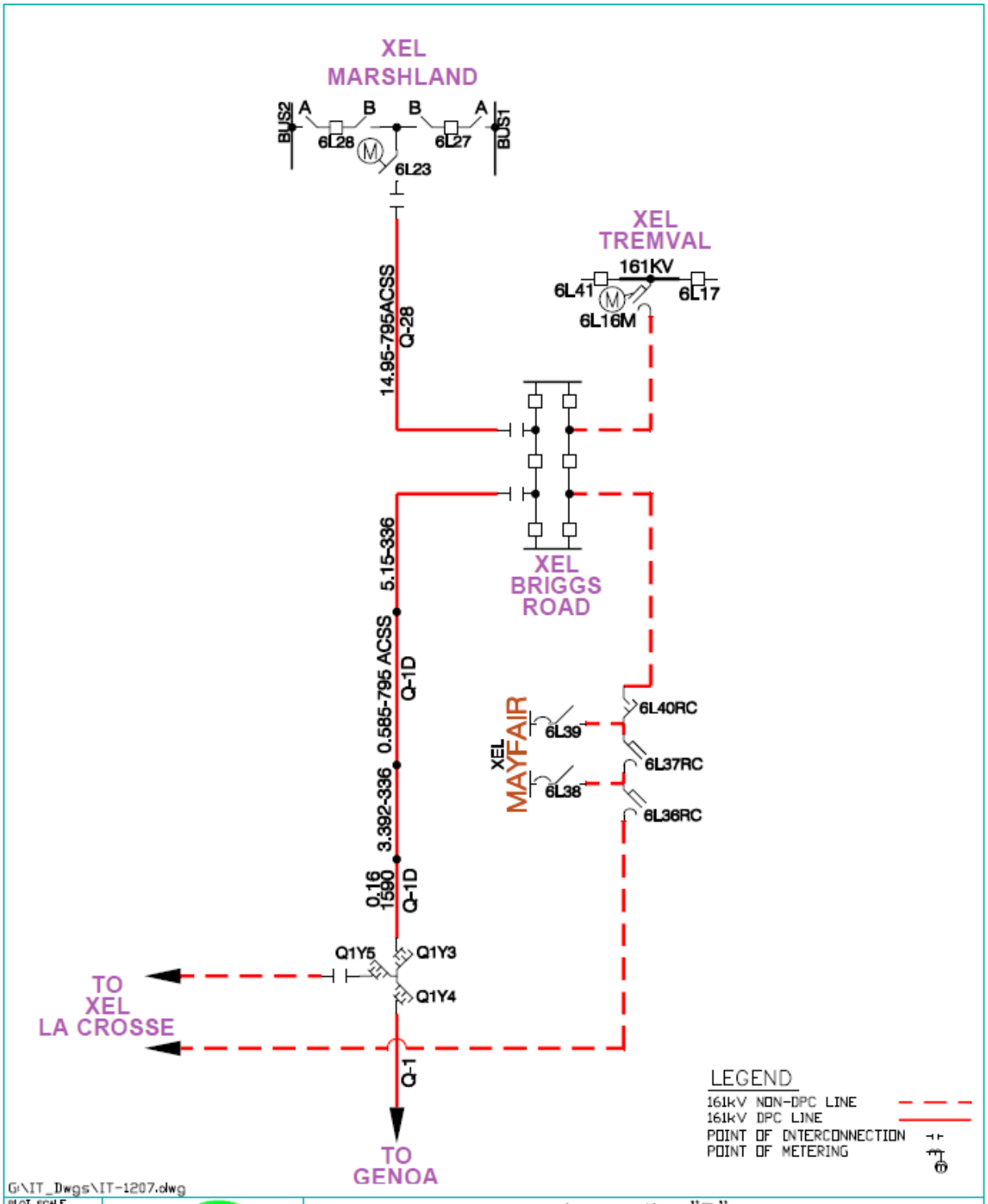
- Arcadia Route
- Arcadia–Ettrick Route
- Q1–Galesville Route

4.0 Environmental Impacts Associated with Alternative Routes for Q-1 Rebuild

4.1 Existing Q-1 Alignment (Sections A-C)

This scenario assumes that the Q-1 Rebuild would occur along the existing Q-1 alignment (**Figure 2**). The width of the right-of-way would be determined by the USFWS permit. For this analysis, Dairyland is assuming a 100-foot right-of-width. The proposed construction plan developed by Dairyland to minimize impacts along this route is included as **Appendix B**.

Appendix B – One-Line Drawing of Marshland-Briggs Road Line Rebuild, Q-28



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PLOT SCALE		
NONE	DAIRYLAND POWER COOPERATIVE	Appendix "B" Marshland to Briggs Road Rebuild
DATE 4/10/13		

Appendix E: Dairyland Power Cooperative Q-1 161 kV Transmission Line Rebuild Comparison of Alternatives

DAIRYLAND POWER COOPERATIVE
Q-1 REBUILD
COMPARISON OF ALTERNATIVES

Technical Memorandum

November 8, 2011

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A Q-1 161 kV Rebuild (Black River Floodplain), Proposed Construction Plan

B Q-1 Rebuild Environmental Sheet Maps

1.0 Introduction

This memorandum provides an analysis of options to rebuild the Alma and Holmen segment of the existing Dairyland Power Cooperative (Dairyland) Genoa – Alma 161 kV line (Q-1 Line). Environmental impacts associated with the Q-1 rebuild are summarized, the need for the rebuild project is discussed, and how portions of the Q-1 line may be rebuilt by the CapX Project is described. The specific area of focus is where the Q-1 line crosses the Black River floodplain near Holmen, Wisconsin. In this area, the existing Q-1 line passes through approximately one mile of Federal Refuge Property. The USFWS has indicated that they cannot permit the rebuild of the Q-1 line on Refuge Property unless there is no practicable alternative.

The Q-1 line was constructed in 1950 and is 71 miles long. The transmission line consists of three segments as follows (north to south):

- Alma–Marshland–North La Crosse Substation (40 miles)
- North La Crosse Substation–La Crosse Tap (9 miles)
- La Crosse–Genoa Tap (21 miles)

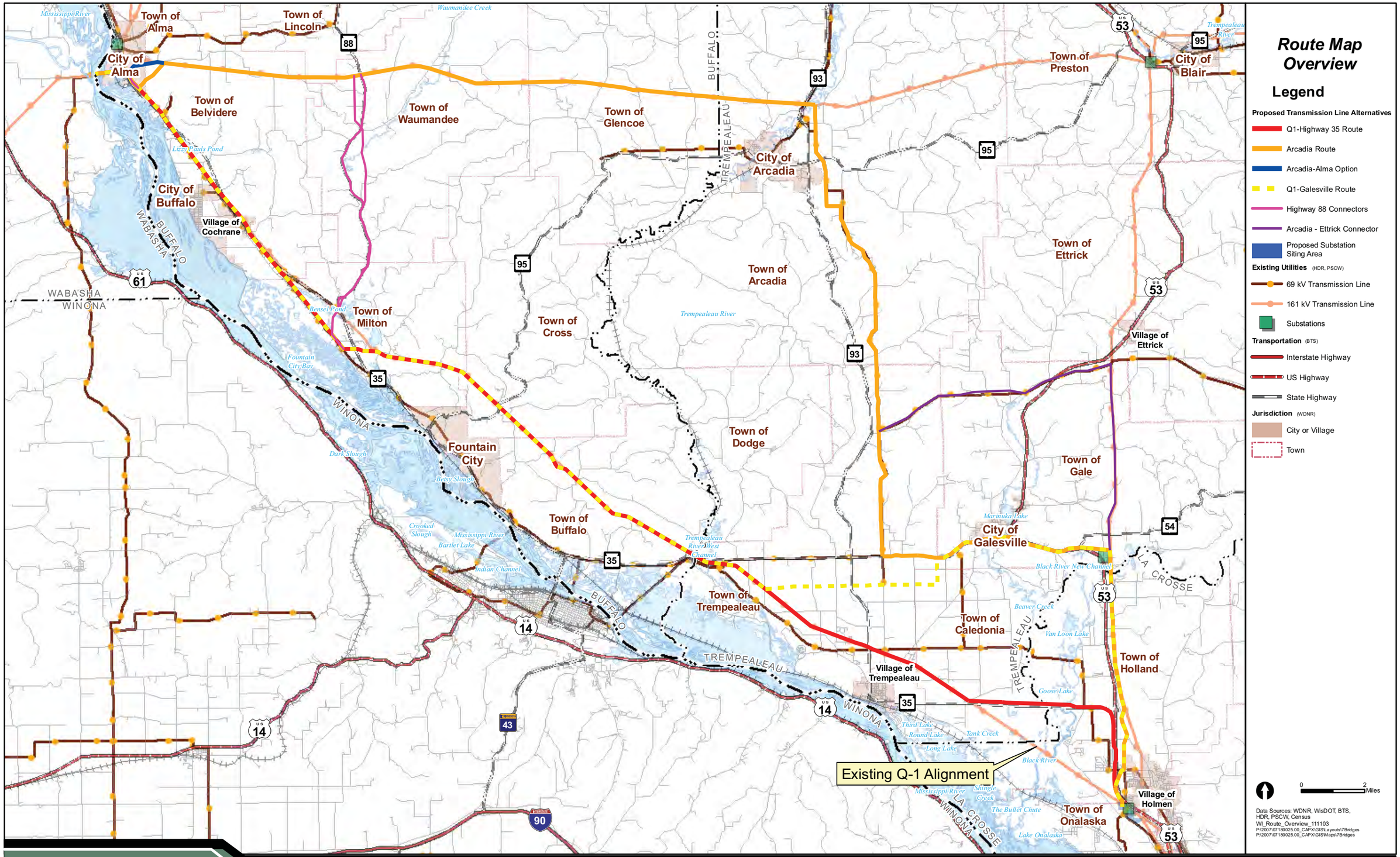
The Q-1 line is reaching the end of its service life and needs to be rebuilt to address the age and degraded condition of the transmission structures and conductors. Dairyland staff surveyed the Q-1 line between the Genoa Generating Station and La Crosse Tap and determined that a number of the existing transmission structures are rotting and are in danger of collapsing; this collapse could cause a loss in electrical service in the region. The survey findings are representative of the entire Q-1 line as the remaining sections were built at the same time with the same materials and design.

The Q-1 rebuild from Alma to Genoa has been included in three Rural Utilities Service (RUS) Transmission Workplans: the 2006-2008 Workplan, the 2008-2010 Workplan and the 2010-2012 Workplan. All three workplans have been approved by the RUS.[1] On March 16, 2007 the RUS approved the Environmental Review for the rebuild of the Q-1 from La Crosse to the Genoa Tap. The project was postponed due to several 161 kV upgrades in Minnesota for wind development. Due to the delay, Dairyland has agreed to update and resubmit the environmental report for this segment of the Q-1 transmission line.

[1] In 2005, A rebuild of the Q-1 was also one of the local options studied to address load serving issues in the La Crosse area. A subsequent joint study by multiple utilities identified the CapX Project as the preferred option for meeting local and regional needs. This comprehensive solution is the project now under review.

The 40-mile section of the Q-1 line from Alma to the North La Crosse Substation includes a section that traverses the Black River floodplain. Some or all of this section of the Q-1 line may be co-located with the CapX2020 Hampton – Rochester – La Crosse 345 kV Transmission Line Project (CapX Project). For simplicity, this document refers to the Alma-North La Crosse section as the Q-1 Rebuild. Routing decisions for the CapX Project will result in either a complete rebuild of this 40- mile section, partial rebuild or no rebuild at all. This document provides a comparison of impacts related to rebuilding a segment of the Q-1 line along its current alignment in the Black River floodplain to other rebuild alternatives, including impacts to the human environment, the natural environment and the costs of each alternative. Costs of rebuilding the remaining segments on the existing alignment are also presented.

At the state level, in Wisconsin, the CapX Project route will be determined in a Certificate of Public Convenience and Necessity (CPCN) proceeding. A CPCN application for the CapX Project was submitted in January 2011 (Docket No. 5-CE-136). The PSCW is preparing a state EIS for the CapX Project and is responsible for selecting the route in Wisconsin. The PSCW process will include a hearing process in the winter of 2011/2012 during which public and agency comments are considered. The ability of the Wisconsin State route selection process arriving at a federally compatible approved route relies upon Federal agencies participating in the CPCN process. A decision is anticipated by June 2012. **Figure 1** shows the routes and route segments under consideration in the CPCN proceeding.



CapX2020

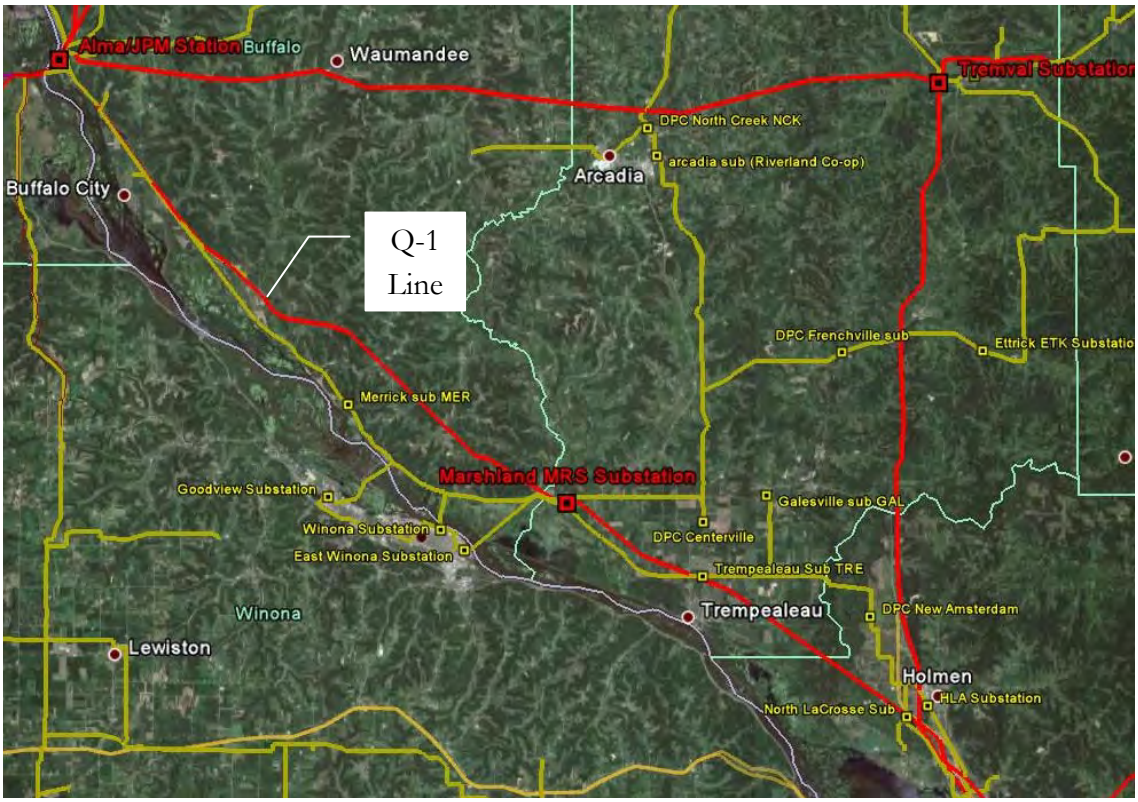
Hampton • Rochester • La Crosse 345 kV Transmission Project

Xcel Energy • Dairyland Power Cooperative • Rochester Public Utilities • WPPI Energy • Southern Minnesota Municipal Power Agency

Figure 1
Wisconsin CPCN Route Overview Map
November 2011

Figure 1 back

The Q-1 Rebuild needs to occur largely on its existing alignment because it serves as the power source to the Marshland 161/69 kV substation located 6 miles northwest of the Village of Trempealeau (see graphic below). At Marshland, the Q-1 feeds four 69 kV transmission lines that serve Xcel Energy and Riverland Energy Cooperative customers in the area and is a key source to the City of Winona, Minnesota. Routing the Q-1 line on a different alignment, such as to Arcadia, would leave the Marshland substation without a transmission power source.



2.0 Impact of CapX Project Route Selection

The federal EIS considers several route alternatives in Wisconsin. Each of these CapX routes would result in different portions of Q-1 line being rebuilt as part of the CapX Project. For clarity the Q-1 Rebuild options are described in three geographic sections labeled A, B and C and are discussed in more detail in Section 3.0. **Table 1** shows which section(s) require rebuild for various CapX Project routing choices.

It is important to note the WI-88 Connector is a partial segment for CapX Project, not a complete route. The WI-88 Connector is a potential modification to the Q1-Highway 35 and Q1-Galesville Routes. Therefore, if the CapX Project is routed on WI-88, it requires the Q-1 Section A rebuild.

Table 1: Q-1 Scenarios for Various CapX Project Routing Decisions

CapX Project Route or Segment	Post CapX Q-1 Rebuild Required (Miles)				Comment
	Q-1 Rebuild Total Length	Section A Alma-Milton	Section B Milton-Trempealeau	Section C Trempealeau-Holmen	
Complete CapX Routes					
Arcadia Route	39 to 46	10	16	13 to 20	Complete stand-alone rebuild of the Q-1 would be required. Length depends upon alternative.
Arcadia Ettrick Route	39 to 46	10	16	13 to 20	Complete stand-alone rebuild of the Q-1 would be required. Length depends upon alternative.
Q1-Highway 35 Route	0	0	0	0	CapX Project rebuilds entire Q-1.
Q1-Galesville Route	13 to 20	0	0	13 to 20	CapX Project rebuilds approximately 27 miles of the Q-1.
CapX Route Segment					
Highway 88 Connector	10	10	0	0	This length is added to the Q1-Highway 35 Route requirements or the Q1-Galesville Route requirements described above.

3.0 Q-1 Rebuild Options

Q-1 Rebuild scenarios are discussed in the sections below. A comprehensive cost summary of the CapX Project routes and Q-1 Rebuild scenarios are presented in **Table 2** (on page 9).

3.1 Section A – Alma to Milton

Section A runs from the Alma Substation to near the intersection of WI-35 and WI-88 in the Town of Milton. As shown in **Table 1**, Section A of the Q-1 Rebuild on the existing alignment would occur if the CapX Project is constructed on any of the following routes:

- Arcadia Route
- Arcadia–Ettrick Route
- Highway 88 Connector

In this section, Dairyland would propose to rebuild the Q-1 line on its existing alignment. This section is 10.2 miles long and estimated to cost $ 8,600,000 (**Table 3**).

Table 3: Q-1 Rebuild Option – Section A – Alma to Milton

Q-1 Rebuild Alternative Name	Length (Miles)	Cost
Existing Q-1 Alignment	10.2	$ 8,600,000

The cost assumes double-circuiting with a portion of an existing 69 kV line.

3.2 Section B – Milton to Trempealeau

Section B runs from WI-88 to where the Q-1 crosses Delaney Road southwest of Centerville, Wisconsin. In this section, Dairyland would propose to rebuild the Q-1 line on its existing alignment. This section is 16.6 miles long and estimated to cost $ 14,900,000 (**Table 4**). As shown in **Table 1**, Section B of the Q-1 Rebuild on the existing alignment would occur if the CapX Project is constructed on any of the following routes:

- Arcadia Route
- Arcadia–Ettrick Route

Table 4: Q-1 Rebuild Option – Section B – Milton to Trempealeau

Q-1 Rebuild Alternative Name	Length (Miles)	Cost
Existing Q-1 Alignment	16.2	$ 14,900,000

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Table 2
Cost Summary - Q-1 Rebuild Scenarios After CapX Project Route Determination

CapX Project			Q1 Rebuild Shaded Cells Below Are Integral and Inseperable CapX Project Costs (See Note 5)							Total Cost View	Comment
				Q1 Rebuild Summary			Q1 Rebuild Details By Section				
CapX 345 Route	CapX Total Cost	CapX Costs Less Q1 Assignment (See Note 4)	Q1 Rebuild Scenario	CapX Q1 Costs	Stand Alone (Dairyland Only) Q1 Rebuild Costs	Q1 Rebuild Total	Section A Alma - Milton	Section B Milton - Trempealeau	Section C Trempealeau - Holmen	CapX + Q1 Rebuild	
Q1	$ 188,767,000	$ 170,947,000	Existing Q1	$ 17,820,000		$ 17,820,000	$ 4,590,000	$ 7,290,000	$ 5,940,000	$ 188,767,000	CapX Q1 route rebuilds the Dairyland Q1 in its entirety
			Q1 - Hwy 35								
			Q1 - 7 Bridges								
			Q1 - Galesville								
Q1 - Highway 35	$ 194,590,000	$ 175,960,000	Existing Q1							$ 194,590,000	CapX rebuilds Q1 in its entirety. The base CapX proposal relocates the Q1 to Hwy 35 as mitigation for crossing the Black River bottoms wetland.
			Highway 35	$ 18,630,000		$ 18,630,000	$ 4,590,000	$ 7,290,000	$ 6,750,000		
			Seven Bridges								
			Galesville								
Q1 - Galesville	$ 202,065,000	$ 190,185,000	Existing Q1	$ 11,880,000	$ 10,500,000	$ 22,380,000	$ 4,590,000	$ 7,290,000	$ 10,500,000	$ 212,565,000	CapX rebuilds Sections A & B of the Dairyland Q1 line.
			Highway 35	$ 11,880,000	$ 12,200,000	$ 24,080,000	$ 4,590,000	$ 7,290,000	$ 12,200,000	$ 214,265,000	
			Seven Bridges	$ 11,880,000	$ 15,800,000	$ 27,680,000	$ 4,590,000	$ 7,290,000	$ 15,800,000	$ 217,865,000	
			Galesville double circuit with CapX	$ 11,880,000	$ 13,010,000	$ 24,890,000	$ 4,590,000	$ 7,290,000	$ 13,010,000	$ 215,075,000	
Arcadia	$ 224,355,000	$ 224,355,000	Existing Q1		$ 34,000,000	$ 34,000,000	$ 8,600,000	$ 14,900,000	$ 10,500,000	$ 258,355,000	CapX rebuilds zero miles of the Q1 line
			Highway 35		$ 35,700,000	$ 35,700,000	$ 8,600,000	$ 14,900,000	$ 12,200,000	$ 260,055,000	
			Seven Bridges		$ 39,300,000	$ 39,300,000	$ 8,600,000	$ 14,900,000	$ 15,800,000	$ 263,655,000	
			Galesville double circuit with CapX		$ 38,300,000	$ 38,300,000	$ 8,600,000	$ 14,900,000	$ 14,800,000	$ 262,655,000	
Arcadia - Ettrick	$ 233,570,000	$ 233,570,000	Existing Q1		$ 34,000,000	$ 34,000,000	$ 8,600,000	$ 14,900,000	$ 10,500,000	$ 267,570,000	CapX rebuilds zero miles of the Q1 line
			Highway 35		$ 35,700,000	$ 35,700,000	$ 8,600,000	$ 14,900,000	$ 12,200,000	$ 269,270,000	
			Seven Bridges		$ 39,300,000	$ 39,300,000	$ 8,600,000	$ 14,900,000	$ 15,800,000	$ 272,870,000	
			Galesville single circuit		$ 40,700,000	$ 40,700,000	$ 8,600,000	$ 14,900,000	$ 17,200,000	$ 274,270,000	
Hwy 88 - Q1 - Highway 35	$ 207,630,000	$ 193,590,000	Existing Q1								CapX rebuilds Sections B & C of Q1 line
			Highway 35	$ 14,040,000	$ 8,600,000	$ 22,640,000	$ 8,600,000	$ 7,290,000	$ 6,750,000	$ 216,230,000	
			Seven Bridges								
			Galesville								
Hwy 88 - Q1 - Galesville	$ 214,910,000	$ 207,620,000	Existing Q1	$ 7,290,000	$ 19,100,000	$ 26,390,000	$ 8,600,000	$ 7,290,000	$ 10,500,000	$ 234,010,000	CapX rebuilds Section B of the Q1 line
			Highway 35	$ 7,290,000	$ 20,800,000	$ 28,090,000	$ 8,600,000	$ 7,290,000	$ 12,200,000	$ 235,710,000	
			Seven Bridges	$ 7,290,000	$ 24,400,000	$ 31,690,000	$ 8,600,000	$ 7,290,000	$ 15,800,000	$ 239,310,000	
			Galesville double circuit with CapX	$ 7,290,000	$ 21,610,000	$ 28,900,000	$ 8,600,000	$ 7,290,000	$ 13,010,000	$ 236,520,000	
No CapX Project (if CapX is not authorized)			Existing Q1		$ 34,000,000	$ 34,000,000	$ 8,600,000	$ 14,900,000	$ 10,500,000		
			Highway 35		$ 35,700,000	$ 35,700,000	$ 8,600,000	$ 14,900,000	$ 12,200,000		
			Seven Bridges		$ 39,300,000	$ 39,300,000	$ 8,600,000	$ 14,900,000	$ 15,800,000		
			Galesville		$ 40,700,000	$ 40,700,000	$ 8,600,000	$ 14,900,000	$ 17,200,000		

Notes

1 Dairyland Power Cooperative foresees the need to rebuild the Q1 161 kV line regardless of the outcome of the CapX proceeding. Five CapX route alternatives would colocate with (and therefore rebuild) some or all of the Alma - Holmen portion of the Q1. Remaining sections would be rebuilt by Dairyland as a separate project. This table presents the various combinations of CapX and Q1 Rebuild scenarios and the associated costs. Environmental impacts of these scenarios are presented in other tables.

2 Hwy 88 scenarios assume Hwy 88 Option B. Hwy 88 Option A adds $5.75 million.

3 Per the CapX2020 agreements, Dairyland has an 11 percent cost and ownership share of the CapX La Crosse project regardless of the route selected.

4 In this column, the incremental cost to attach the Q1 to the CapX line as a double circuit, when applicable, was removed and assigned to the shaded cells in Q1 Rebuild portion of this table. This presentation does not change the CapX2020 proposal for each route.

5 Shaded cells represent incremental costs of colocating the Q1 with the CapX 345 line as a double circuit. The shaded costs are integral components of the related CapX2020 proposal and represent CapX project costs. A go-by incremental cost of $450,000 was assigned to the Q1 circuit.

October 19, 2011

Table 2: back

3.3 Section C – Trempealeau to Holmen

Section C includes a crossing of the Black River floodplain. At the request of RUS and the US Fish & Wildlife Service (USFWS), four alternatives have been studied for this section of the Q-1 Rebuild (**Table 5**). These alternatives represent the only available alternatives for re-routing of the Q-1 line that comply with Wisconsin's Siting Statutes that prioritize the use of existing corridors. As shown in **Table 1**, the Section C rebuild on one of the four identified routes would occur if the CapX Project is constructed on any of the following routes:

- Arcadia Route
- Arcadia–Ettrick Route
- Q1–Galesville Route

Table 5: Q-1 Rebuild Options – Section C – Trempealeau to Holmen

Q-1 Rebuild Alternative Name	Length (Miles)	Cost	Existing Infrastructure at Black River
Existing Q-1 Alignment	13.2	$ 10,500,000	Q-1 161 kV line
Highway 35 Route	15.0	$ 12,200,000	WI-35
Seven Bridges Route	16.2	$ 15,800,000	Xcel Energy 69 kV line
Galesville Route (double-circuit with CapX Project)	19.9	$13,010,000	WI-53/93
Galesville Route (single-circuit)	19.9	$ 17,200,000	WI-53/93

Environmental impacts of these potential options are summarized in **Table 6**. Because these options are intertwined in with the CapX Project, potential impacts are presented for three scenarios; CapX only, CapX plus Q-1 and Q-1 only.

In the CPCN application, CapX did not include a route along the Q-1 segment in the Black River. It is therefore not shown on Figure 1. This segment (The Original Q-1 Route) is being evaluated in the Wisconsin EIS and is evaluated in this document.

Appendix A describes specialized methods to minimize environmental impacts if the Q-1 Rebuild occurs along the existing Q-1 alignment though the Black River floodplain. Dairyland is confident that these methods can be utilized to minimize impacts to the Black River floodplain wetland. Specific methods described in **Appendix A** eliminate the need for concrete, avoid the need for dewatering, do not generate spoils and will not require the placing gravel or other fill for construction access. These designs can be constructed with either ground-based equipment or helicopters.

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Table 6: Impact Summary for Q-1 Rebuild Options across Black River Floodplain

Resource Category	Original Q-1 Route			Highway 35 Route			Seven Bridges Route			Galesville Route		
	CapX Plus Q-1 assumes 100% CapX/Q-1 double circuit			CapX Plus Q-1 assumes 100% CapX/Q-1 double circuit			CapX Plus Q-1 assumes CapX on the Galesville Route and Q-1 on Seven Bridges[1]			CapX Plus Q-1 assumes 11.3 miles CapX/Q-1 double circuit, 8.6 miles Q-1 single circuit, 9.0 miles CapX[2]		
	CapX Only	Cap X plus Q-1	Q-1 Only	CapX Only	Cap X plus Q-1	Q-1 Only	CapX Only (On Galesville Route)[1]	Cap X plus Q-1	Q-1 Only	CapX Only	Cap X plus Q-1	Q-1 Only
Length (miles)		**13.2**	**13.2**	**15.0**	**15.0**	**15.0**	**20.3**	**36.5**	**16.2**	**20.3**	**28.9**	**19.9**
General Characteristics												
Existing ROW	Not applicable. If CapX is built on the Q-1 route it would of necessity double circuit the Q-1											
Length utilizing existing Transmission corridor (miles)		13.2	13.2	7.4	7.4	7.4	5.0	17.4	12.4	5.0	5.0	0.0
% of route utilizing existing Transmission corridor		**100%**	**100%**	**50%**	**50%**	**50%**	**25%**	**48%**	**77%**	**25%**	**17%**	**0%**
Length utilizing existing Transportation corridor (miles)		0.0	0.0	6.5	6.5	6.5	6.9	10.7	3.8	6.9	15.4	13.6
% of route utilizing existing Transportation corridor		**0%**	**0%**	**43%**	**43%**	**43%**	**34%**	**29%**	**23%**	**34%**	**53%**	**68%**
Length utilizing existing Transmission corridor and/or Transportation corridor (miles)		13.2	13.2	13.9	13.9	13.9	11.9	28.1	16.2	11.9	20.4	13.6
% of route utilizing existing Transmission corridor and/or transportation corridor		**100%**	**100%**	**93%**	**93%**	**93%**	**59%**	**77%**	**100%**	**59%**	**70%**	**68%**
Length not utilizing linear features (miles)		0.0	0.0	1.1	1.1	1.1	8.4	8.4	0.0	8.4	8.5	6.3
% of route not following linear infrastructure		**0%**	**0%**	**7%**	**7%**	**7%**	**41%**	**23%**	**0%**	**41%**	**30%**	**32%**
Natural Resources												
Length crossing Wetlands (miles)		2.6	2.6	1.5	1.5	1.5	1.1	2.9	1.8	1.1	1.1	1.1
Forested Wetlands Impacted (Acres of Forested Wetlands Converted to non-Forested Wetlands)		6.5	1.4	26.5	26.5	17.7	12.9	24.8	11.9	12.9	13.2	9.3
Upland Forest Impacted (acres)		14.1	4.5	19.9	19.9	8.3	76.2	83.4	7.2	76.2	91.0	32.9
Waterway Crossings		27	27	18	18	18	4	11	7	4	5	4
NHI Occurrences (Historic and Non-Historic) within 2 miles of reference centerline		47	47	44	44	44	25	44	40	25	28	28
Residences												
Total residences 0-25 feet		0	0	0	0	0	0	0	0	0	0	0
Total residences 26-50 feet		0	0	0	0	0	1	1	1	0	0	0
Total residences 51-100 feet		5	5	6	6	6	9	21	15	6	13	10
Total residences 101-150 feet		3	3	5	5	5	11	33	25	8	17	15
Total residences 151-300 feet		15	15	25	25	25	51	100	42	58	101	82
Total Residences 0 - 150 feet		**8**	**8**	**11**	**11**	**11**	**21**	**55**	**41**	**14**	**30**	**25**
Total Residences 0 - 300 feet		**23**	**23**	**36**	**36**	**36**	**72**	**155**	**83**	**72**	**131**	**107**
Newly impacted residences 0-25 feet		0	0	0	0	0	0	0	0	0	0	0

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Resource Category	Original Q-1 Route			Highway 35 Route			Seven Bridges Route			Galesville Route		
	CapX Plus Q-1 assumes 100% CapX/Q-1 double circuit			CapX Plus Q-1 assumes 100% CapX/Q-1 double circuit			CapX Plus Q-1 assumes CapX on the Galesville Route and Q-1 on Seven Bridges[1]			CapX Plus Q-1 assumes 11.3 miles CapX/Q-1 double circuit, 8.6 miles Q-1 single circuit, 9.0 miles CapX[2]		
	CapX Only	Cap X plus Q-1	Q-1 Only	CapX Only	Cap X plus Q-1	Q-1 Only	CapX Only (On Galesville Route)[1]	Cap X plus Q-1	Q-1 Only	CapX Only	Cap X plus Q-1	Q-1 Only
Newly impacted residences 26-50 feet		0	0	0	0	0	1	0	0	0	0	0
Newly impacted residences 51-100 feet		0	0	0	0	0	6	3	0	3	9	9
Newly impacted residences 101-150 feet		0	0	3	3	3	9	8	2	6	15	15
Newly impacted residences 151-300 feet		0	0	9	9	9	38	48	8	40	82	79
Newly impacted Residences 0 - 150 feet		**0**	**0**	**3**	**3**	**3**	**16**	**11**	**2**	**9**	**24**	**24**
Newly impacted Residences 0 - 300 feet		**0**	**0**	**12**	**12**	**12**	**54**	**59**	**10**	**49**	**106**	**103**
Schools, Day-care Centers, and Hospitals												
Total 0-300 feet		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
State and Federal Lands												
State Lands crossed (miles)		0.30	0.30	0.11	0.12	0.12	0.00	1.54	1.54	0.00	0.06	0.06
Federal Lands crossed (miles)		0.93	0.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

One house in the Total Residences 151-300 feet range for the Galesville Route and the Cap X plus Q-1 would be double counted because it is 195' from the 161 kV line and 252' from the 345 kV line.

1 Assumes CapX follows the Galesville Route. While this route was studied for the Q-1 line it is not seen as a feasible for the CapX 345 kV route. Therefore the "CapX Only and CapX plus Q-1" option presented in Table 5 studies the Galesville route for this option.

2 Galesville Route note: CapX/Q1 double-circuit on the east-west portion of this route (11.3 miles) and independent routes on the north-south portion. On the north-south portion the CapX line is proposed to be double circuited with the Tremval 161 kV line and therefore the Q-1 line is proposed on a new alignment adjacent to Highway 53/93.

4.0 FEDERAL AGENCY NEXUS

4.1 Federal Agencies

This section summarizes the relationships among the federal and state permitting agencies regarding the CapX Project. Dairyland, a rural electric cooperative headquartered in La Crosse, Wisconsin, has requested financing assistance from the RUS for its anticipated 11% ownership interest in the construction of the Project in southeastern Minnesota and southwestern Wisconsin. Under the Rural Electrification Act, as amended (RE Act), the U.S. Secretary of Agriculture is authorized and empowered to make loans for rural electrification to nonprofit cooperatives and others "for the purpose of financing the construction and operation of generating plants, electric transmission and distribution lines or systems for the furnishing and improving of electric service to persons in rural areas."[2] A primary function or mission of RUS is to carry out this electric loan program.[3]

RUS, as the agency carrying out the federal action, is responsible for complying with the requirements of the NEPA and Section 106 of the National Historic Preservation Act. Consistent with federal regulations implementing NEPA, the lead agency is responsible for establishing liaison with all federal, state, local, and tribal agencies that have jurisdiction by law or special expertise with respect to any environmental impact involved in a proposed action and for requesting their participation as cooperating agencies on an EIS, as appropriate.[4] RUS has requested the U.S. Army Corps of Engineers (USACE) and the U.S. Fish and Wildlife Service (USFWS) to participate as cooperating agencies, and both have accepted.

The USACE would need to issue the following permits for the Project:

- A permit under Section 10 of the Rivers and Harbors Act, for the crossing of the Mississippi and Black Rivers.
- A permit under Section 404 of the Clean Water Act (CWA), for activities that discharge fill into Waters of the United States, including wetlands.

The USFWS would need to issue a Special Use Permit for crossing a National Wildlife Refuge, and may need to authorize additional right-of-way. USFWS also has authority and trust responsibility under the Endangered Species Act, the Bald and Golden Eagle Protection Act, and the Migratory Bird Treaty Act.

4.2 State Agencies

State agencies within both Minnesota and Wisconsin have responsibility and authority for addressing the need for new transmission projects.

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[2] United States Code, Title 7 (7 USC) 904

[3] 7 USC 6942

[4] 40 CFR 1501.5, 1501.6, 1508.5, and 1508.16

4.2.1 *Minnesota*

In Minnesota, the Public Utilities Commission (PUC) is responsible for determining whether or not a proposed large transmission project is needed and for approval of a route if it determines the project is needed. These decisions are implemented through a Certificate of Need (CON) and a Route Permit.[5] The Applicants submitted an application for a CON in August 2007. The PUC issued the CON that included the Project on May 22, 2009.

In January 2010, the Applicants filed a Route Permit Application (RPA) for the Project, (MPUC Docket No. E002/TL-09-1448). The Department of Commerce Energy Facility Permitting has prepared a draft and final EIS the Project. That RPA is currently pending and a decision from the Commission is anticipated in early 2012.

4.2.2 *Wisconsin*

In Wisconsin, the PSCW is responsible for determining if a large transmission project is needed. An applicant applies for a Certificate of Public Convenience and Necessity (CPCN), and, if approved, the PSC grants a CPCN.[6] The Wisconsin Department of Natural Resources (WDNR) Office of Energy participates in the process jointly with the PSC. WDNR permit applications are filed at the same time as the CPCN application. On January 3, 2011, the Applicants filed an initial CPCN application. After additional submittals to address information requests, the PSC determined that the application was complete on June 9, 2011. On June 29, 2011, the CPCN Applicants submitted a final revised package that incorporated additions and changes from all information requests.

The PSC and WDNR are preparing a draft EIS for the Project, anticipated to be available for public comment in November 2011. The PSCW process will include a hearing process in early 2012 during which public and agency comments are considered. The process of Wisconsin State route selection arriving at a federally compatible approved route relies upon Federal Agencies participating in the CPCN process. A decision from the PSC is anticipated in the summer of 2012.

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[5] Minn. Stat. 216B.243 and Minn. R .ch.7849, 7829, and 1405 CON process; Minn. Stat. 216E.03 and Minn. R ch. 7850.1700 to 7850.2700 RPA process

[6] Wis. Stat. 1.12(6), 196.491 and WAC PSC 2, 4, 111 and 112 govern the CPCN process.

5.0 Environmental Impacts Associated with Alternative Routes for Q-1 Rebuild

5.1 Existing Q-1 Alignment (Section C)

This scenario assumes that the Q-1 Rebuild would occur along the existing Q-1 alignment **(Figure 2)**. For this analysis, Dairyland would rebuild the existing Q-1 line within the existing maintained ROW (roughly 100 feet). The proposed construction plan developed by Dairyland to minimize impacts along this route is included as **Appendix A**. Both the Q-1 Rebuild and the CapX 345 kV/Q-1 161 kV double-circuit are evaluated for this segment. **Figure 3** depicts various double circuit pole alternatives proposed if the CapX line crosses the Black River floodplain. CapX specifically proposes the horizontal asymmetrical design. These designs can be used for either the Q1-Highway 35 Route or the Original Q-1 Route.

Figure 4 shows the single circuit 161 kV structure that would be used if the Q-1 were re-built alone on its existing alignment. A cost summary of the Q-1 Rebuild Scenarios is included in **Table 2.** Q-1 Rebuild Environmental Sheet Maps are included as **Appendix B.**

Pole heights in the Black River floodplain section are approximately as follows:

- Existing Q-1 line: 65 feet
- Q-1 Rebuild: 75 feet
- CapX2020 345/161 kV proposal: 75 feet

As shown in **Table 6,** 100% of this alternative follows existing transmission corridor. It would cost an estimated $ 10,500,000 to construct[7]. Approximately 2.6 miles of wetland would be crossed, at the same location where the existing Q-1 alignment crosses. Approximately 1.4 acres of forested wetland would be converted to non-forested wetland and 4.5 acres of upland forest would be removed to accommodate a 100-foot right-of-way. There are 27 waterway crossings. There are 47 NHI occurrences within 2 miles of the route centerline.

There are 23 residences within 300 feet of the centerline 0 within 50 feet, 5 from 51-100 feet, 3 from 101-150 feet, and 15 from 151-300 feet. None of them is newly impacted; that is, all residences are already within 300 feet of the exiting transmission line.

This alignment crosses 0.30 miles of state land and 0.93 miles of federal land.

[7] Q-1 Rebuild costs are incremental over and above the CapX Project costs.

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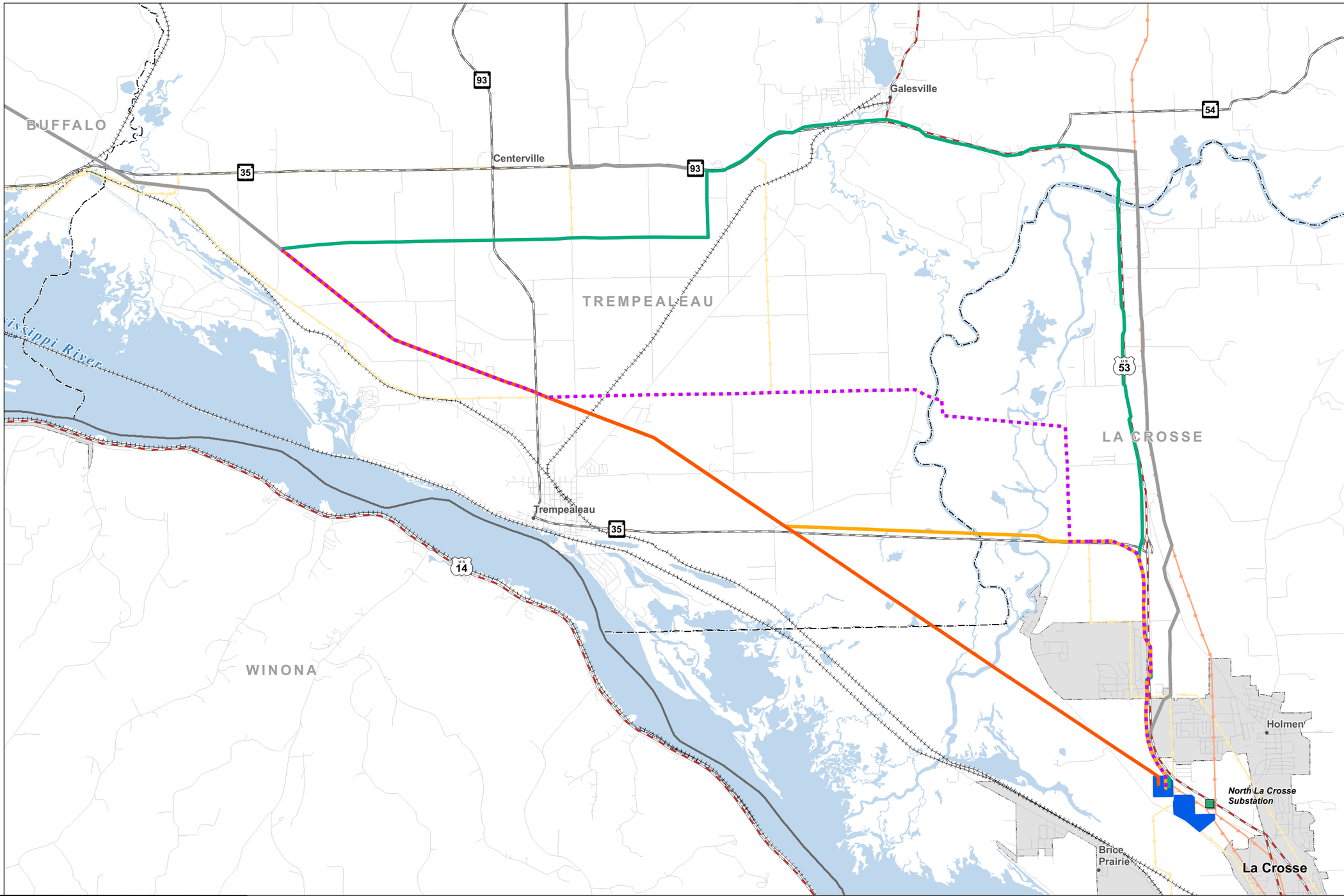


Legend

Project Features

- Proposed WI CPCN Route
- Q-1 Seven Bridges Route
- Orginal Q-1 Route
- Q-1 Galesville Highway 53 Route

Existing Utilities (HDR, GRE, PSCW)

- 69 kV Transmission Line
- 161 kV Transmission Line
- Substation
- Natural Gas Pipeline

Jurisdiction (Census)

- Municipality
- County

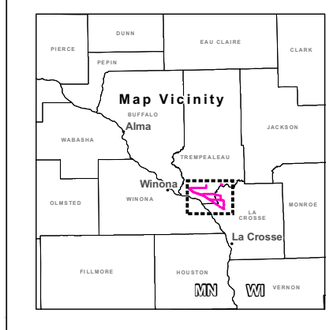
Transportation (Census, BTS, WisDOT)

- Rail
- Interstate Highway
- US Highway
- State Highway
- Local Road

Water Features (WDNR)

- Open Water

0 0.5 1 Miles



DATA SOURCES: Census, WDNR, BTS, WisDOT, PSCW, GRE, HDR
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CapX2020

Hampton • Rochester • La Crosse 345 kV Transmission Project

Xcel Energy • Dairyland Power Cooperative • Rochester Public Utilities • WPPI Energy • Southern Minnesota Municipal Power Agency

Figure 2
Q-1 Rebuild Options Across Black River Floodplain

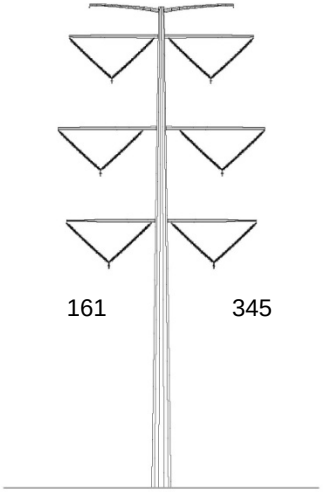
November 2011

FIGURE 2 BACK

CapX2020 Pole Design Alternatives
Black River Floodplain

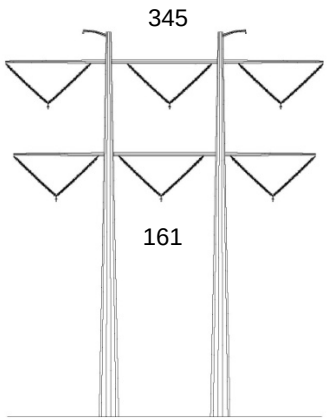
Height and Width Tradeoffs of Various Designs
Poles carry both CapX 345 kV and Q1 161 kV circuits

All designs can be installed by helicopter using vibratory caisson foundations



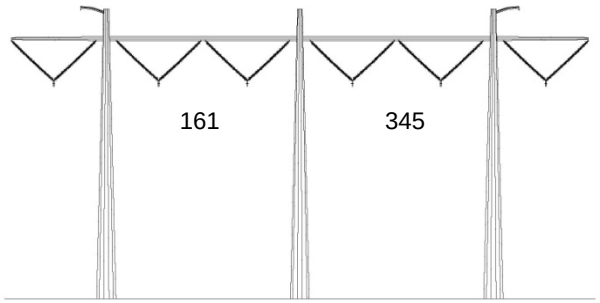
Vertical Monopole

Height: 125 feet
ROW Width: 105 feet



Two Pole Delta

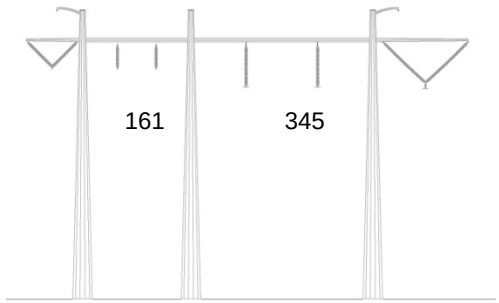
Height: 100 feet
ROW Width: 130 feet



Horizontal Symmetrical

Height: 75 feet
ROW Width: 200 feet

Design proposed by CapX2020 for Q1 and Q1 - Highway 35 routes



Horizontal Asymmetrical

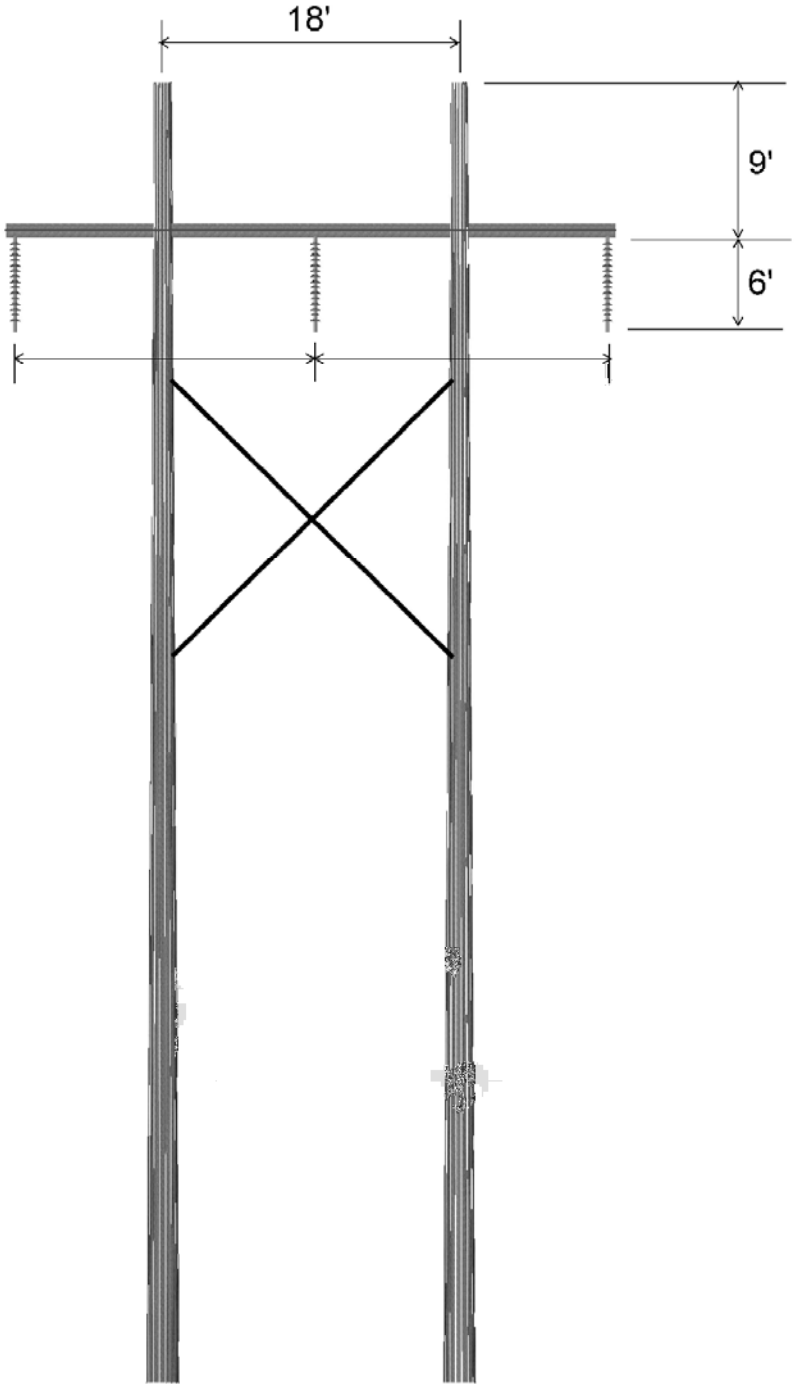
Height: 75 feet
ROW Width: 155 feet

Vibratory caisson foundations are hollow pole bases that are vibrated into the earth and require no excavation, concrete or fill. They can be installed by helicopter or ground-based equipment.

Existing 161 kV poles on Q1 route are 60 to 80 feet tall.

Figure 3
June 16, 2010

Figure 3 back



Typical Height: 75 Feet

ROW Width: 100 Feet

Not to scale

Figure 4
Typical 161 kV Single Circuit Steel H-Frame Structure

Figure 4 Back

5.2 Highway 35 Route

The Q-1 Rebuild could be constructed adjacent to a portion of WI-35. While this option has the benefit of crossing the floodplain at a slightly narrower point and being located adjacent to an existing infrastructure crossing, it would require clearing of a new corridor through the floodplain forest. As shown on Sheet Maps 44 and 45, the alignment along Highway 35 is proposed to be approximately 350 feet north of the highway in order to avoid WisDOT scenic easements and to minimize aesthetic impacts to the Great River Road by preserving a strip of trees between the highway and the proposed line. It is, however, technically feasible to construct the line immediately adjacent to the highway. A cost summary of the Q-1 Rebuild Scenarios is included in **Table 2.** Q-1 Rebuild Environmental Sheet Maps are included as **Appendix B.**

As shown in **Table 6**, 93% of this alternative utilizes existing right-of-way, 50% transmission and 43% transportation corridor. It would cost an estimated $ 12,200,000 to construct. Approximately 1.5 miles of wetland would be crossed. Approximately 17.7 acres of forested wetland would be converted to non-forested wetland and 8.3 acres of upland forest would be removed. There are 18 waterway crossings. There are 44 NHI occurrences within 2 miles of the route centerline.

There are 36 residences within 300 feet of the centerline: 0 within 50 feet, 6 from 51-100 feet, 5 from 101-150 feet, and 25 from 151-300 feet. Twelve of these residences are newly impacted, 3 within 150 of the route centerline.

Approximately 0.12 miles of state land occurs within the proposed right-of-way.

5.3 Seven-Bridges Route

Moving the Q-1 line to the Seven Bridges Trail area **(Figure 2)** would remove the existing line from its current alignment and construct it on an alignment through the Black River floodplain adjacent to an existing 69 kV line. While this route was studied for the Q-1 line it is not seen as a feasible for the CapX 345 kV route. Therefore the "CapX Only and CapX plus Q-1" options presented in Table 6 studies the Galesville route for this option. While this option has the benefit of crossing the floodplain at a slightly narrower point and being located adjacent to an existing transmission line crossing, it would require widening of the existing transmission line right-of-way by 60 feet through the floodplain forest. It would also be located in the vicinity of the historic bridges and related recreational trail. A cost summary of theQ-1 Rebuild Scenarios is included in **Table 2.** Q-1 Rebuild Environmental Sheet Maps are included as **Appendix B.**

As shown in **Table 6**, 100% of this alternative follows existing right-of-way, 77% transmission and 23% transportation corridor. It would cost an estimated $ 15,800,000 to construct. Approximately 1.8 miles of wetland would be crossed. Approximately 11.9 acres of forested wetland would be converted to non-forested wetland and 7.2 acres of upland forest would be removed due to additional clearing within the additional 60-feet of right-of-way. There are 7 waterway crossings. There are 40 NHI occurrences within 2 miles of the route centerline.

There are 83 residences within 300 feet of the centerline: 1 within 50 feet, 15 from 51-100 feet, 25 from 101-150 feet, and 42 from 151-300 feet. Ten of these residences are newly impacted: 2 within 150 feet.

Approximately 1.54 miles of state land is crossed.

5.4 Galesville Route

The Galesville Route generally follows property lines south of Centerville and WI-53/93 near Galesville. If the CapX Project is also routed along WI-53/93 the Q-1 could be combined as a 345/161 double-circuit on the east-west portion of this route. On the north-south portion of this route, the CapX line is proposed to be double-circuited with the Tremval 161 kV line and therefore the Q-1 line is proposed to be on a new alignment adjacent to WI 53/93. The estimated cost of this option (including the incremental cost of the double-circuiting) is $ 14,900,000. If the Q-1 is built as a single-circuit along WI-53/93, the estimated cost of the Q-1 Rebuild along this route would be $17,200,000. Additional constraints of this route are discussed in section 3.4. A cost summary of theQ-1 Rebuild Scenarios is included in **Table 2.** Q-1 Rebuild Environmental Sheet Maps are included as **Appendix B.**

As shown in **Table 6** 68% of Galesville Route follows existing transportation corridor. Approximately 1.1 miles of wetland would be crossed. Approximately 9.3 acres of forested wetland would be converted to non-forested wetland and 32.9 acres of upland forest would be removed due to additional clearing within the 100-foot right-of-way. There are 4 waterway crossings. There are 28 NHI occurrences within 2 miles of the route centerline.

There are 107 residences within 300 feet of the centerline: 0 within 26-50 feet, 10 from 51-100 feet, 15 from 101-150 feet, and 82 from 151-300 feet. One hundred and three of these residences are newly impacted: 24 within 150 feet.

Approximately 0.06 miles of state land is crossed by the route.

6.0 Reliability Considerations

Relocating the Q-1 to either the Highway 35 or Galesville Routes provides increased reliability risk that should be considered. The risk exists if the CapX 345 kV project is never built and is somewhat higher if the CapX line is routed on the Q1-Galesville, Arcadia or Arcadia-Ettrick routes. The National Electric Reliability Corporation (NERC) establishes mandatory reliability standards that apply to all electric utilities in the United States. Two of the NERC criteria, described in more detail below, address situations when multiple transmission lines are placed in close proximity to each other. These criteria are the minimum reliability criteria utilized by utilities in North America.

Placing the Q-1 close to another line that provides redundancy to the Q-1 line creates additional reliability risk and increases the chance of customer outages if a major weather event causes simultaneous outages of these two lines. The Tremval – Mayfair 161 kV line is shown on sheet maps 25 through 38 and runs north from Holmen, just east of WI 53/93. Any alternative that places the Q-1 line in close proximity to the Tremval line reduces system reliability. The most reliable alternative for both the Q-1 and CapX is to maximize the distance between the Q-1 line and the Tremval line which would be accomplished by rebuilding the Q-1 line on its existing alignment.

Routing the Q-1 line to Highway 35 or Galesville would necessarily place a portion of the Q-1 along Highway 53 and therefore in proximity to the Tremval line. Routing the CapX Project on the Q1-Galesville, Arcadia or Arcadia-Ettrick routes increases the distance the two 161 kV lines are in close proximity (**Table 7**).

Table 7: Length (miles) of Q-1 and Tremval Transmission Lines within 0.5 mile Separation

CapX Project Route	Q-1 Rebuild Route			
	Existing Q-1	Highway 35	Seven Bridges	Galesville
Q1-Highway 35	n/a	0.5	n/a	n/a
Q1-Galesville	0.5	3.0	3.0	8.0
Arcadia	0.5	3.0	3.0	8.0
Arcadia - Ettrick	0.5	3.0	3.0	8.0
CapX Project Not Built	0	1.0	1.0	5.5

Notes:
- The CapX Project Q1-Highway 35 route includes double-circuiting with the Q-1 line
- Lower values in table are more reliable choices

As described below, placing these transmission lines ¼ to ½ mile apart increases reliability risks to the area.

Two of the NERC standards relate to reliability considerations of placing multiple transmission lines in close proximity. It is also considered good utility practice to locate transmission lines that serve

similar purposes distant from each other. This geographic diversity reduces the risk that multiple lines will lose service due to the same event, i.e. weather.

NERC Category C[8] applies to multiple transmission circuits attached to common poles or structures, commonly referred to as double circuits.[9] Under category C requirements transmission planners must assume that both circuits of a double circuit are outaged simultaneously. When this double outage occurs the remaining transmission system must be able to perform without loss of customer load, cascading outages or reducing system stability. Some double circuit combinations pass this test, others fail. For the CapX La Crosse project, planning engineers have determined that the CapX 345 kV circuit can be double circuited with any of the existing 161 kV and 69 kV lines in the project area. Two existing 161 kV lines, however, clearly cannot be built as a double circuit: Q-1 in combination with Xcel Energy's Tremval – Mayfair 161 kV line.

Separating these two 161 kV lines a few feet and placing them onto separate but immediately adjacent sets of poles will allow technical compliance with Category C but the risk of a simultaneous outage of both circuits due to a single event remains. NERC acknowledges this risk in Category D, simultaneous loss of multiple circuits on adjacent rights-of-way. NERC does not prohibit Category D but requires utilities to understand and prepare for this situation. Good utility practice, and that of Dairyland and Xcel Energy, is to avoid creating a category D situation. Dairyland and Xcel Energy know that creating a Category D with these two 161 kV lines will result in a higher probability of loss of customer load in the La Crosse area and urge that this situation be avoided.

When evaluating potential placement for new transmission lines, planning engineers not only apply the NERC category C and D standards, but consider how geographically close the proposed facilities will be to existing facilities. Even when NERC criteria C and D are satisfied, locating lines near each other results in reduced reliability, particularly when two lines serve a common purpose such as the 161 kV lines feeding La Crosse. The more common corridors are propagated, particularly involving high voltage facilities, the more likely it becomes that an outage involving multiple facilities could occur. Routes that are more geographically distant from existing transmission facilities provide the most reliability benefit.

Routing the Q-1 to the Galesville / Highway 53 corridor places it within ¼ to ½ mile of the Tremval line for a length of up to eight miles. A single weather event could result in simultaneous loss of both lines and therefore has a higher probability of outages to customers. Routing the Q-1 line on the existing Q-1 alignment provides the most reliable solution.

---

[8] NERC standard TPL-003-0.

[9] Category C situations can comprise more than two circuits on the same poles (for example, triple circuits). For this discussion only double circuits apply.

7.0 Pinch Points along East -West Portion of WI 53/93

The following discussion describes routing constraints based on the presence of homes close to the roadway along the east/west segment of Highway 53/93. These considerations apply if either of the following CapX routes is approved:

- Q1–Galesville Route
- Arcadia Route

If the CapX Arcadia Route or the Q1-Galesville Route is ordered by the PSCW, the CapX Project and the Q-1 Rebuild **(Figure 1)** could be constructed as a double-circuit line on the east-west portion of Highway 53 south of Galesville **(Figure 2).** While this is feasible, the presence of homes near the highway would result in the line being in proximity to numerous residences. The CapX 345 kV alignment was designed to place all conductors on the roadway side of the poles to minimize tree clearing and avoid impacts to residences. A double-circuit configuration would have to have conductors on both sides of poles thus increasing right-of-way needs and impacts to homes.

For either the single circuit 345kV line or the double circuit 345/161 kV line, poles would typically be placed 5 feet outside of the Hwy-93 right-of-way. The alignment varies from the north side and south side of Hwy-93 with a total of seven road crossings.

For the single circuit design, structures will be a vertical construction with all conductors overhanging the road right-of-way. A 100-foot right-of-way would be required, 50 feet on each side of the centerline. The structure heights will range from approximately 130-175 feet with foundation diameters ranging from approximately 7-9 feet. .

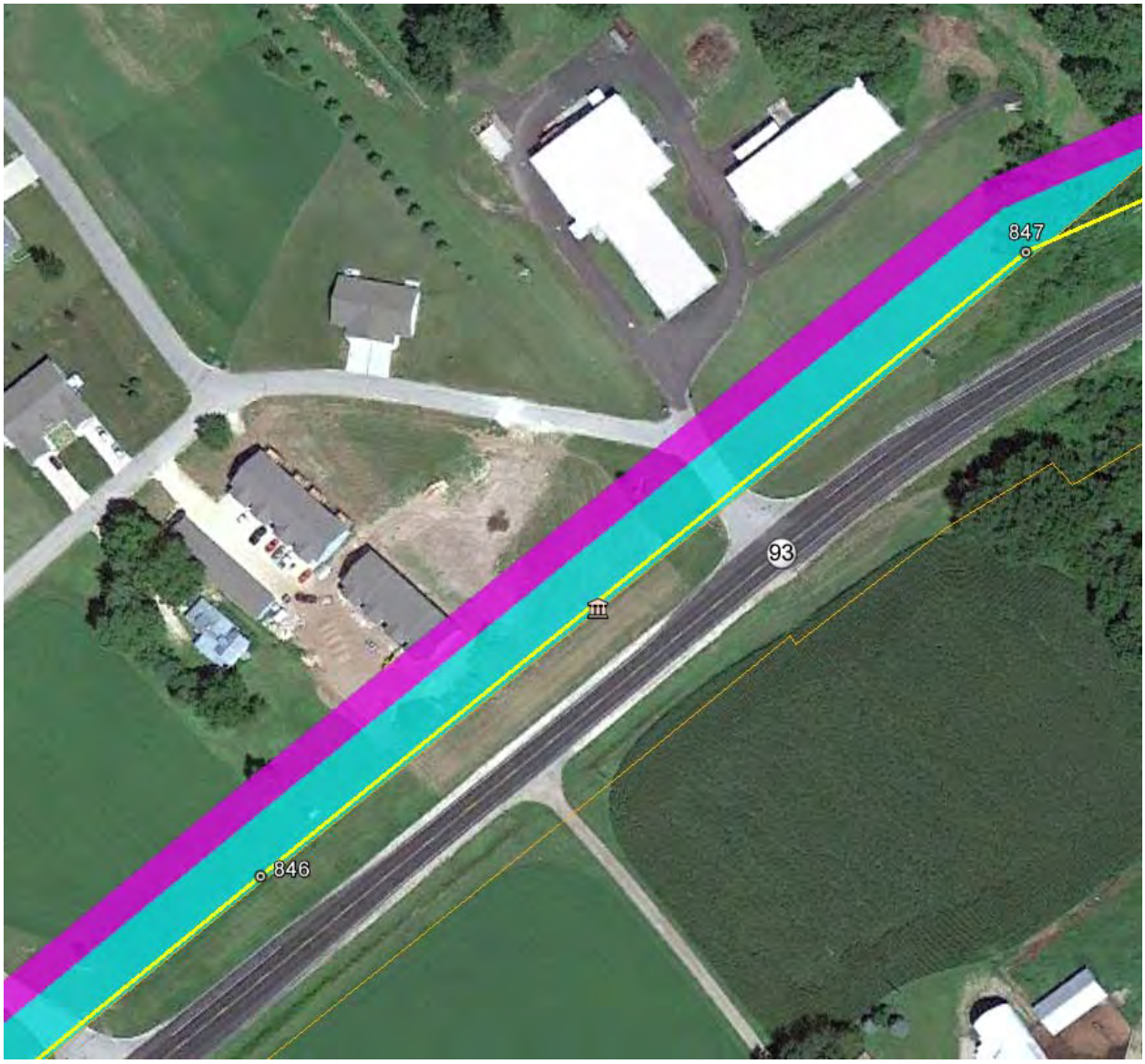
The double circuit would require structure heights ranging from approximately 130-175 feet with foundation diameters ranging from approximately 8-10 feet. Structures would be a double circuit vertical construction with one circuit overhanging the road right-of-way and the other overhanging the private property. Right-of-way requirement is 150-feet, 75 feet on either side of the centerline.

Pinch points created converting to double circuit 345/161-kV are identified in the following pages. The cyan color represents 50 feet from centerline for single circuit design and the magenta color represents the extended 75 feet from centerline required for double circuit design.

PINCH POINT
A

Adjustments to the proposed structure locations and most likely the addition of another structure closer to the house would be required to reduce the required easement in this area.

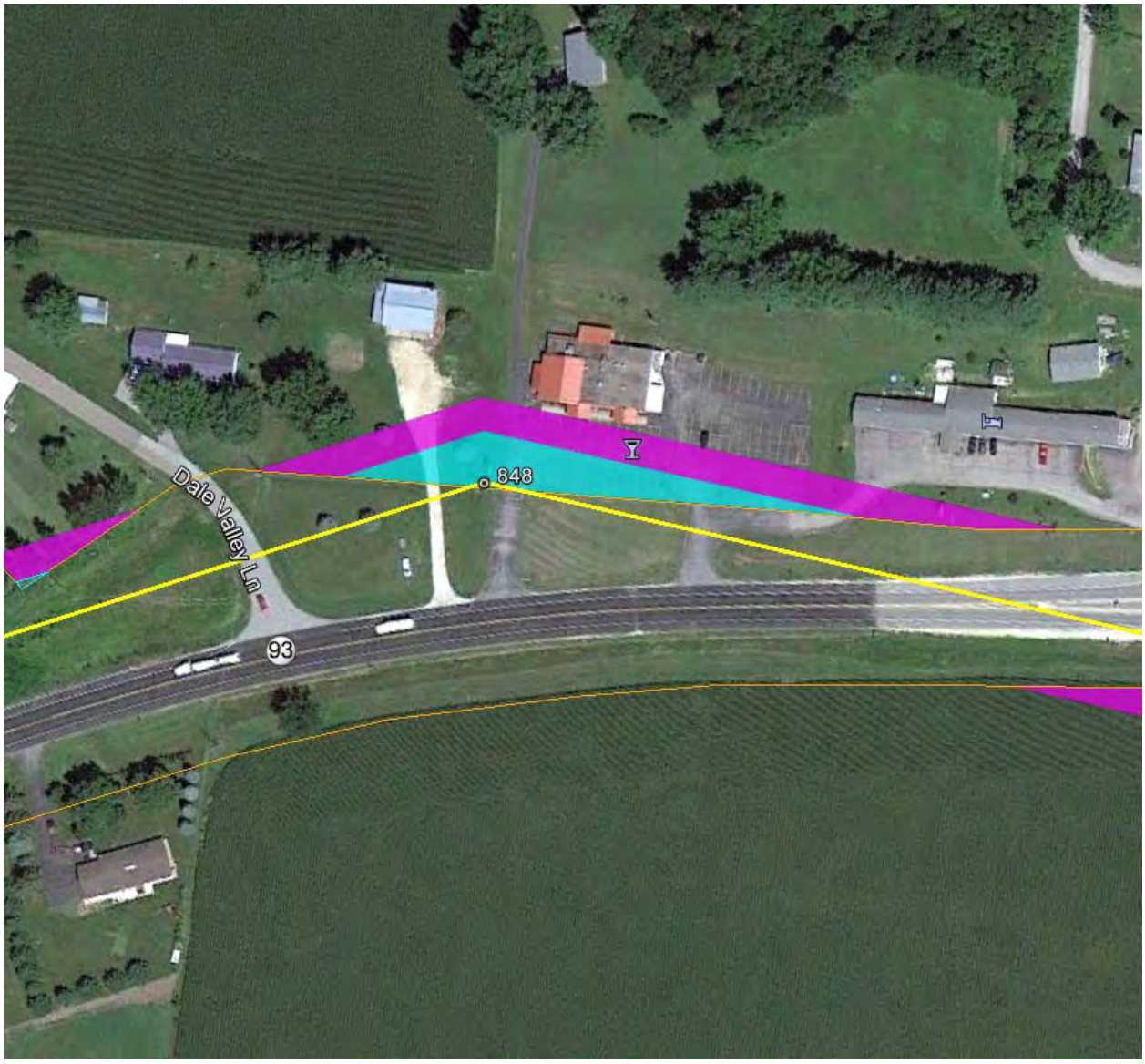
Yellow – transmission centerline
Cyan – 50 feet from centerline (single circuit CapX 345 kV)
Magenta – Extended 75 feet from centerline (CapX 345 / Q-1 double circuit)



PINCH POINT
B

Adjustments to the proposed structure locations and most likely the addition of another structure would be required to reduce the required easement in this area.

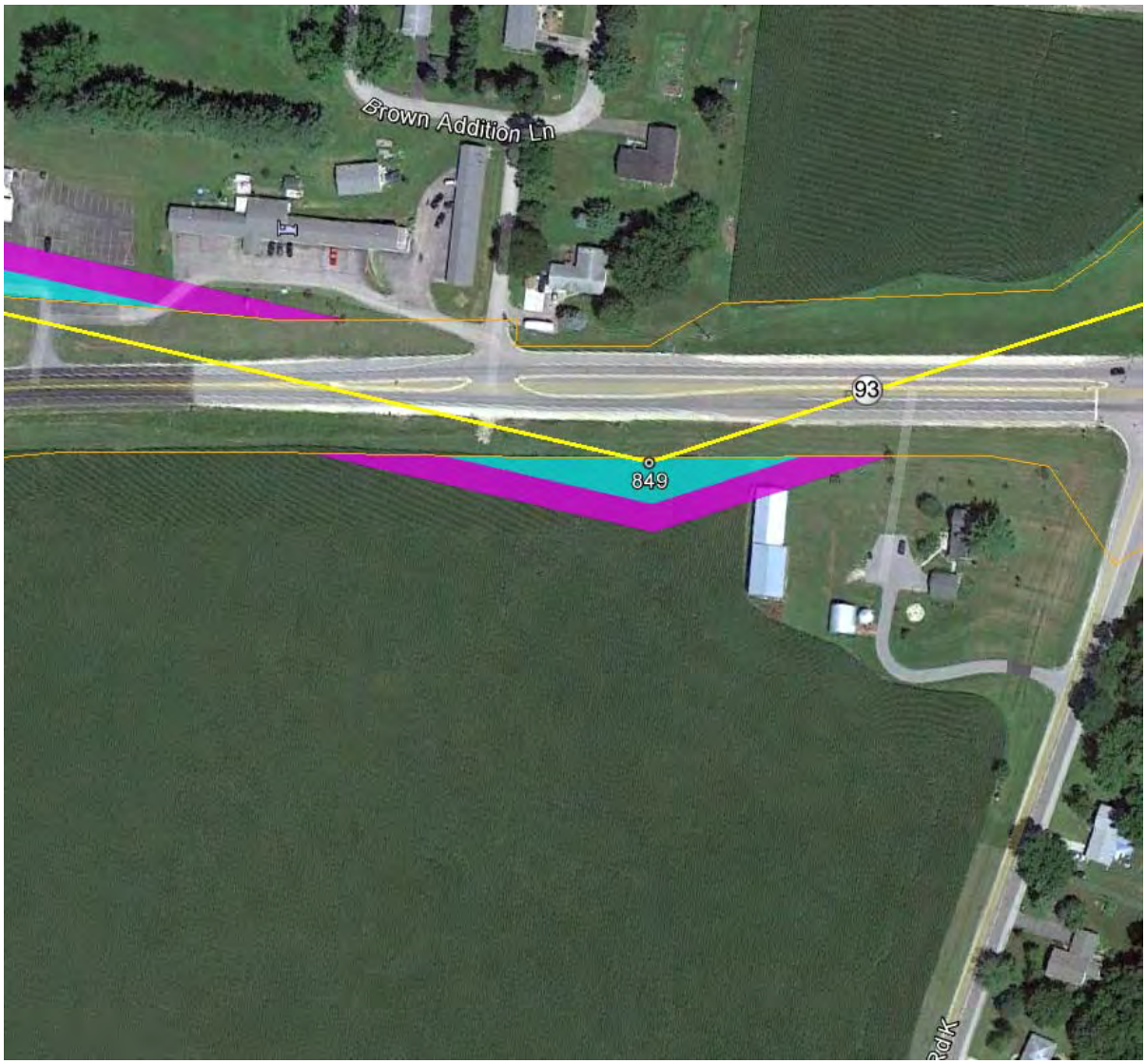
Yellow – transmission centerline
Cyan – 50 feet from centerline (single circuit CapX 345 kV)
Magenta – Extended 75 feet from centerline (CapX 345 / Q-1 double circuit)



PINCH POINT
C

The standard 80 foot easement runs directly up to the building. Some reduction in the required easement in this area can be accomplished because of the proposed structure located near the building.

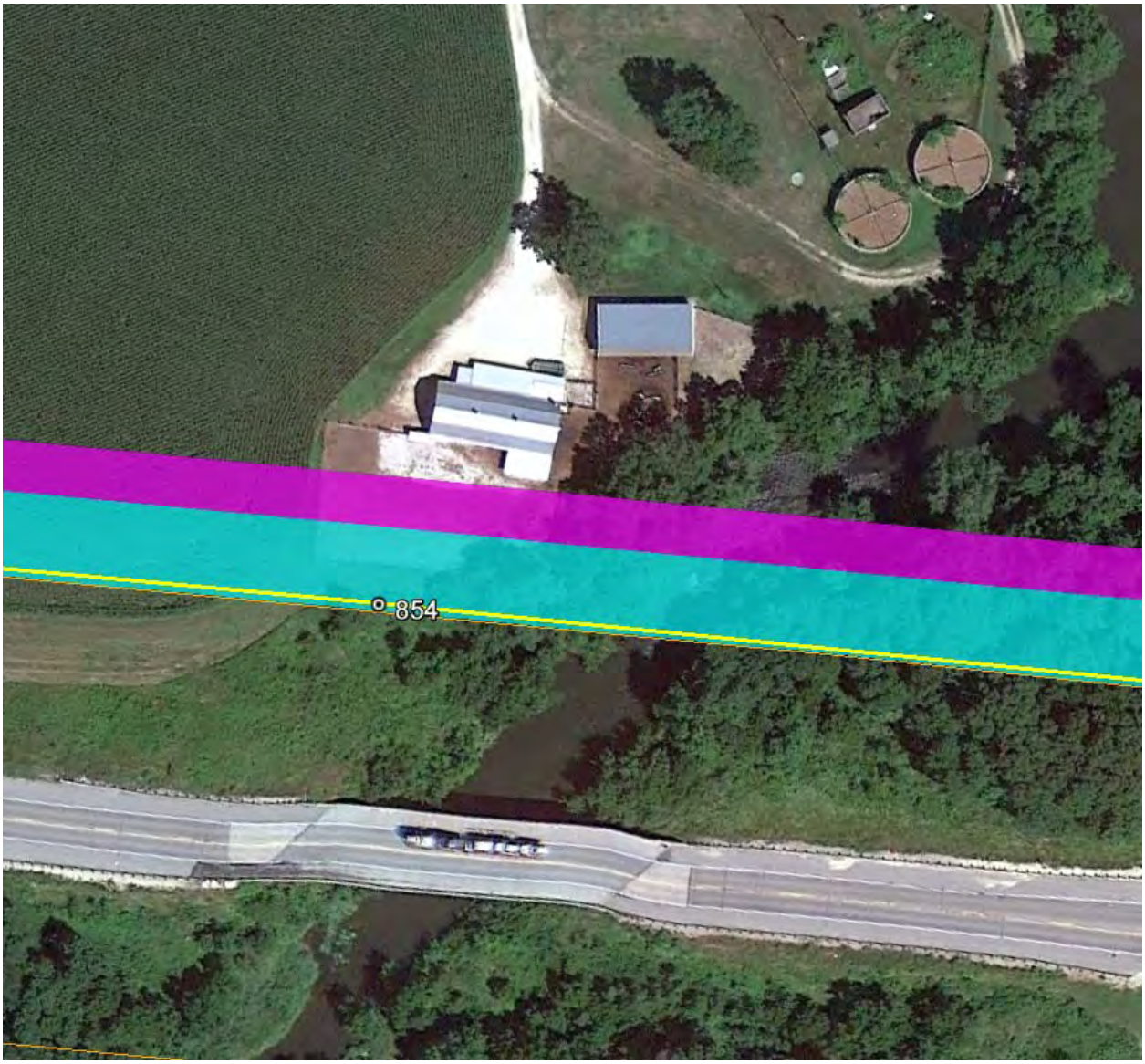
Yellow – transmission centerline
Cyan – 50 feet from centerline (single circuit CapX 345 kV)
Magenta – Extended 75 feet from centerline (CapX 345 / Q-1 double circuit)



PINCH POINT
D

The standard 80 foot easement has a conflict with a building. Some reduction in the standard 80 foot easement in this area can be accomplished because of the proposed structure located near the building. Structure 849 may also be shifted to the west to reduce the conflict.

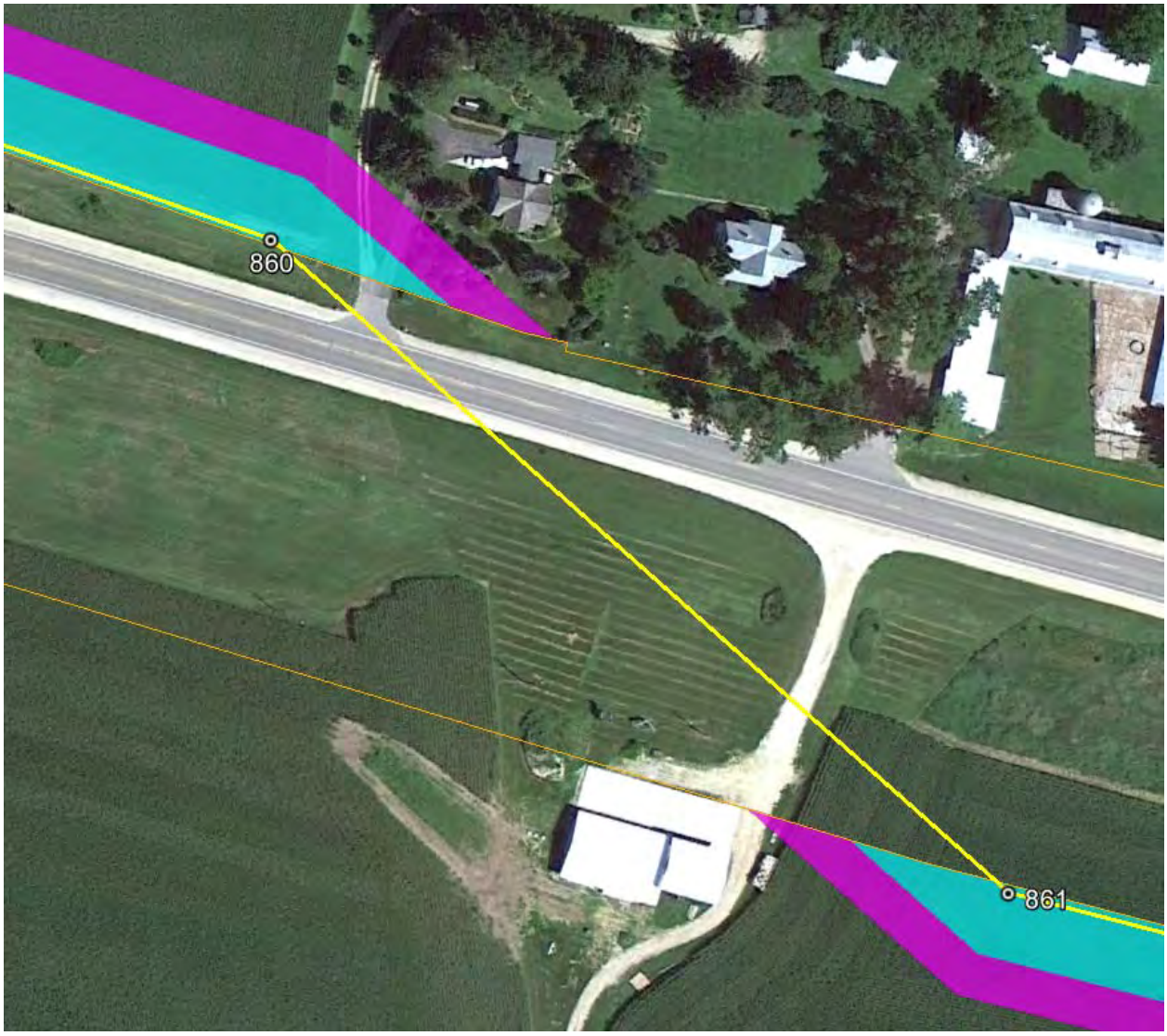
Yellow – transmission centerline
Cyan – 50 feet from centerline (single circuit CapX 345 kV)
Magenta – Extended 75 feet from centerline (CapX 345 / Q-1 double circuit)



PINCH POINT
E

The standard 80 foot easement runs directly up to the building. Some reduction in the required easement in this area can be accomplished because of the proposed structure located near the building.

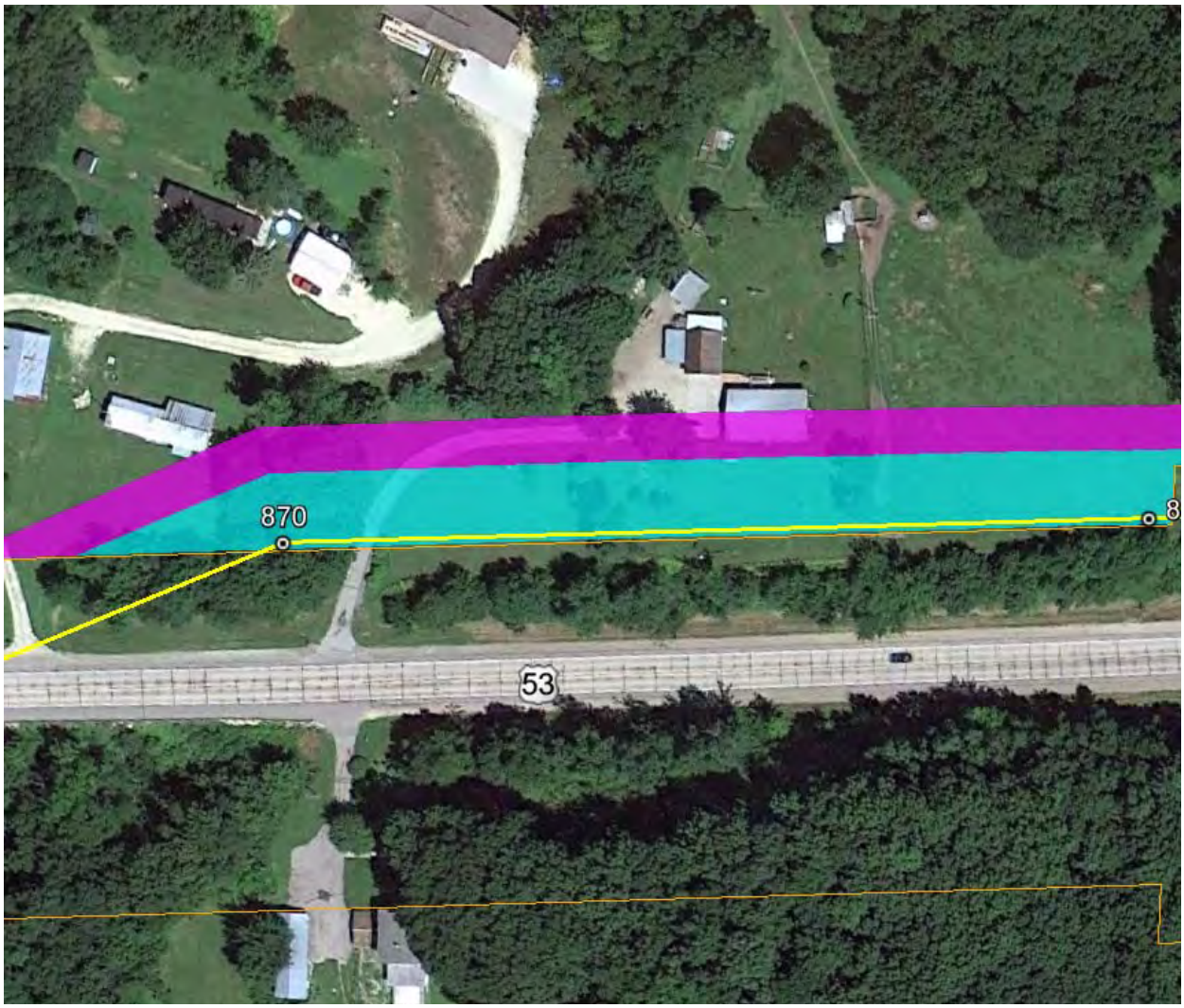
Yellow – transmission centerline
Cyan – 50 feet from centerline (single circuit CapX 345 kV)
Magenta – Extended 75 feet from centerline (CapX 345 / Q-1 double circuit)



PINCH POINT
F

The 80 foot easement will require some trees surrounding the house to be removed. Some reduction in the required easement in this area can be accomplished because of the proposed structure located near the house. Structure 860 could be adjusted further northwest to reduce the impact to the house.

Yellow – transmission centerline
Cyan – 50 feet from centerline (single circuit CapX 345 kV)
Magenta – Extended 75 feet from centerline (CapX 345 / Q-1 double circuit)



PINCH POINT
G

The standard 80 foot easement impacts the building. As a result of a sort span from structure 870 to 871 the proposed easement could be reduced to 60 feet which will run up to the edge of the building.

Yellow – transmission centerline
Cyan – 50 feet from centerline (single circuit CapX 345 kV)
Magenta – Extended 75 feet from centerline (CapX 345 / Q-1 double circuit)

8.0 Responses to RUS Information Requests

Appendix C contains the responses to additional RUS information requests.

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Appendix A:
Q-1 161 kV Rebuild (Black River Floodplain), Proposed Construction Plan

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Q-1 161 kV Rebuild
(Black River Floodplain)

Proposed Construction Plan

This report describes specialized methods to minimize environmental impacts if the Q-1 Rebuild occurs along the existing Q-1 alignment though the Black River floodplain. Dairyland is confident that these methods can be utilized to minimize impacts to the Black River floodplain wetland. Specific methods described in this document eliminate the need for concrete, avoid the need for dewatering, do not generate spoils and will not require the placing gravel or other fill for construction access.

Design Options to Reduce Construction Impacts

Design choices can be made to minimize impacts. Foundation types such as vibratory caissons do not require concrete, do not require dewatering and do not generate spoils from the excavations. Dairyland proposes to use vibratory caissons through the Black River floodplain if the Q-1 is rebuilt along its existing alignment.

The design of Q-1 Rebuild through the Black River floodplain wetlands would utilize spans between structures of approximately 550-750 feet. The new line would look similar to the existing line but would use steel instead of a wood H-frame design with heights varying from 65-80 feet. Shorter spans reduce structure height, reduce right-of-way width requirements and result in poles that weigh less. Shorter and lighter structures reduce equipment size requirements. Shorter and lighter structures also reduce the foundation strength requirements allowing for the use of smaller and lighter equipment for foundation installation. The use of helicopters to assist with the installation of foundations and erection of structures, if necessary, is made more feasible with shorter and lighter structures.

It is anticipated that the vibratory caisson foundations will be 6-7 feet in diameter and 40-60 feet in length. The use of concrete foundations and the associated drilling and soil removal within the wetlands are not anticipated.

Construction Considerations

The major construction activities for this 3 mile section of the line would be similar to the balance of the Project with the following considerations, accommodations and mitigations for constructing electrical transmission facilities in an extensive, active wetland.

Note: The Construction Plan described below assumes that the size of the waterway on the west side of is the floodplain (appears to be) too large to cross with a temporary bridge structure. Therefore the Construction Plan only considers foot or helicopter access to three structures in this difficult access area encompassing approximately 1,700 feet of the existing right of way west of the main Black River channel. If a detailed field review determines that the waterway can be crossed with a temporary bridge structure, the use of helicopters for installation of the vibratory caissons and pole structures will be eliminated. These three structures would then be accessed from the west.

Pre-Construction Field Activities – Ground access to each of the structure locations is required prior to construction to conduct surveying and staking and a geotechnical investigation (soil borings). Surveying and staking is normally performed by a 2-man survey crew using pickup or 4-wheel all-terrain vehicles following existing roads and trails and causing little to no impact. In wetland areas and adjacent to waterways, various types of boats or rafts are often used, also causing no impact.

Six to 8 soil borings will be required within the wetland to determine the soil strength properties needed for foundation design. In all locations, with the exception of the section of line in the difficult access area, 4-inch diameter soil borings will be conducted with a low impact, all-terrain, track-mounted drill rig causing minimal impact. These soil borings can also be scheduled to be performed during the winter to further minimize disturbances. The soil boring required for the section of line in the difficult access area will require small, modular drilling equipment that can be disassembled transported by helicopter to the site and reassembled.

Construction Access Routes – Existing access and proposed temporary access routes are shown on the attached mapping. Construction access methods through the wetland will be planned to minimize ground disturbance and may include, but are not limited to: construction mats, winter access which includes mowing and snow removal to facilitate soil freezing, low ground pressure equipment, and restricting the length and width of the access route. These techniques may also be combined (for example, low ground pressure equipment driving on construction mats place over frozen soil.)

Dairyland's experience and that of other utilities demonstrates that winter access and matting techniques result in no rutting or damage to plants.

Temporary fill, gravel or rock is <u>not</u> anticipated for access to any of the sites in the Black River floodplain wetlands. Upon completion of construction all, construction matting used for access routes and temporary work areas will be removed either by conventional equipment or helicopter. Estimated temporary access road and structure pad impacts will be calculated for each structure option at the time permits are applied for.

Ice and Frozen Ground Access with Matting

Access to Structures– Ground access is proposed either with the use of tracked or rubber tired equipment in areas of stable soils or with the use of construction mats and/or frozen soil conditions for areas of unstable soils. The use of temporary small construction bridges with construction mats are anticipated for crossing small channels.

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

If saturated or unstable soil conditions exist at a construction location, several construction techniques may be implemented to reduce the effects on wetland soil structure and dependent functions, including hydrology and the wetland's capacity for re-vegetation of native species. These techniques include the use of the following: construction during frozen conditions, construction mats, low ground pressure or tracked vehicles in areas where the soils are saturated or not frozen.

Access to Three Structures in the difficult access area – Ground access for construction equipment is not anticipated for these 3 structure sites. Helicopter supported construction techniques for foundation installation, structure assembly and erection and wire stringing is planned.

Clear Span Bridge and Matting

Removal of Existing Line – The existing wood H-frame structures in the vicinity of structures will be removed by conventional means using the access routes developed for construction of the new line. All poles will be cut off at ground line so no additional fill will be required for the holes.

Foundation Construction – Tubular steel vibratory caissons are the proposed foundation type for all structures within the Black River floodplain wetland. At each structure location a temporary work surface will be constructed with construction matting. The steel caisson, crane, vibratory hammer and associated equipment are transported to the site. The steel caisson is stood up at the staked location and the vibratory hammer is placed on top of the steel caisson. The high frequency vibration and weight of the vibratory hammer vibrate the hollow steel caisson into the earth to a pre-determined elevation, normally two - three feet above ground level. The vibratory caisson foundation is complete and ready for erection of the tubular steel pole. Vibratory caisson foundation installations do not require concrete, do not require dewatering and do not generate spoils from the excavations.

For locations with construction equipment access, all material (steel caisson), equipment (trucks, crane, vibratory hammer, etc.) and labor will access the site via the temporary access routes.

For locations with restricted construction equipment access , the steel caisson, alignment jig, vibratory hammer and associated equipment are transported to the site with a heavy lift helicopter. The same helicopter is then used to stand up the steel caisson and place it in the staked location inside the alignment jig. The helicopter then lifts the vibratory hammer and places it on top of the caisson. The heavy lift helicopter then removes all equipment when installation is complete.

Ground Based Vibratory Caisson and Hammer Unit

Helicopter Based Vibratory Caisson and Hammer Unit

Structure Erection – At structures with access, tubular steel structures will be hauled to the site utilizing the temporary access routes previously established. The steel structures will be erected on the vibratory caissons using a crane sitting on the work platform.

At difficult access locations, a heavy lift helicopter will transport the tubular steel pole in sections (based upon the lift capacity of the helicopter) and attach to the vibratory caisson foundation or previously set lower section. Prior to erection, these poles will be stored in a nearby marshalling yard and then flown to the site in multiple "picks". Each structure will likely require 2-4 picks to complete installation.

Wire Stringing – Wire stringing in the wetland areas will use similar techniques to those on the remainder of the Project in including using a helicopter to string the lead line prior to pulling conductor.

Linemen climb the structures and erect temporary work platforms supported off of the structure to attach the conductors to the insulators. Linemen, tools, temporary work platforms and small material will be transported to these three structures by helicopter.

Where truck access is available, linemen will work from truck mounted portable work platforms to attach the conductors to the insulators. The truck mounted portable work platforms will utilize the temporary access routes and work areas previously established.

Before and After Photos of Work in Wetlands

ATC and NRC have provided photographic documentation of ATC's Elvoy Bog wetland construction. Dairyland Power has conducted similar successful projects.

Before

After -- Spring

After – Early Summer

After – Fall

Appendix B:
Q-1 Rebuild Environmental Sheet Maps

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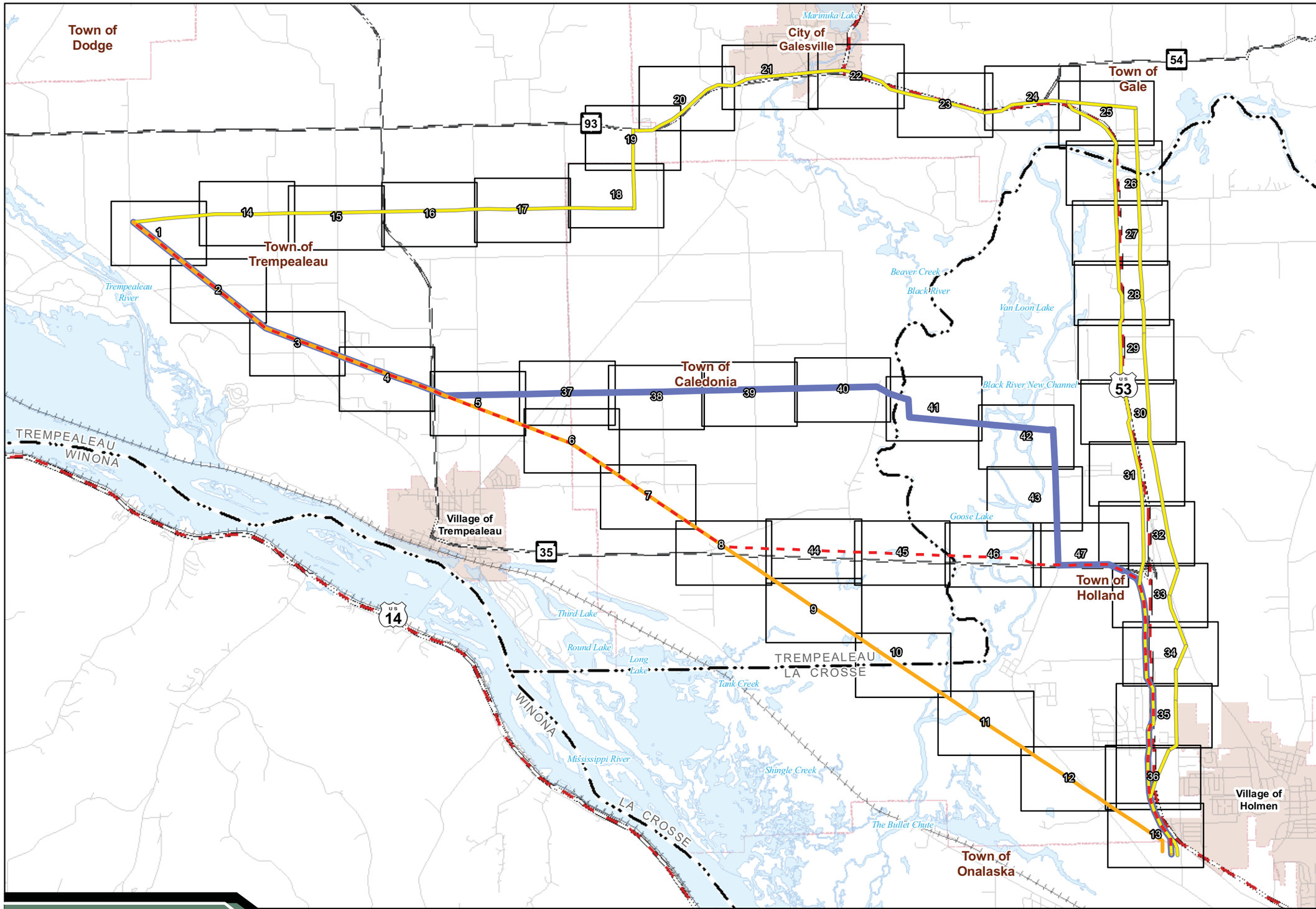

Project Overview

Legend

Proposed Transmission Line Alternatives

- Q1-Highway 35 Route
- Q1 Route
- Q1-Galesville Route plus 161 kV Route
- Seven Bridges Route

Highways (BTS)

- Interstate Highway
- US Highway
- State Highway

Jurisdiction (WDNR)

- City or Village
- Town

0 1 Miles

Data Sources: WDNR, WisDOT, BTS, PSCW, LMIC, Census
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Xcel Energy • Dairyland Power Cooperative • Rochester Public Utilities • WPPI Energy • Southern Minnesota Municipal Power Agency

Q1 Rebuild
Environmental Features

November 2011

Sheet Map 1

Legend

Proposed Transmission Line Alternatives
- Q1-Highway 35 Route
- Q1 Route
- Q1-Galesville Route plus 161 kV Route
- Seven Bridges Route
- Access Route (Not available for Seven Bridges Route)

Right of Way
- Q1 161 kV Rebuild ROW
- HRL 345 kV ROW or Double-Circuited ROW

Identified Natural Resources
- Wetlands Delineated from Aerial Interpretation
- Field Sketched Wetlands
- Field Sketched Open Water
- Field Sketched Waterway

Water Features (FEMA, WWI)
- FEMA Floodplain
- Wisconsin Wetland Inventory

WDNR 24K Hydrography (WDNR)
- Intermittent Stream
- Perennial Stream
- Waterbody

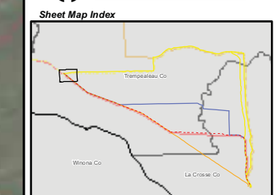
NRCS Soils Survey Data
- Hydric Soils
- Possible Hydric Inclusions
- Non-Hydric Soils

Jurisdiction
- State
- County
- Section
- City, Village or Town

Distribution Lines
- Xcel Distribution Line
- Riverland Distribution Line
- Proposed Substation Siting Area

0 400 Feet

Sheet Map Index



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Q1 Rebuild
Environmental Features

November 2011

Sheet Map 2

Legend

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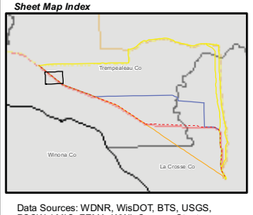

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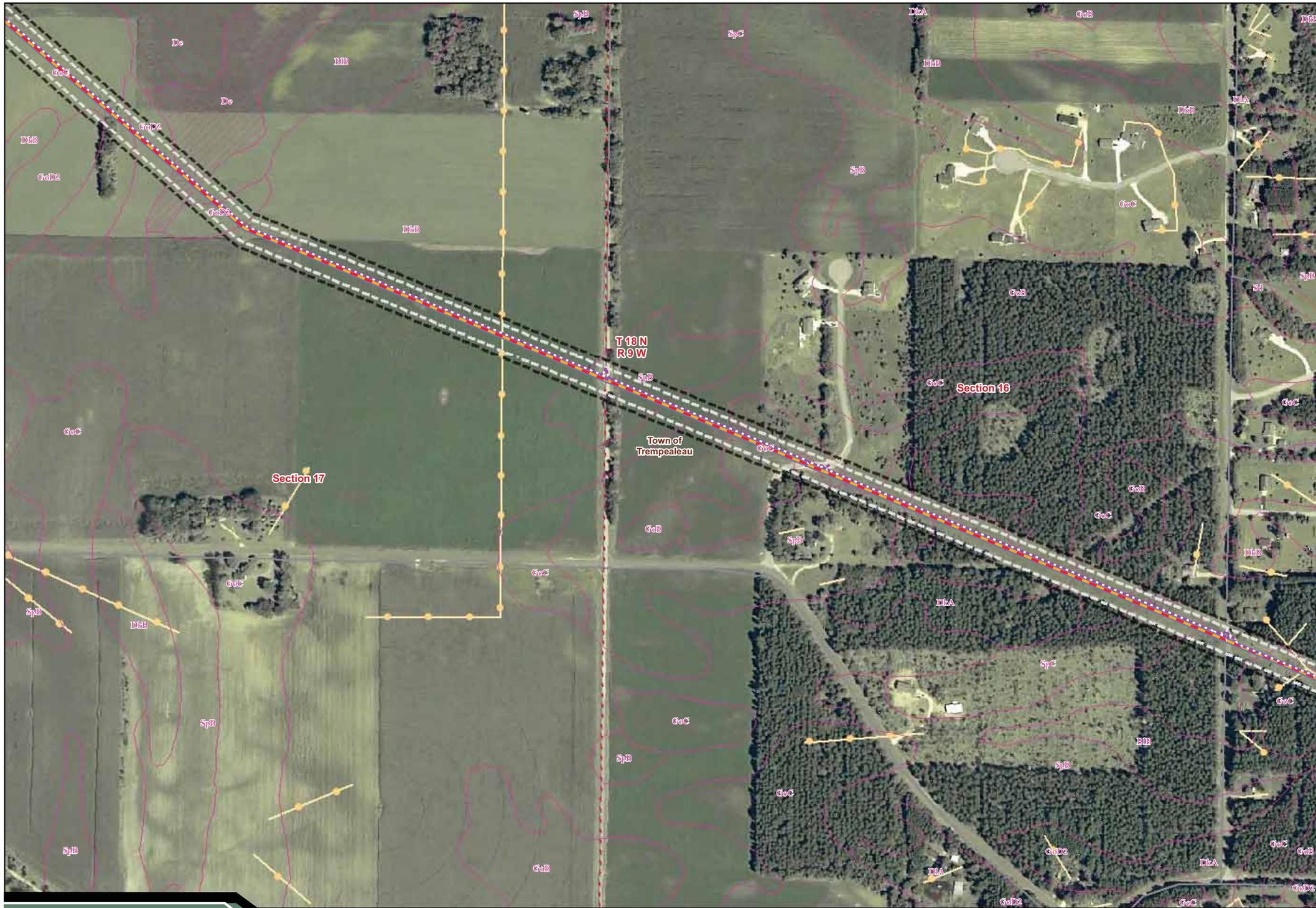
Q1 Rebuild Environmental Features

November 2011



Sheet Map 3

Legend

Proposed Transmission Line Alternatives
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- Proposed Substation Siting Area

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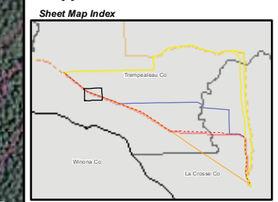

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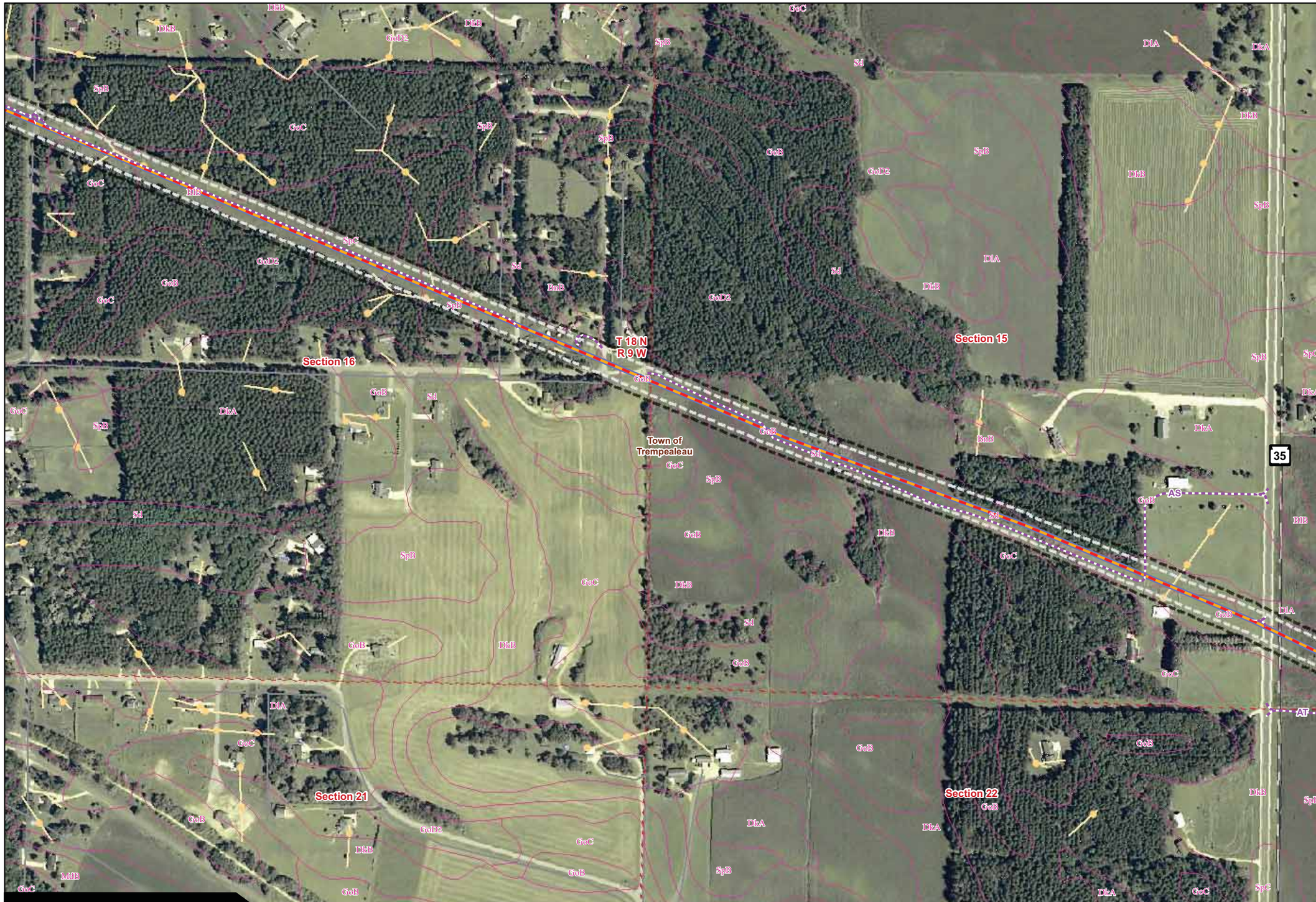
Q1 Rebuild
Environmental Features

November 2011



Sheet Map 4

Legend

Proposed Transmission Line Alternatives
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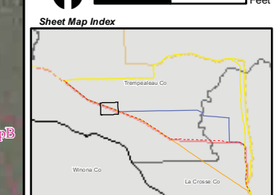

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CapX2020

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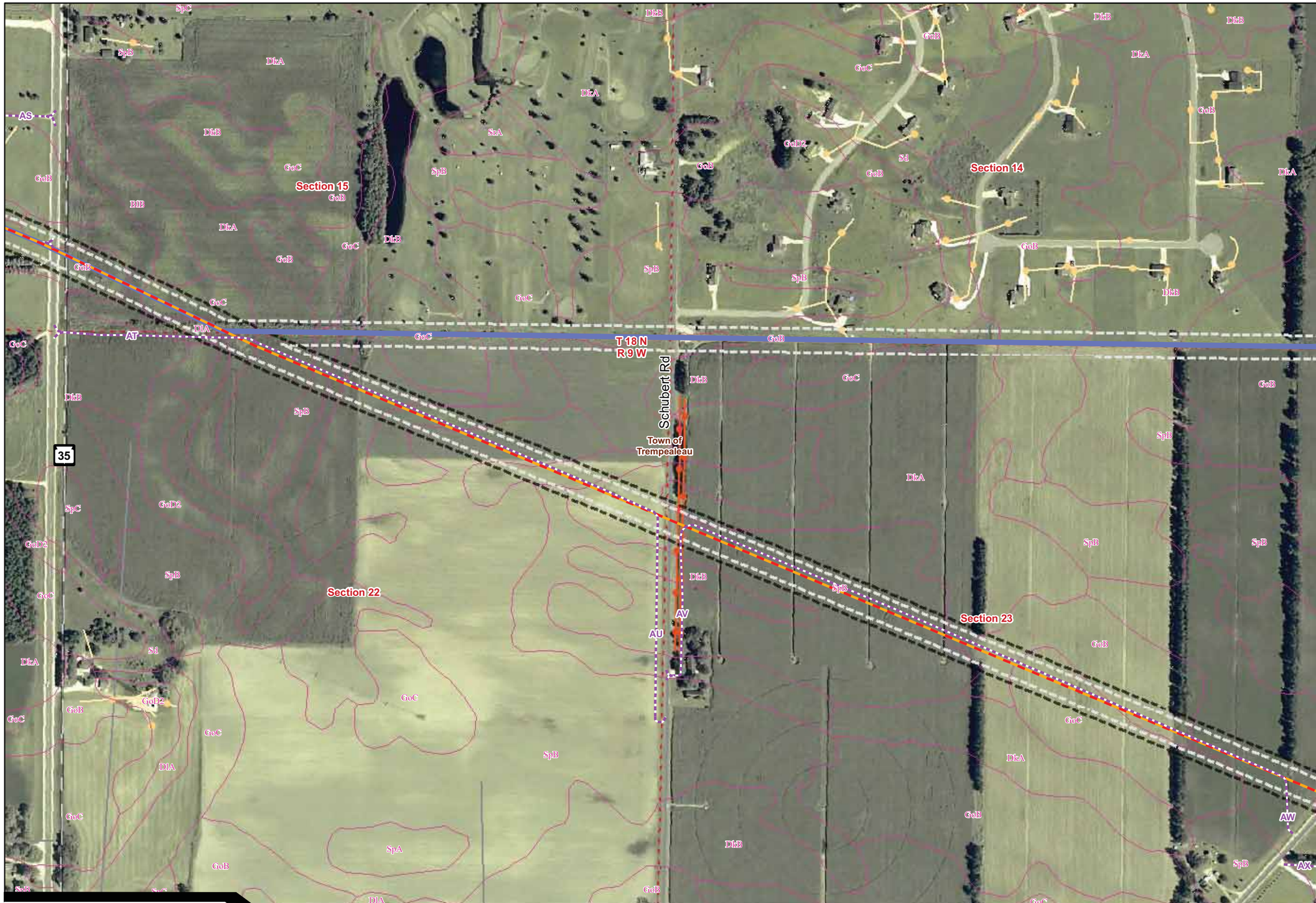
Q1 Rebuild
Environmental Features

November 2011



Sheet Map 5

Legend

Proposed Transmission Line Alternatives
- Q1-Highway 35 Route
- Q1 Route
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- Seven Bridges Route
- Access Route (Not available for Seven Bridges Route)

Right of Way
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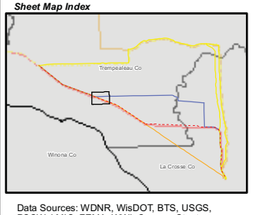

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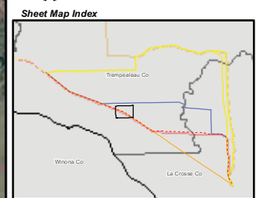

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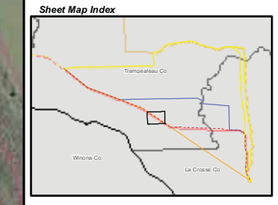

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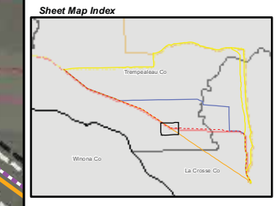

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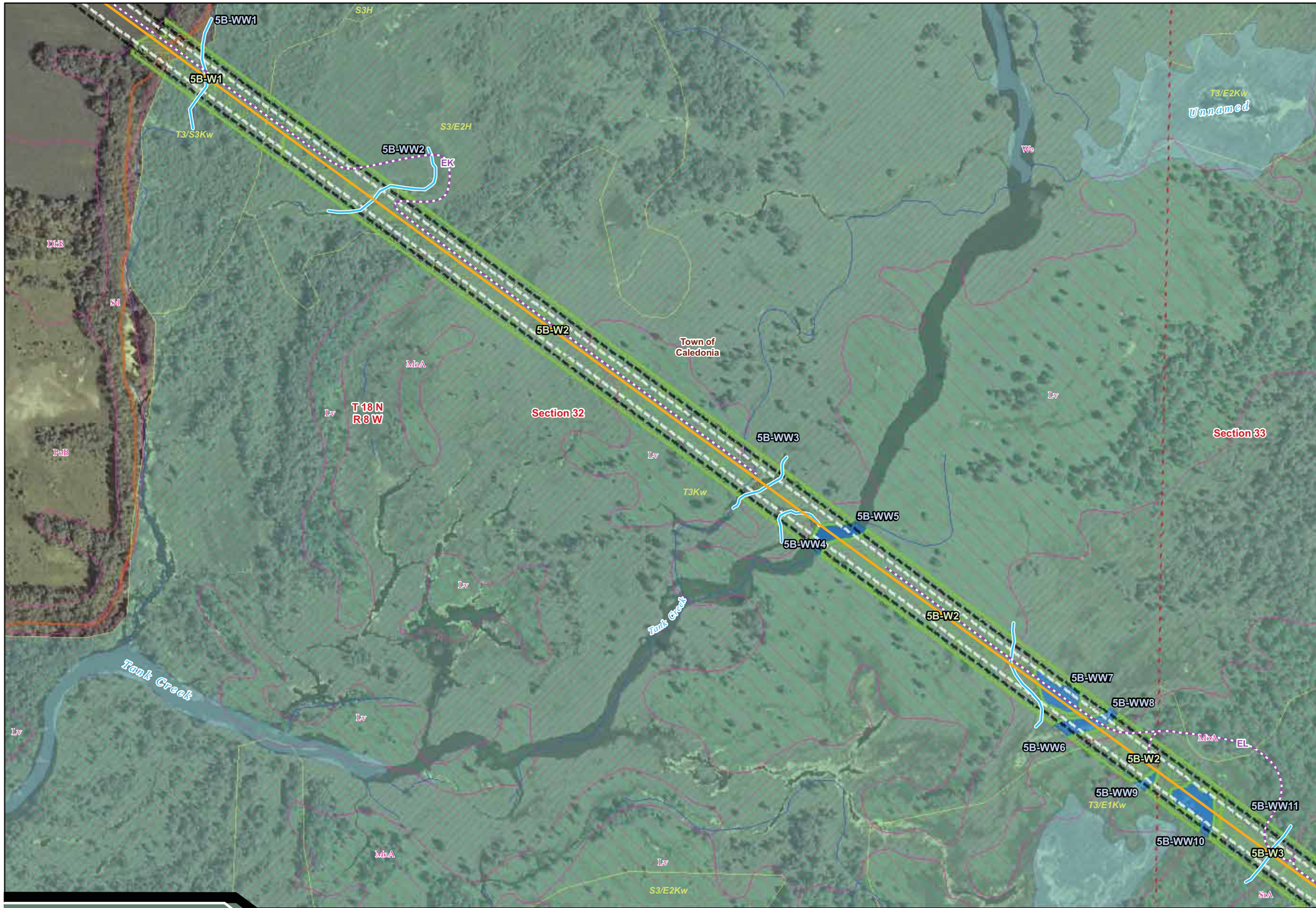

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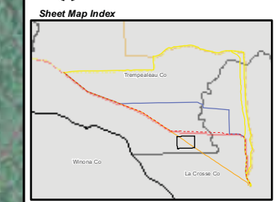

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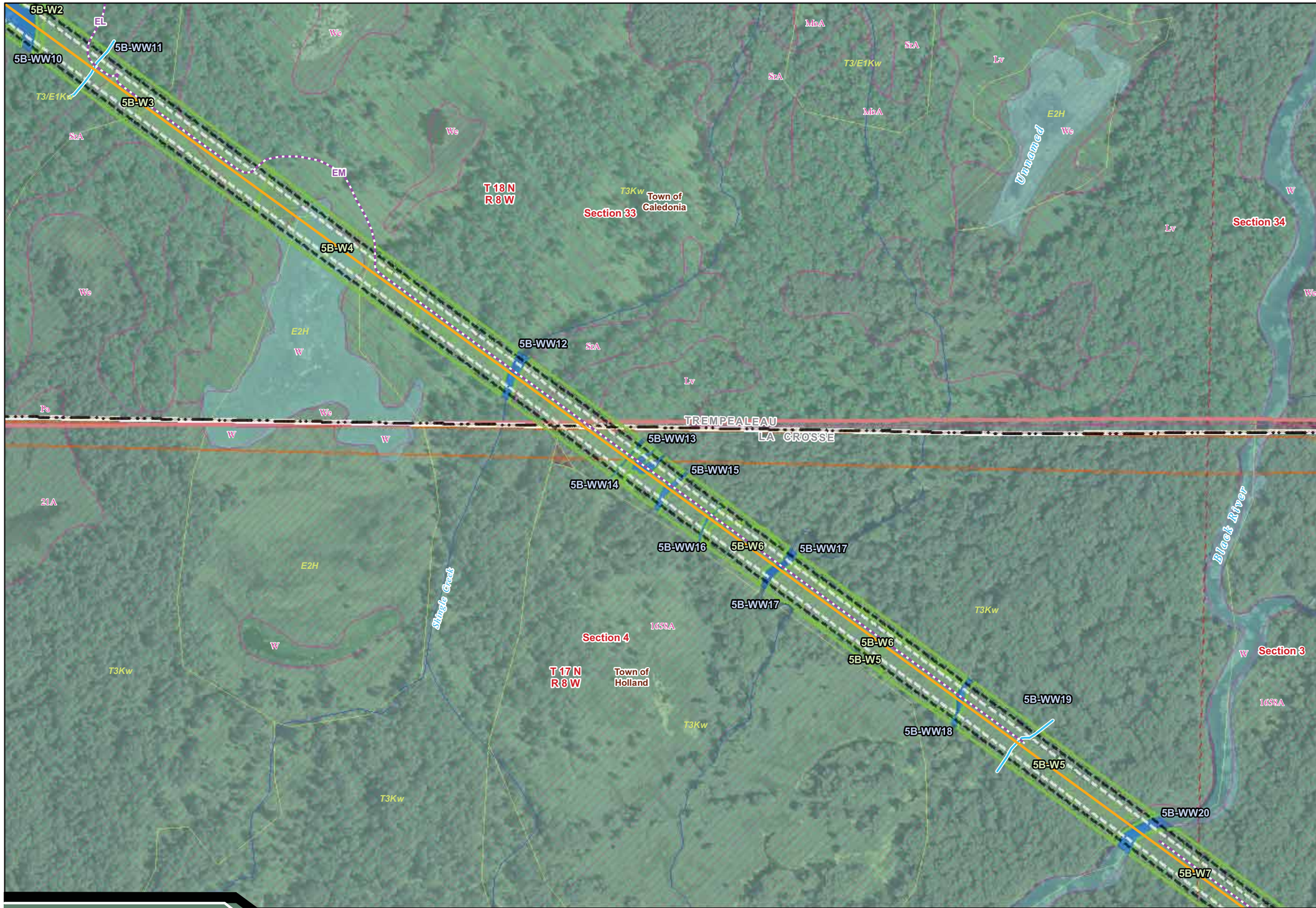

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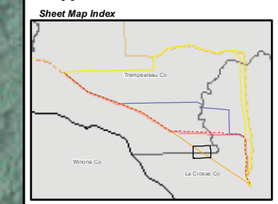

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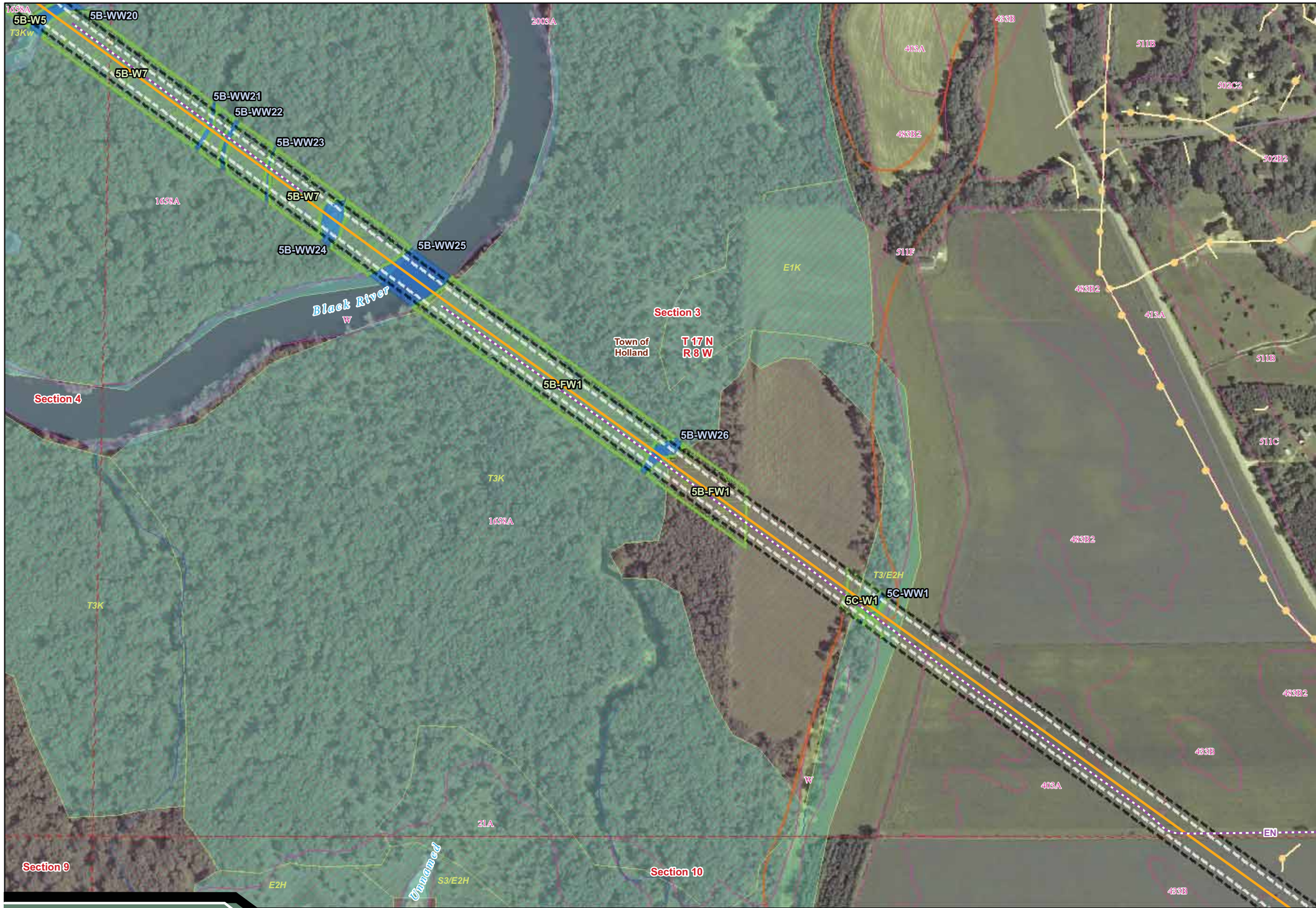

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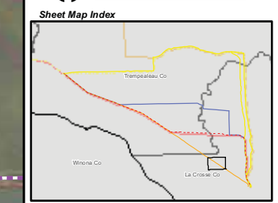

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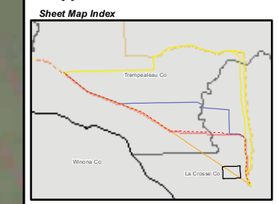

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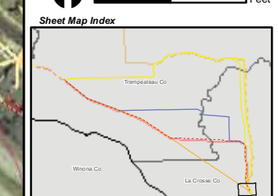

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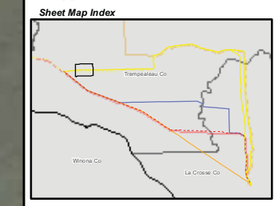

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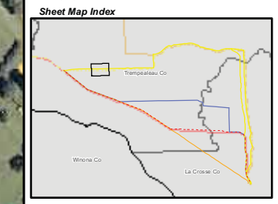

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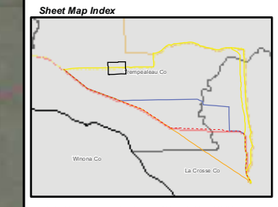

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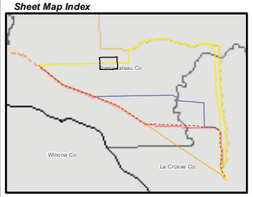

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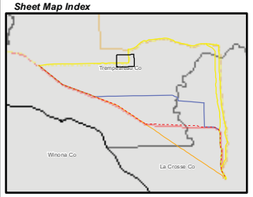

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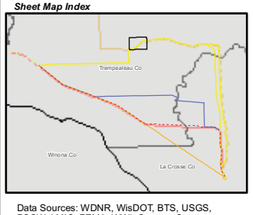

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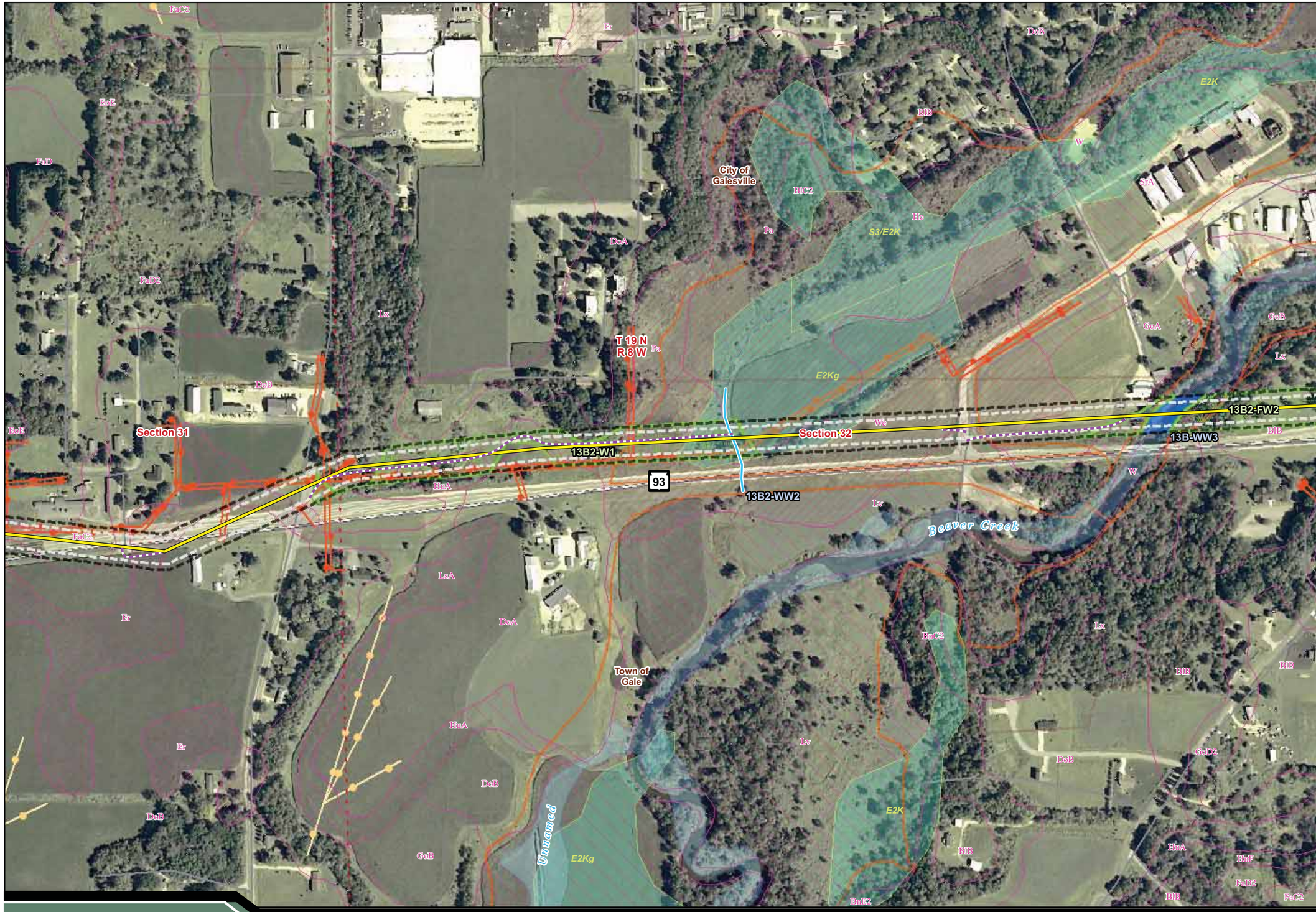

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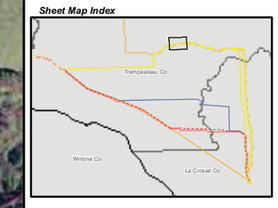

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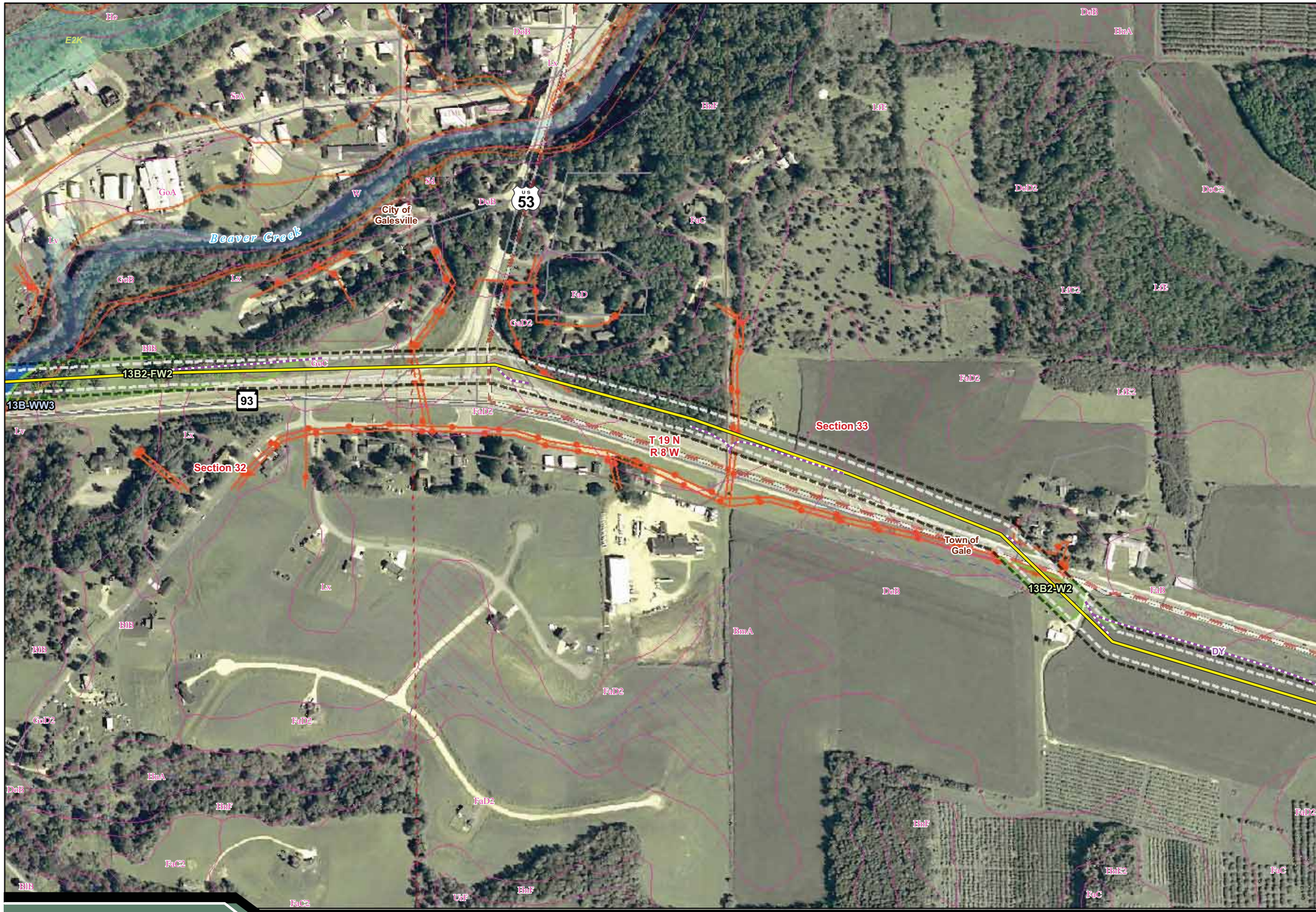

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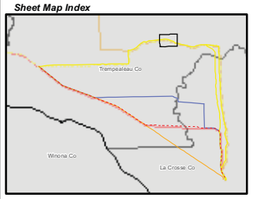

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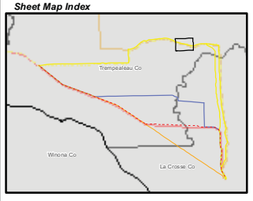

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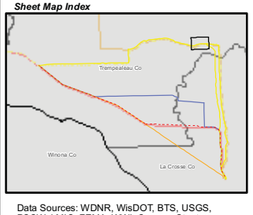

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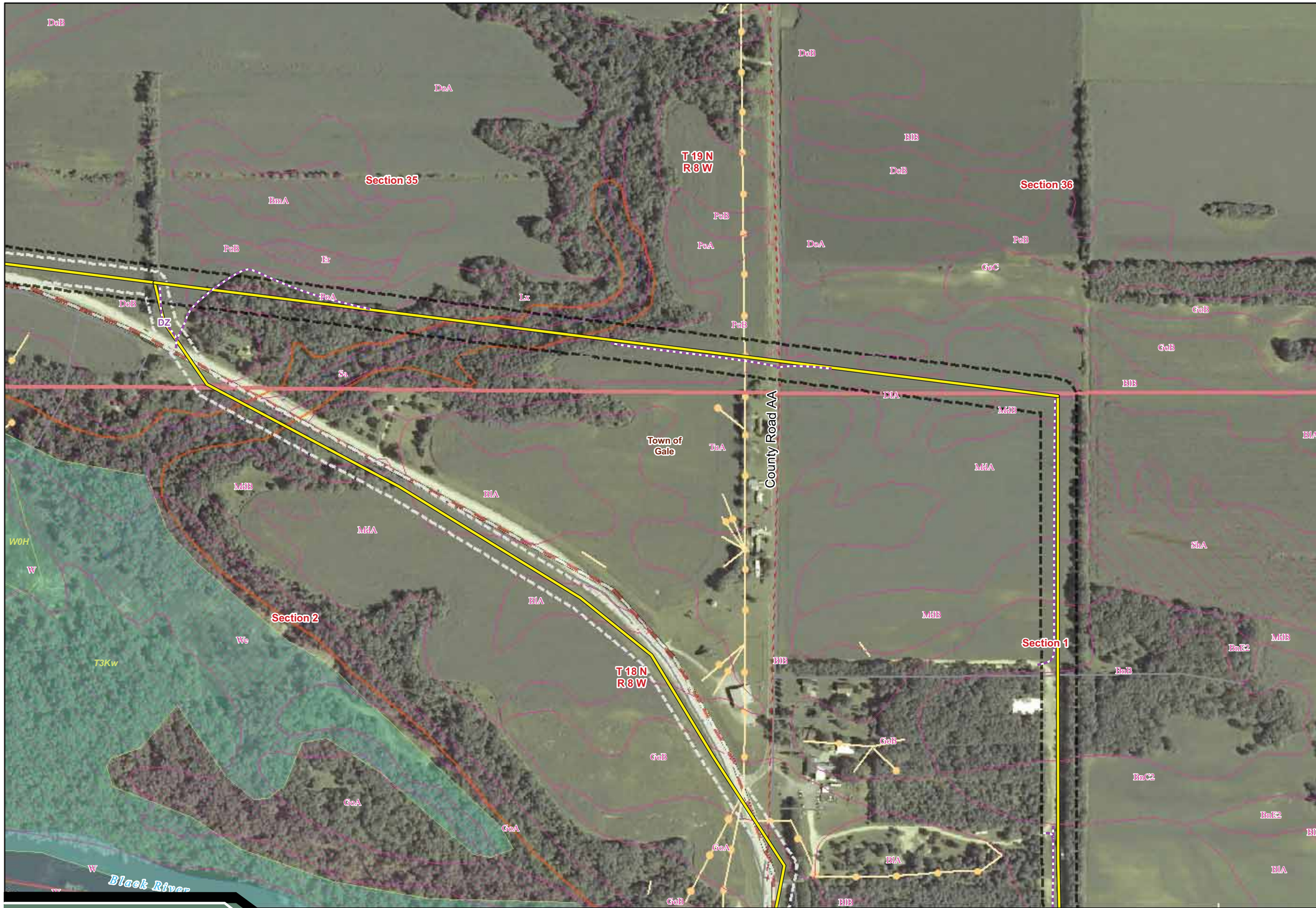

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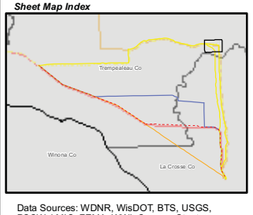

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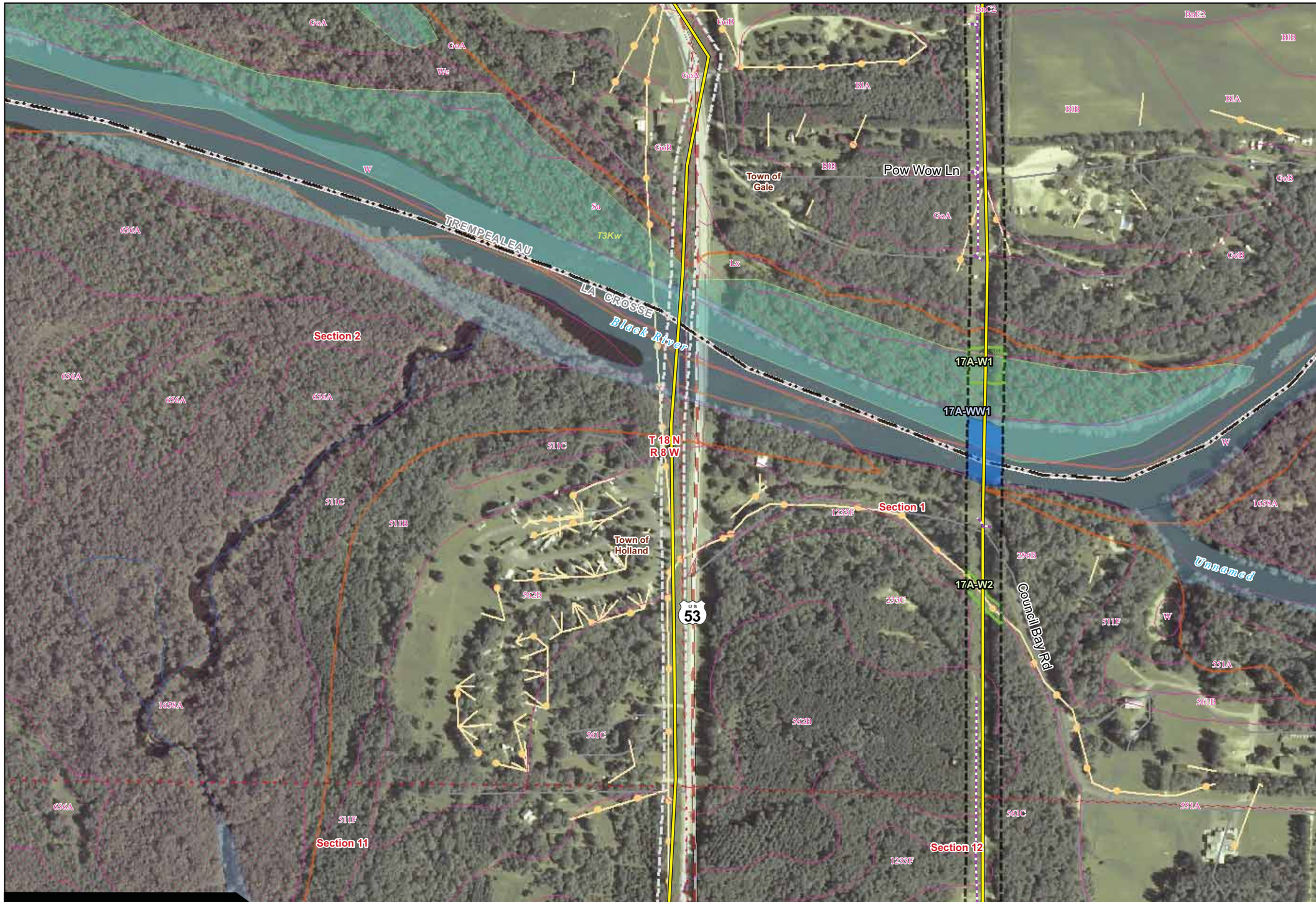

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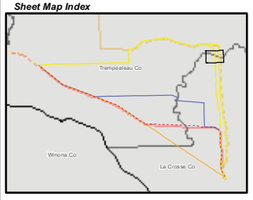

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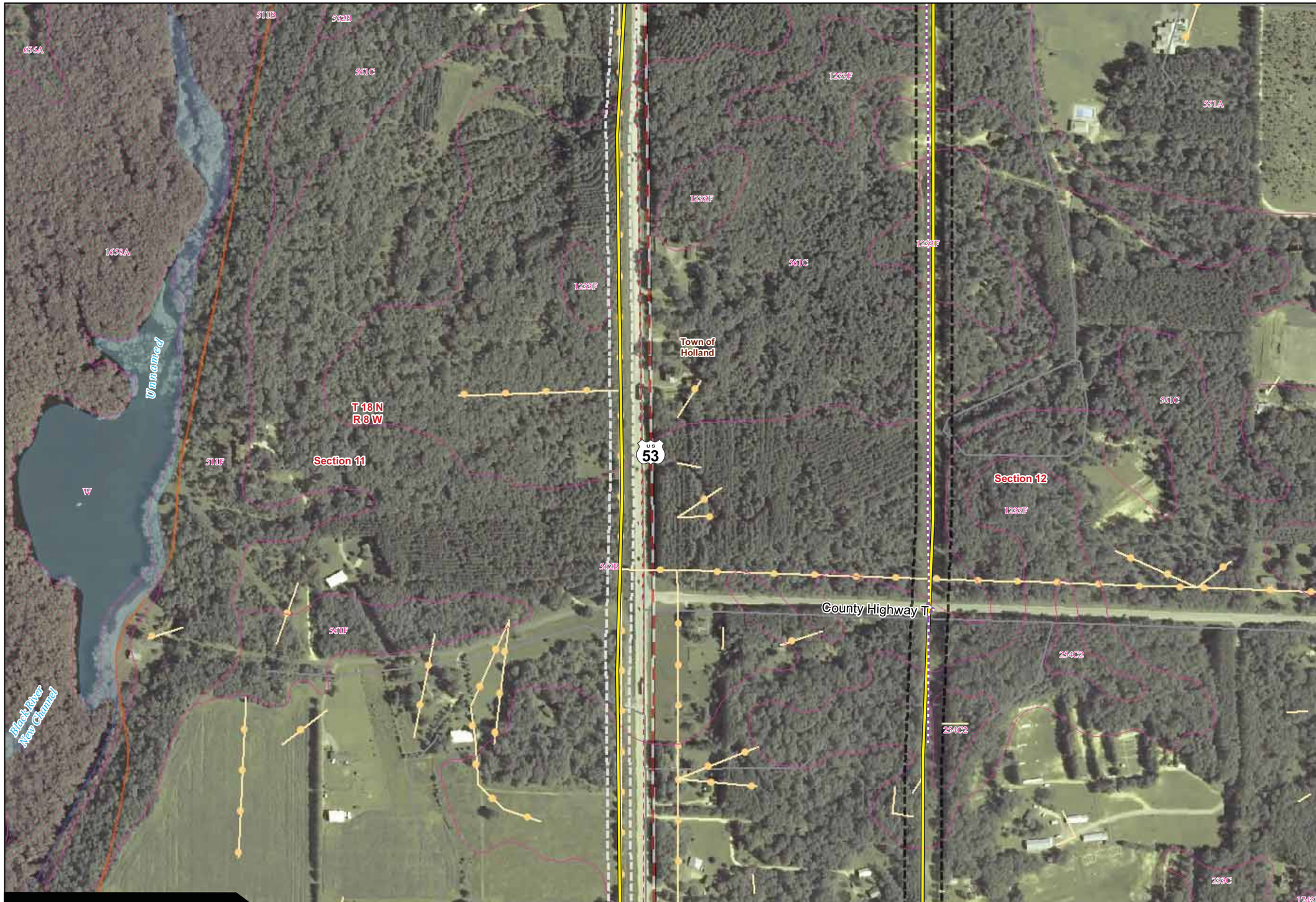

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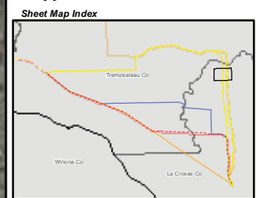

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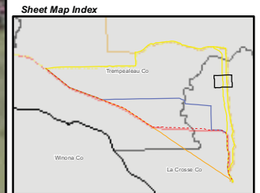

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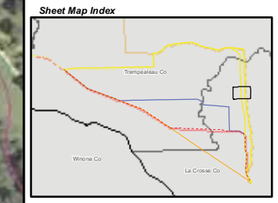

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Q1 Rebuild Environmental Features

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Sheet Map 30

Legend

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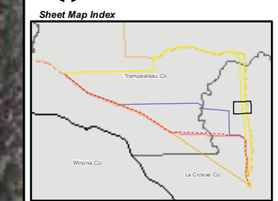

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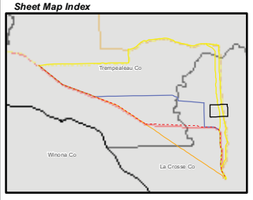

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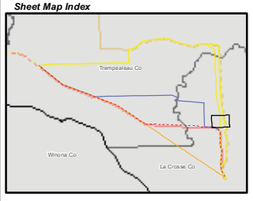

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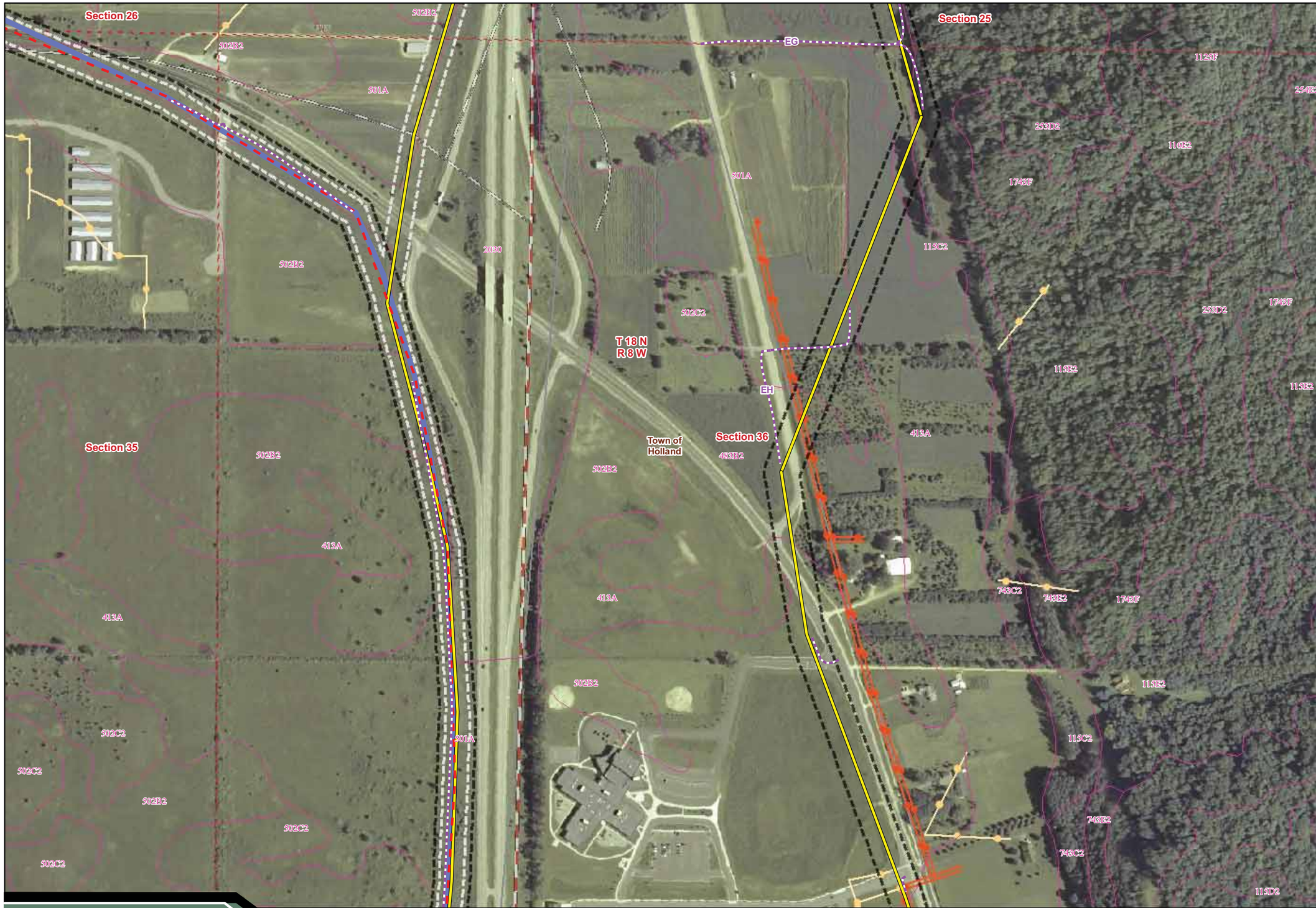

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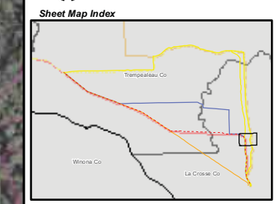

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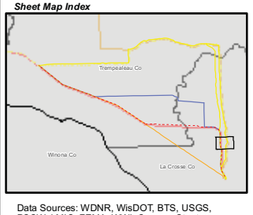

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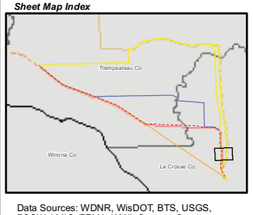

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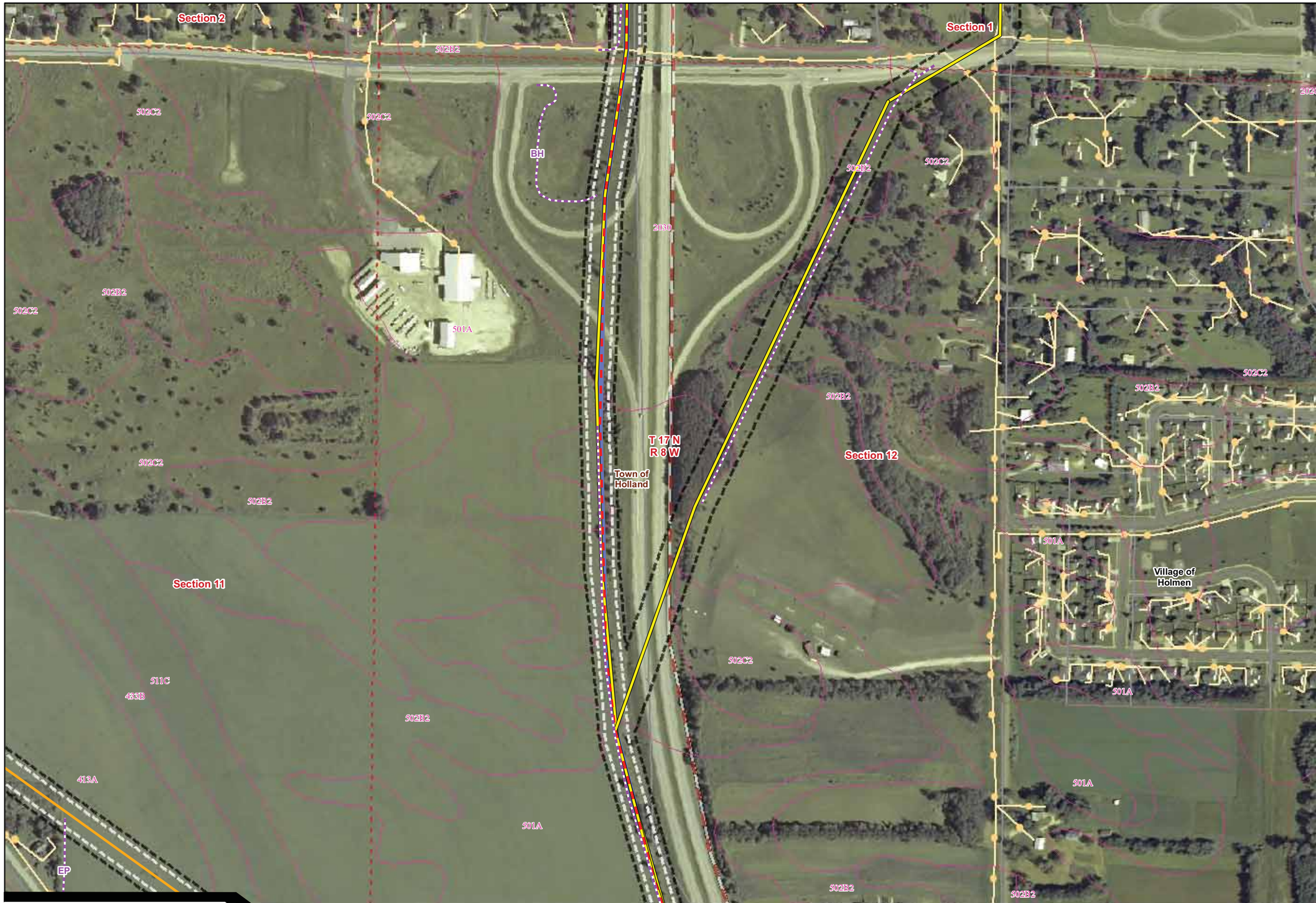

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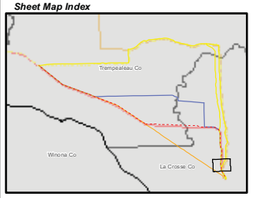

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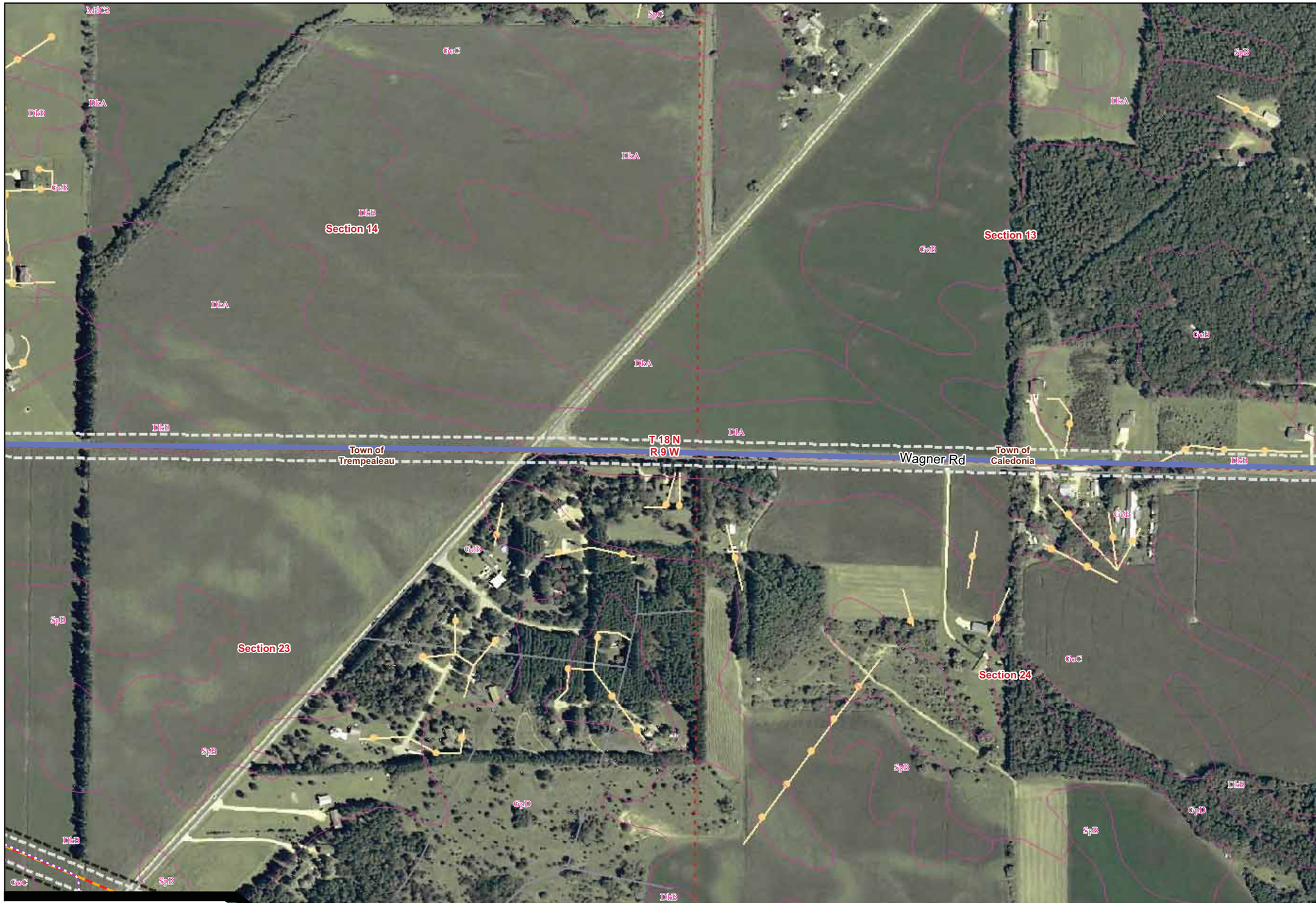

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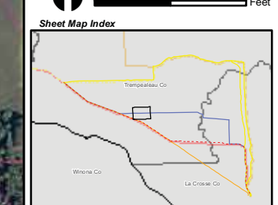

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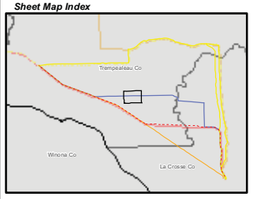

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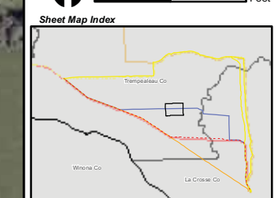

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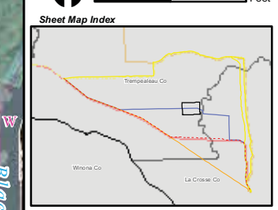

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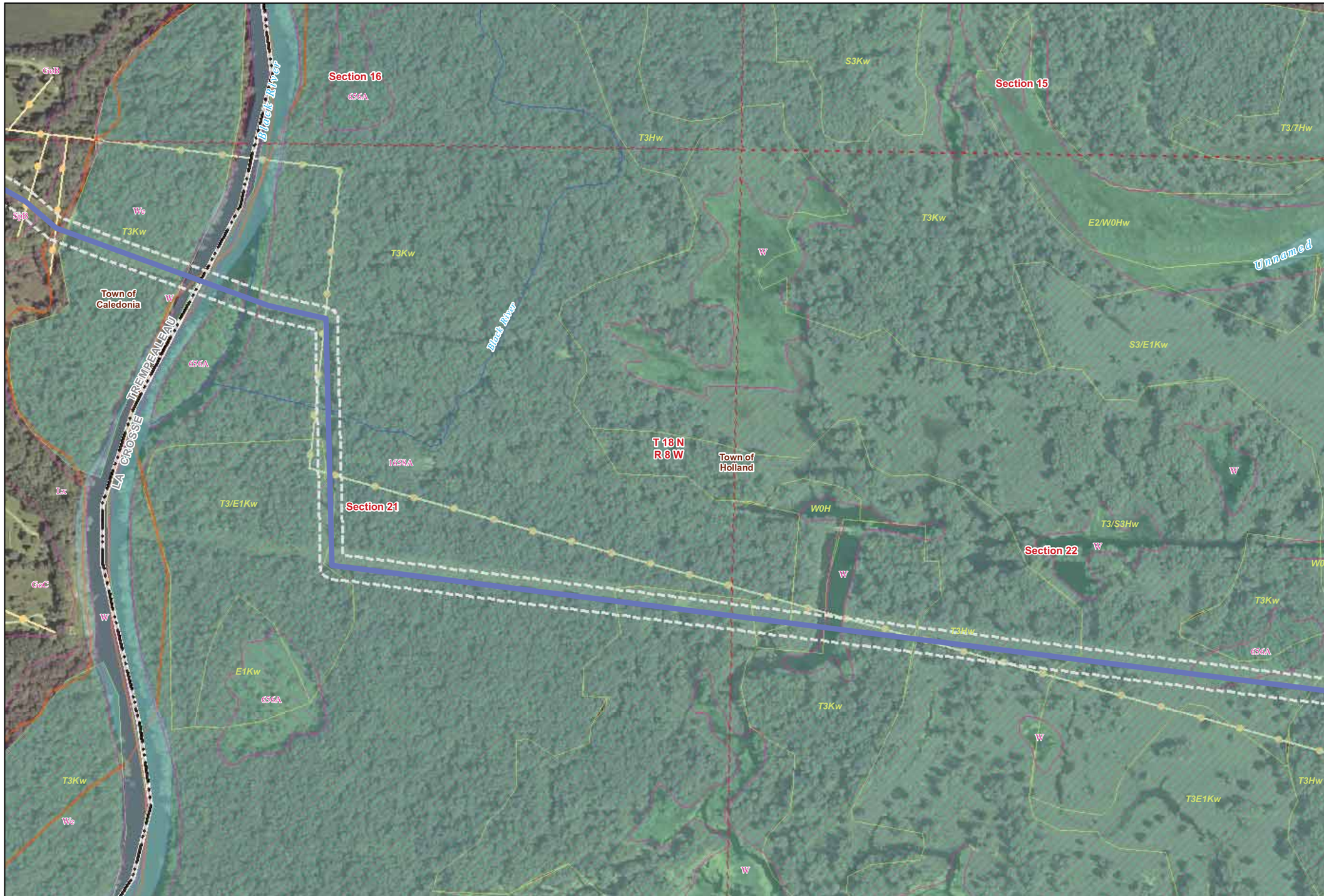

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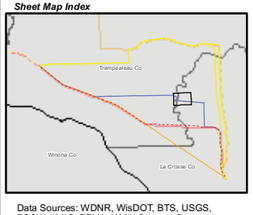

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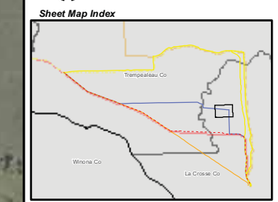

Data Sources: WDNR, WisDOT, BTS, USGS, PSCW, LMIC, FEMA, WWI, Census, Stantec

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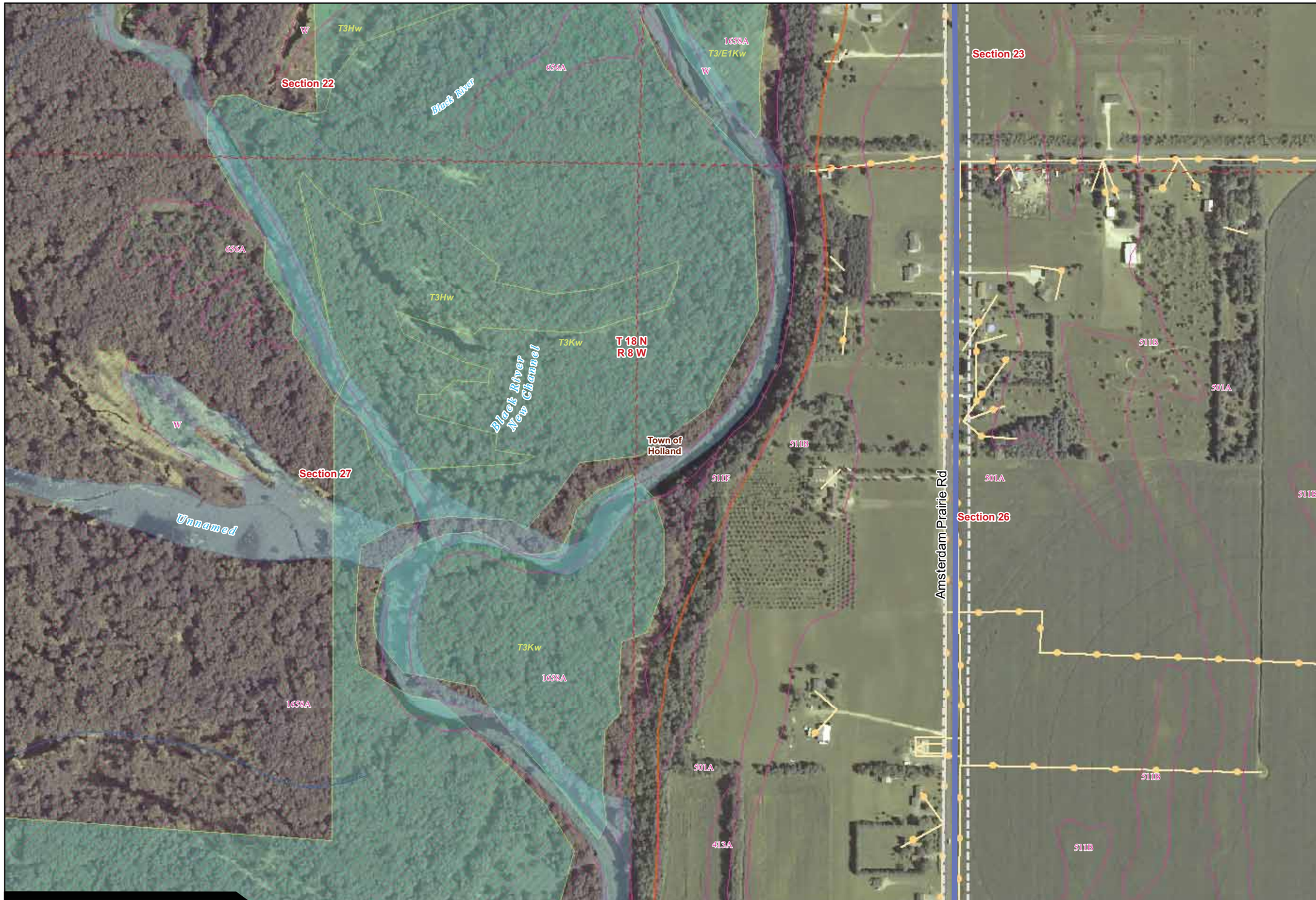
Q1 Rebuild Environmental Features

November 2011



Sheet Map 43

Legend

Proposed Transmission Line Alternatives
- Q1-Highway 35 Route
- Q1 Route
- Q1-Galesville Route plus 161 kV Route
- Seven Bridges Route
- Access Route (Not available for Seven Bridges Route)

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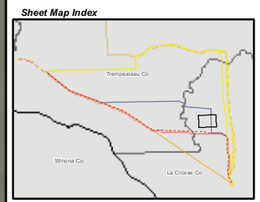

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Q1 Rebuild
Environmental Features

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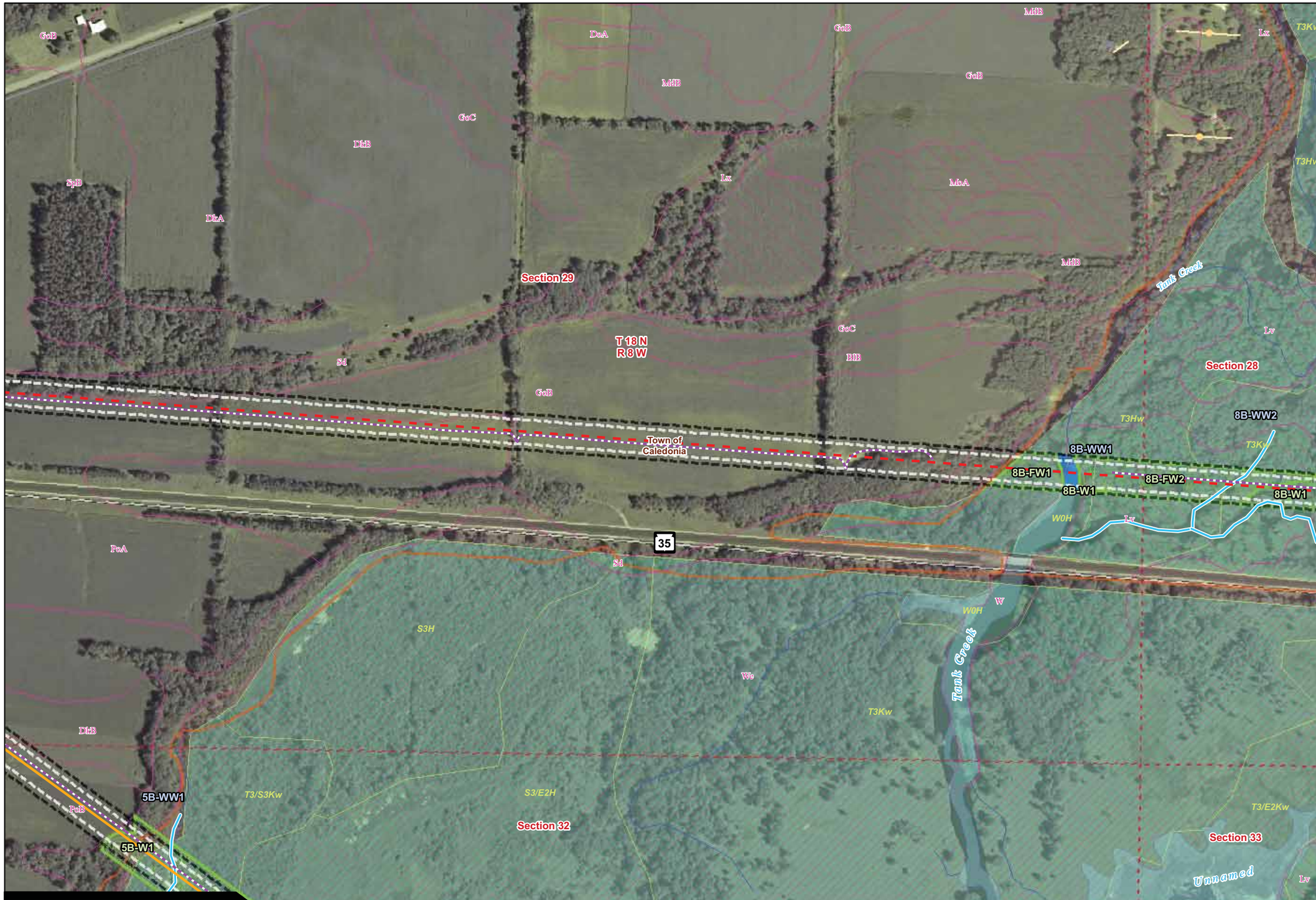

Sheet Map 44

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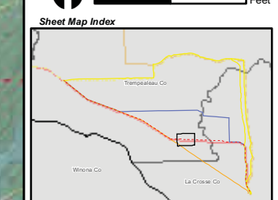

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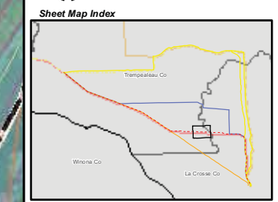

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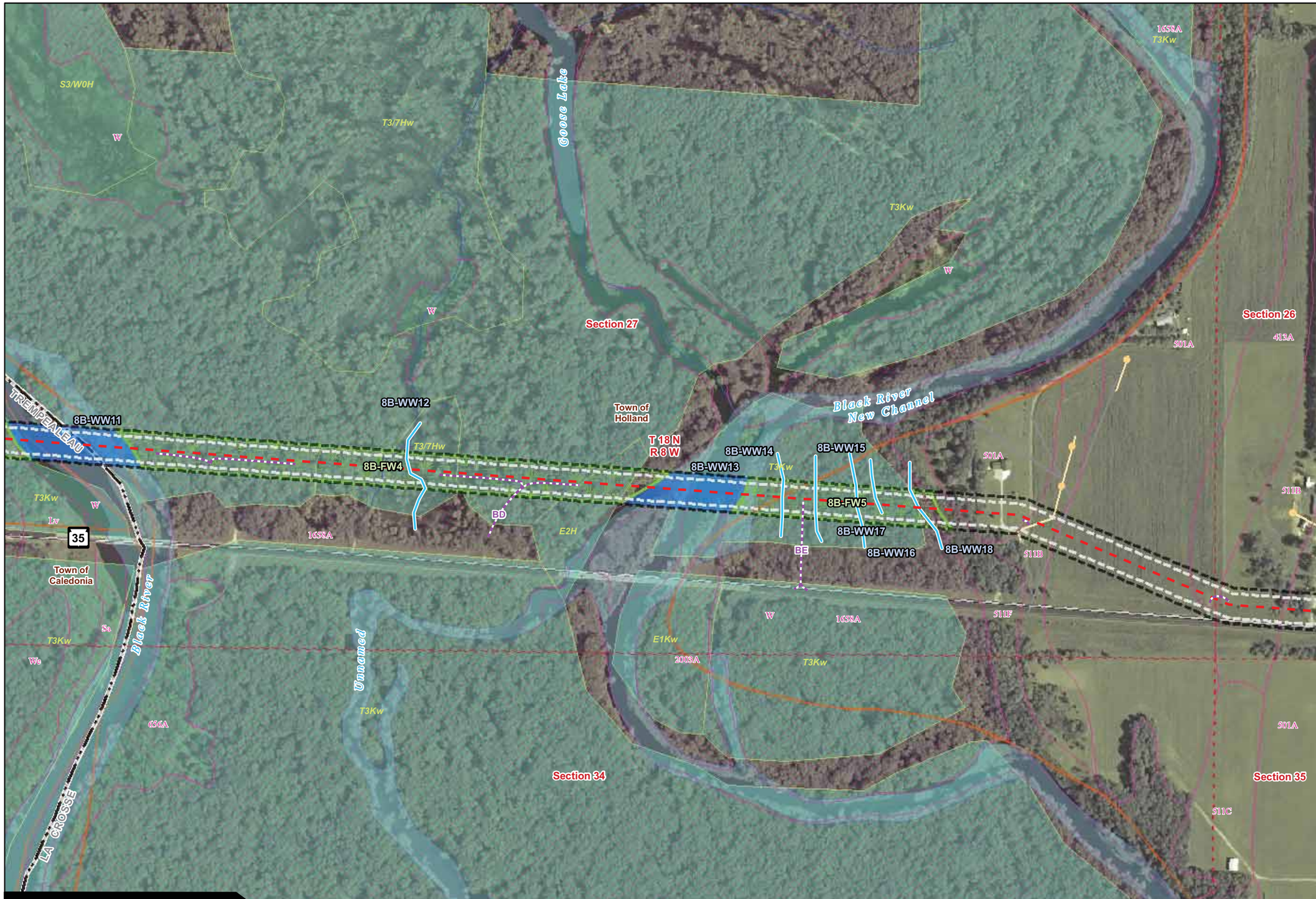

Sheet Map 46

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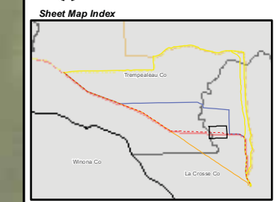

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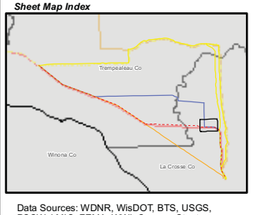

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